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An integrated approach to ex-post impact assessment

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ACIAR IMPACT ASSESSMENT SERIES

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Cover image: For more than 2 decades, Landcare activities have addressed soil erosion, which is a key problem in the sloping agricultural fields of the Philippine uplands. Farmers work in a community garden in the province of South Cotabato, Mindanao, where ongoing ACIAR-supported research is based on the Landcare model. Photo: Jeoffrey Maitem

Foreword

The international partnerships that underpin research supported by the Australian Centre for International Agricultural Research (ACIAR) aim to improve the productivity and sustainability of agricultural, forestry and fisheries systems in partner countries. Through this research Australia contributes to improving food security, food system resilience and the livelihoods of smallholder farmers in the Indo-Pacific region. Importantly, this research also helps improve the Australian agricultural innovation system, with flow-on benefits to rural industries and regional communities.

The ACIAR 10-Year Strategy (2018–2027) sets out commitments to build the organisational learning culture, broaden the range of impacts ACIAR is able to report on and improve our ability to assess and communicate performance and results at the portfolio-level. Assessing impacts and progress against development objectives such as improving nutrition, gender equity, mitigating and adapting to climate change and improving scientific and policy capabilities among partners means evaluating much more than agricultural yields or gross margins per hectare. Delivering on this commitment involves adding more tools to our impact evaluation toolkit. We need new approaches that are fit for purpose to evaluate the multiple and complex benefit streams that modern agricultural research for development seeks to catalyse.

In commissioning this impact evaluation, ACIAR and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) designed a process that would enable us to jointly review, identify, develop and apply impact assessment approaches that explore multiple impacts of complex agricultural research for development investments, including economic, social, environmental, policy and capacity impacts.

The evaluation framework that the team cooperatively developed draws from and adapts methods from the evaluation, impact assessment and organisational learning literature. It seeks to strengthen the process of preparing for and implementing an integrated *ex-post* impact assessment, particularly for complex and systems-oriented projects.

In the framework development and application, the joint evaluation team of CSIRO, PCAARRD, the University of the Philippines, Los Baños and Visayas State University modelled both the technical application of a mixed-method evaluation and the reflective, multi-loop learning that is a core element of organisational learning. The resulting case study generated rich insights for the development and application of integrated, mixed-method impact evaluations.

As the world commits to the 17 Sustainable Development Goals (SDGs) under the United Nations Agenda 2030, we need better ways of tracking and measuring progress that can comprehend the full suite of social, environmental, economic and ethical dimensions. Importantly, these new frameworks and tools need to be useful for, and able to be implemented by, partners in low- and middle-income countries.

This Australian–Philippines collaboration is a valuable addition to the evaluation toolkit with much wider international relevance and applicability.

Andrew Campbell
Chief Executive Officer, ACIAR

A group of farmers working in a hillside vegetable garden, in the province of South Cotabato, Mindanao. ACIAR and PCAARRD programs have used the Landcare model over 2 decades to engage communities to improve agricultural livelihoods and land management. Photo: Jeoffrey Maitem

Foreword (PCAARRD)

Impact assessment has been integral in the Department of Science and Technology – Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) monitoring and evaluation initiatives to ensure effective research and development (R&D) governance and social accountability. As the apex organisation for R&D in agriculture, aquatic and natural resources, the Council has been supporting impact assessment studies to determine significant impacts of public R&D investments and improve effective R&D management policies.

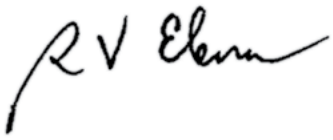
Impact assessment initiatives have provided DOST-PCAARRD with a decision support in setting R&D policies, priorities and directions that give light to whether a project merits continuation, scaling up or redesigning—a step crucial in target setting and R&D agenda planning. Impact assessment studies have also provided the Council an institutional mechanism to account for science and technology investments and justify continuous R&D funding.

DOST-PCAARRD shares with the Australian Centre for International Agricultural Research (ACIAR) this commitment to impact assessment endeavor, since 2007 when the Council published its 'Impact Assessment Guidelines' that became the local reference of the DOST- and PCAARRD-supported impact assessment projects. Adapted from the ACIAR impact assessment framework, this set of guidelines was based on a conventional economic cost:benefit framework in capturing outcomes and impacts of R&D investments. While these guidelines are robust and substantial, the economic framework to examine the full spectrum of outcomes and impacts of R&D outputs may be limited, as qualitative dimensions are not fully captured. Cognisant of this shortfall, the Council collaborated anew with ACIAR, this time together with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), University of the Philippines Los Baños, and the Visayas State University, to develop a mixed-method approach to impact assessment.

The mixed-method approach guides impact assessment teams in assessing impacts beyond the quantitative economic dimension—establishing internal and external validity and assessing indirect, unexpected, long-term and multi-dimensional impacts of R&D projects. Most importantly, this approach to impact assessment has been tailored to the Philippine context to generate comprehensive and in-depth results useful in packaging succeeding programs and in developing policies.

This publication intends to guide researchers on the application of the mixed-method framework and presents experiences and lessons from its initial application to three ACIAR-supported programs:

1. Landcare Program in the Philippines
2. Development of Sustainable Production System for the Darag Chicken (*Gallus gallus domesticus*) in Western Visayas
3. Improved and Sustainable Value Chains for Mango Production in the Philippines and Australia.



Dr Reynaldo V. Ebora
Executive Director, DOST-PCAARRD

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Abbreviations

ACCA	Adapting to Climate Change in Asia project
ACIAR	Australian Centre for International Agricultural Research
AECI	Agencia Española de Cooperación Internacional
AR4D	agricultural research-for-development
ATT	average treatment effect of the treated
BAFTECH	barangay farmer-technician
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FGD	focus group discussion
ha	hectare
ICRAF	World Agroforestry Centre
KASA	knowledge, attitude, skills and aspirations
KII	key informant interview
km	kilometre
LFPI	Landcare Foundation of the Philippines Incorporated (primary focus of ACIAR Landcare's program for ensuring sustainability)
LGU	local government unit
MMAIA	mixed-method approach to impact assessment
MSC	most significant change
NVS	natural vegetative strip
PCAARRD	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
PILAR DAM	Pilar Improvement through Landcare and Resource Development and Management
PHP	Philippine peso
RD&E	research, development and extension
SE	standard error
SEARCA	Southeast Asian Regional Centre for Graduate Study and Research in Agriculture
SLG	small Landcare group
UPLB	University of the Philippines, Los Baños
VSU	Visayas State University

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This document represents a significant journey for all those who have been involved in it. Our thanks to the extended team for their willingness to come along and try something different, and their patience as we worked it out.

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For input and guidance in crafting the MMAIA Framework applied in the Philippine research (Part 2) and support to project implementation, we would like to thank Dr. Ernesto O. Brown and Dr. Fezoil Luz C. Decena of PCAARRD.

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Summary

Agricultural research-for-development projects are increasingly complex, multi- or transdisciplinary and occur in dynamic settings. These projects often involve interconnected interventions that aim to deliver long-term impacts. Although there is an abundance of frameworks to guide assessments of the overall impact of these projects, examples that integrate more holistic and multidimensional approaches to assessing livelihood, economic, social and environmental impacts are harder to find.

This framework adapts methods from the evaluation, impact assessment and organisational learning literature. It seeks to strengthen the process of preparing for, and implementing, an integrated ex-post impact assessment with complex and systems-oriented projects in mind, in recognition of the wide array of resources available for guiding the design of impact assessments for more simple projects.

Mixed-method approaches to impact assessment are necessary to understand the impact pathways and appraise the resulting impacts and capacity development among research partners and communities.

To harness the full potential of mixed methods, we need to look beyond adding qualitative methods to an economic assessment (for example). We need to reframe the types of questions that are asked, how data are collected, and how data analysis from across different disciplines is integrated to give a more nuanced and richer picture of the various types of impacts that have resulted from agricultural research-for-development projects.

In developing this guide, we hope to contribute to the thinking and cultural change required to support this process.

This work has been a collaborative and iterative process between the:

- Commonwealth Scientific Industrial Research Organisation (CSIRO)
- University of the Philippines, Los Baños (UPLB)
- Visayas State University (VSU)
- Philippine Council for Agriculture and Aquatic and Natural Resources Research and Development (PCAARRD).

Teams met regularly over 18 months to discuss and share insights from the literature and our own experiences, as a basis for common understanding of what such a framework needed to cover, integrating practical examples and tools. Part 1 of this document presents the framework that resulted from these discussions.

To test and refine the framework, it has been applied to examine the impacts of the Australian Centre for International Agricultural Research (ACIAR)-funded Landcare projects in the Philippines. The application by the VSU and UPLB teams highlights the need for flexibility and adaptiveness in approaches, to reflect different organisational contexts and priorities.

Drawing on the framework in Part 1, UPLB and VSU articulated their own process, tailoring an approach to suit their context and skills, and to help define research activities. Part 2 presents the results of this.

Though there is momentum towards new ways of defining, measuring and reporting on impact, in reality this represents a long-term organisational change agenda to support integrated approaches. Having a framework that seeks to enable multiple impacts to be assessed with integrated approaches is useful to provide guidance, but is not sufficient on its own.

In commissioning and planning for integrated approaches to impact assessments, the following considerations apply:

- Establishing a shared understanding of impact is critical.
- Organisational norms and structures may need to shift to accommodate integrated approaches.
- Integrated approaches are likely to require more time, more resources, teams with different skills, and new ways of working together.

This document is structured in two parts:

- Part 1 provides a framework to guide an integrated approach to ex-post impact assessment. It includes insights and lessons from the process of collaboratively developing this framework and in trialling such an approach.
- Part 2 provides an example of how the framework was applied to the Landcare projects in the Philippines. This section details the UPLB and VSU experiences in implementing the integrated approach to impact assessment outlined in Part 1. This section also includes reflections and implications from the Philippines team, based on their experiences implementing the approach.

PART 1
An integrated approach to ex-post impact assessment

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By expanding standard and widely applied approaches to ex-post impact assessment, an integrated framework was able to demonstrate social and environmental impacts, which often cannot be translated into an economic value. Photo: Nikki Cordero

1 Introduction

There is a growing acknowledgment within organisations that conventional economic frameworks or guidelines to evaluate research impact, though important, do not capture the full spectrum of outcomes and impacts that flow from agricultural research-for-development (AR4D) investments. This includes the Australian Centre for International Agricultural Research (ACIAR) and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD).

This document is the result of a collaboration exploring how to overcome this challenge, between the Commonwealth Scientific and Industrial Research Organisation (CSIRO), University of the Philippines Los Baños (UPLB), Visayas State University (VSU) and PCAARRD.

Our task was to expand standard and widely applied approaches to ex-post impact assessment to encourage or guide greater consideration of other social and environmental impacts, many of which cannot be meaningfully quantified or translated into an economic value. This includes more inclusive and transparent markets or improved ecosystem health.

As such, this framework has had to set out a broad process for:

- identifying and considering the types of impact that may be considered
- providing guidance on how to integrate insights from qualitative and quantitative methods to allow for a better recognition of the breadth and depth of impacts (especially those not easily quantified).

Designing an ex-post impact assessment framework is challenging. By nature, AR4D projects:

- are diverse
- take place in vastly different contexts
- tackle different problems from different entry points
- have a range of different planned (and unplanned) outcomes and impacts that go well beyond the commonly measured farm productivity and increases in household income.

There are also no guarantees about the availability of data from the project being assessed, from which the impact assessment can draw.

Expanding the approach to ex-post assessments will likely bring together larger teams spanning different disciplines and perhaps including stakeholders as key team members. Finding a common understanding among the team is fundamental to the task, including shared understanding and values for how and why the assessment is undertaken. These elements are less tangible, but can influence the design, effectiveness and use of an assessment.

The approach outlined is not novel, nor is it intended to provide a standard recipe of how to do integrated mixed-method impact assessment. Its purpose is to explore the value of mixed-method approaches to impact assessment to capture impacts, and to provide guidance on alternative approaches and how these can be integrated to support more nuanced and deeper understanding of impact.

It provides a framework for thinking about different types of impacts and impact pathways, and the different options for exploring and capturing these impacts. This is not to exclude economic, or quantitative assessments, which are likely to remain at the core of many impact assessment methods.

It is important to note that while our focus is on ex-post impact assessments (assessments that occur many years after projects have finished) these assessments are just one part of the broader monitoring evaluation and learning cycle. Many of the principles, tools and approaches that are discussed in this document are either already commonly used as the basis of monitoring evaluation and learning systems in projects and programs, or would be of value in supporting them.

Ideally, impact assessments would be able to draw on the original monitoring evaluation and learning information from the project being assessed—project documents, monitoring data, end-of-project evaluations—but this is not always the case. Even where such data exist, they may not be easily accessible to impact assessment teams.

The guide is intended for use by experienced researchers with an understanding of monitoring and evaluation approaches, but for whom an integrated approach is likely to be novel. As with other impact assessment frameworks, it requires professional judgement by researchers on how best to adapt and adjust the application of the framework for their project or case and the resources available.

This work has been a collaborative and iterative process between CSIRO, UPLB, VSU and PCAARRD. Teams have met regularly over 18 months—reviewing current approaches to impact assessments, developing this framework, and applying it to an impact assessment of ACIAR-funded Landcare projects in the Philippines. The framework development and application were done in an iterative process, with the UPLB and VSU teams' experiences in applying the framework used to modify and refine it.

Part 1 of this document articulates a theory-based approach to impact assessment. It starts with a rationale for the new approach, considering the changing needs of impact assessment. Section 3 sets out the conceptual and theoretical principles that guide the application of the framework. Section 4 provides guidance on how to plan for and implement the approach. Section 5 captures some of the insights and lessons learned in the process of developing the framework, drawing out implications for others interested in trialling such an approach.

2 Agricultural research-for-development and changing needs of impact assessments

Over the past 60 years, there have been significant changes in the expectations, goals and approaches that guide AR4D.

Since the Green Revolution, which focused on technology transfer to improve production of staple food crops, the scope of AR4D has broadened to include development goals such as improved nutrition, gender equity, social inclusion, healthy ecosystems and environmental sustainability (for example, Byerlee, de Janvry and Sadoulet 2009; Feldman and Biggs 2012). This expanding mandate has required new approaches to how we undertake AR4D projects, embracing participatory processes, co-production of knowledge, collaboration and partnership across a range of scientific disciplines and knowledge-types, and approaching problems from a systems perspective.

As the scope and approaches to AR4D change, so too does the way in which we define and measure research impact, and how the results of impact assessments are used (Maredia et al. 2014).

Acknowledging the limitations in quantifying some types of outcomes and impacts, there has been greater interest in the use of qualitative methods, including participatory methods, to better capture the breadth of impacts achieved.

The use of qualitative methods also enables a deeper analysis of the processes that have led to impact, which has contributed to an interest from commissioning organisations to consider the value of impact assessments for institutional learning that drives change and improvement (ACIAR 2018). To meet these multiple goals, ex-post impact assessment frameworks need to be able to draw on, and integrate, different methods and perspectives.

This framework is a response to these changes, and an effort to guide a different approach to ex-post impact assessments that encourages integration of diverse perspectives and a greater emphasis on learning and improvement.

This is not to say that all projects are suited to, or require, a more integrated approach. Rather, that impact assessments need to be designed appropriate to the context, outcomes, impact and complexity of the project[1] being assessed. Considering the type of project being assessed, and the aim of the assessment or how it will be used by stakeholders, is critical to scoping the impact assessment.

2.1 What type of project is being assessed?

Impact assessments (and monitoring evaluation and learning systems more broadly) need to be tailored to the scope and anticipated impacts of the project being evaluated, and the resources available. Depending on the type of project:

- there will be different types of impact at different scales
- there may be uniform or adapted approaches to achieving that impact at different project sites
- there may be direct or highly contingent and non-linear pathways to achieving impact (for example, Rogers 2009).

Figure 1 provides a characterisation of the spectrum of work addressed in AR4D projects, acknowledging that although the scope of R4D has broadened, there are multiple approaches or types of projects, and that each has its own contribution to make.

The y-axis indicates degrees of complexity in how problems are defined, from simple to complex. The x-axis infers the required research approaches to meet that complexity. 'Bounded' or simple R4D focus on a set of components in the system, usually with a single-discipline or technical focus, with a tightly defined, often linear pathway to impact, focused on transfer of knowledge (for example, crop genetic improvement).

1 We use the word 'project' to refer to an investment that seeks to create change, but 'program' or 'intervention' would also be appropriate.

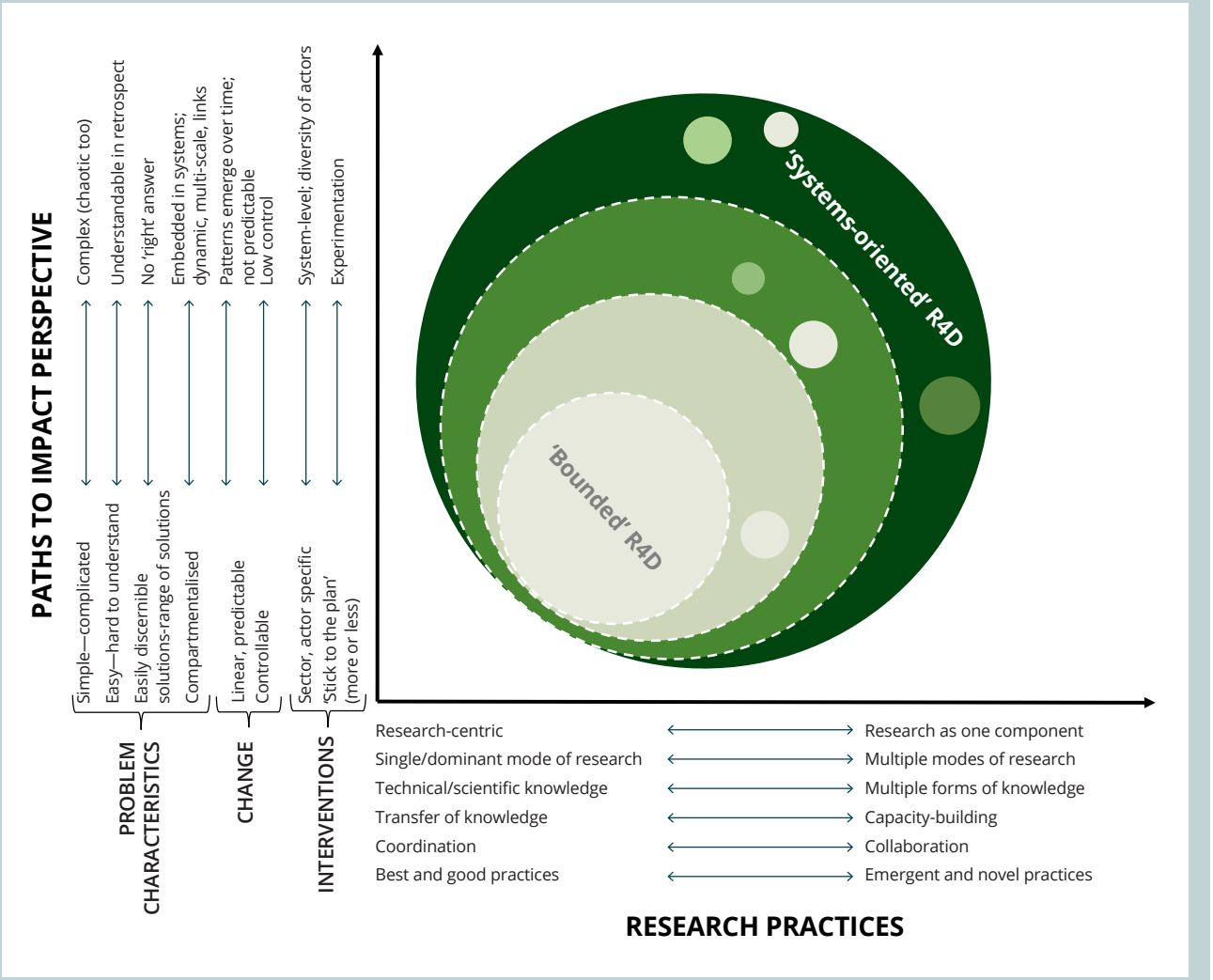


Figure 1 The nexus between research practices and impact: considerations for international R4D
Source: Stone-Jovicich et al. 2015, p. 10.

In contrast 'systems-oriented' or complex AR4D projects take a systemic approach to fostering change. These projects often work at multiple scales to have impact, and often research is just one component within a broader set of actions to reach the desired impact (for example, the Philippines Landcare work). These projects usually involve a wide range of stakeholders and have more complex impact pathways that require a focus on capacity, institutional and policy changes. Likewise, these projects often require much larger investments of resources and time.

The degree of the complexity and context of the project being assessed will determine the kind of impact assessment that is suitable. Importantly, the more systems-focused the project, the more expensive and time consuming it is to undertake a rigorous, integrated impact assessment.

Table 1 presents a summary of how impact assessments may differ for different types of projects, and highlights some design considerations for ex-post assessments.

We can roughly equate the terminology in Figure 1, such that 'bounded' R4D projects relate to 'simple' interventions, and 'systems' equate to 'complex'.[2]

For example, in simple projects that are linear and generally predictable, impact may be easily anticipated and clearly defined by the actors involved.

2 Rogers discusses complicated interventions as almost in continuum with complex interventions, rather than an easily distinguishable separate category.

Table 1 Impact evaluation in simple, complicated and complex interventions

	Simple/bounded	Complicated/complex/systems
Defining impact	Likely to be agreed and more or less similar to what was planned	Definition and perception of impacts likely to be different depending on perspective. Impacts emerge over time and are dependent on multiple interrelated components; may be different to original project plans.
Metrics	Standardised measures possible	Evidence needed about multiple components of the intervention. Metrics depend on context and impacts investigated.
Causality and contribution	Clear counter-factual likely	Non-linear causality. Causality likely to be contingent on context; likely different in different project sites.
Replication	Relatively easy	Site-specific adaptation needed. Can be replicated only when similar conditions can be achieved.

Source: Adapted from Lilja et al. 2010, p. 992.

In complicated projects, with multiple actors working at different scales, there may be different definitions or interpretations of impact, depending on the priorities and perspective of different actors. Complex projects that rely on multiple actors and multiple interacting impact pathways may mean that pre-defining all anticipated impacts is difficult, as they often emerge as the project evolves (Rogers 2009). Impact assessments of complex projects need to account for the many interactions that may lead to unexpected and unanticipated outcomes and impacts.

As projects become more complex, involving more partners or having multiple, interconnected impact pathways at different scales, the complexities for impact assessments likewise increase.

Straightforward indicators of success become more complicated to anticipate and emerge based on the context and alignment of different factors. The definition of impact itself becomes more contingent on the stakeholders involved (who may have different values and perspectives).

Likewise, the evidence used to measure impact and potential to replicate impact assessment methodologies also look different across the different project types. In particular, the strategies that are appropriate for attributing causality are likely to be more difficult and rely on more qualitative strategies as projects become more complicated and complex (see discussion on 'Establishing causal links' in Section 4.3).

2.2 What is the purpose of the assessment, how will it be used, and by whom?

Within the broader project and program evaluation cycle, ex-post impact assessments provide an opportunity to analyse the consequences of past interventions. This enables us to contrast the changes measured and/or anticipated at the end of a project with what has happened since the project, without the ongoing direct intervention or resources provided by project teams.

Impact assessments are used for different purposes (Table 2). Conventionally, they have been focused on demonstrating transparency and accountability for public spending, and to guide decisions on where or how to invest future funding for greatest benefit.

As competition for funding has increased, impact assessments play a greater role in communicating the value and benefits of AR4D projects to stakeholders and the wider public, often to maintain public support for investment.

For researchers, frustration with slow progress in meeting development goals has also led to greater use of impact assessments to contribute to a better understanding of what works (and what doesn't) to inform continuous improvement in project design and implementation.

For participants and beneficiaries of projects, impact assessments can enable their experiences and views of the project to be incorporated into the assessment process and methods.

Table 2 Different needs fulfilled by ex-post impact assessments

	Accountability	Investment allocation	Advocacy and public support	Learning and improvement
Aim	*Measuring impact:* Meeting requirements for transparency and accountability of use of funds.	*Measuring impact:* Informing future investments based on greatest returns and/or specific target groups.	*Measuring impact:* Generating support for research/ research bodies with stakeholders.	*Improving practice:* Generating greater insights from what has/hasn't worked to draw broader lessons and inform future improvements in design and implementation.
Main audience	*External audience:* Regulators, funding bodies.	*Internal audience:* Strategy or investment boards; program or fund managers.	*External audience:* community, industry and other stakeholders; broader public.	*Mixed:* Researchers, managers, program implementers, donors, broader research and development community.
Information required	Quantitative assessments; scale of impact and potential for further impact.	Quantitative assessments; scale of impact and potential for further impact.	Mixed qualitative and quantitative. Needs to go beyond quantitative assessment to provide narratives and 'human' impacts that speak to interests of diverse stakeholders.	Mixed qualitative and quantitative. Informs constructive critical reflection of what worked and what didn't and how/why actions resulted in impact.
Implications for impact assessments	Quantitative, top-down, clearly defined impacts in economic values; impact focused.	⟷		Mixed qualitative and quantitative. Combination of top-down and bottom-up. Multiple definitions/ types of impact. Impact and process focused.

Note: For the 'implications' row, 'accountability' and 'learning and improvement' can be considered at two ends of a spectrum from quantitative to mixed assessments, as indicated by the arrow.

Source: Modified from Bird 2002 and CSIRO 2015.

Impact assessments rarely have just one aim, and often balance multiple objectives for multiple stakeholders. These may be determined in part by the funding arrangements (that is, the terms of reference or funder priorities), but may not necessarily be limited by them.

For example, the implementing agency for a project that is being 'assessed' may be interested in learning from the findings of the impact assessment to improve their own delivery or practice, and this might be a constructive way to make their participation in the impact assessment more worthwhile (for example, via interviews, sharing of documents, and others).

Likewise, for those who have participated in projects as target beneficiaries (for example, households and communities), impact assessments are an important mechanism to voice their perspectives, reflections and experiences with a project—positive and negative.

Depending on the aims of the impact assessment and the main audiences, there is likely to be different types of information required (Table 2).

While regulators and funding bodies may easily understand the economics of return-on-investment calculations, such information may only partially meet the needs or interest of the industry stakeholders who may be more interested in the detail of how a project has supported vegetable growers or improved market linkages, for example. Identifying specific individuals within different organisations (funders, implementers, beneficiaries) and engaging to ensure the impact assessment meets their needs is central to ensuring the findings will be useful and used.

Ex-post impact assessments also provide an opportunity to increase capacity and understanding in evaluation and provide lessons that may guide ongoing learning and improvement.

Increasingly, AR4D investments are including capacity building as a central component to projects. The focus on capacity building aims to enable communities to adapt, to collectively navigate trade-offs and to drive institutional change, contributing to long-term sustainability and empowerment (for example, Armitage et al. 2011; Berkes 2009; Hummelbrunner and Reynolds 2013).

Figure 2 depicts this deeper approach to learning. The notion of multiloop learning arises from organisational change and social learning disciplines. In the context of AR4D and impact assessment, it can broadly be described as framing social learning that enables structured reflection to understand the complexity and underlying systemic causes of how and why impacts may (or may not) have occurred.

An impact assessment that seeks to document what has changed would focus on the actions of the project being assessed and its effects. For example, it may assess changes in household income as a result of the project. Such 'single-loop learning' refers to learning about the consequences of specific actions, and addresses the question 'are we doing things right?'.

Understanding how that change has occurred enables testing of how the project was designed, its underlying assumptions and how this affected the impact. Such 'double-loop learning' reflects on the underlying rules, norms and governance and asks the question 'what are the right things?'.

Triple-loop learning challenges the fundamental beliefs, values and higher order thinking processes that underpin the project's assumptions and actions, and re-assesses fundamental values and beliefs.

Asking 'what is right?' allows stakeholders to reflect on the enabling or constraining factors (for example, institutional rules and regulations, power dynamics, organisational cultures) and how this has shaped the outcomes and impact. This provides an avenue for co-learning and deeper capacity building (Hummelbrunner and Reynolds 2013), which can then inform future project design and investments.

Incorporating a 'meta-assessment' after an impact assessment process—comparing across impact assessments and trying to derive broader insights—can assist agencies that commission assessments to reflect on the process and results and consolidate lessons. This may inform better R4D projects in the future (Zaveri 2017).

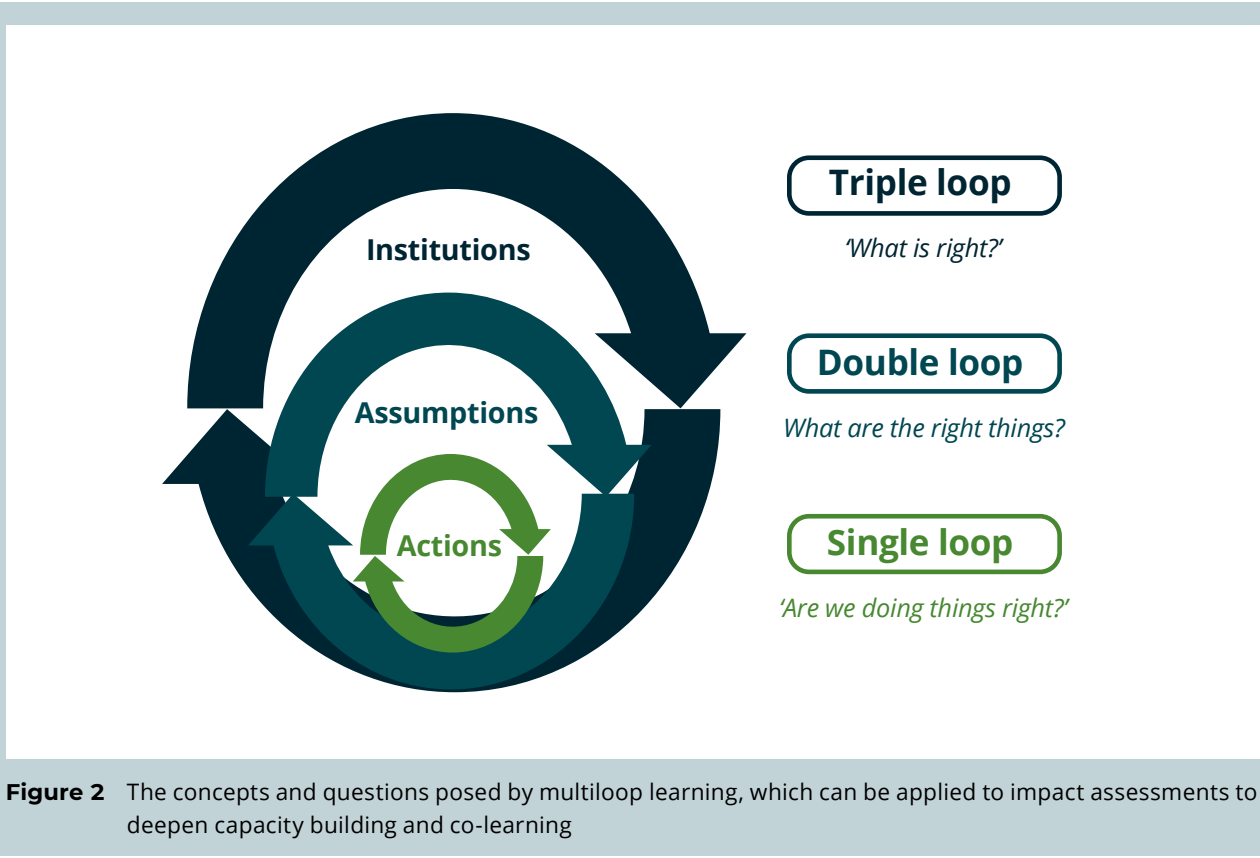


Figure 2 The concepts and questions posed by multiloop learning, which can be applied to impact assessments to deepen capacity building and co-learning

2.3 Implications for the scope and design of impact assessments

The discussion has so far provided a brief overview of how the aims and scope of impact assessments are evolving. The typical questions posed by an impact assessment focused on accountability would generally focus on economic calculations of benefit:cost ratios, or return on investment.

On the other hand, an impact assessment concerned with providing information to generate public support would likely focus on the human stories behind these numbers, asking questions about how benefits have translated in the community.

An impact assessment designed to foster learning would focus more deeply on what can be learned from the strategies and practices of the project (whether successful or not) to inform the design of future projects. Impact assessments will often balance a range of these questions.

The greater interest in understanding the 'how' and 'why' research projects have contributed to impact (double- and triple-loop learning) often correlate to a greater use of mixed-method approaches as part of the design and implementation of impact assessments (for example, Bamberger 2012; USAID 2013).

To some extent, existing economic frameworks already incorporate mixed methods (for example, interviews or adoption surveys that include questions on the process of adoption and information sharing). However, the outputs of these mixed methods are often used to inform economic calculations and/or are translated into economic values (for example, Davis et al. 2008).

Expanding our approaches to impact assessment to include 'how' and 'why' questions is not just about adding in qualitative methods, but reframing the types of questions that are asked, how data are collected, and how data analysis from across different disciplines is integrated to give a more nuanced and richer picture of the various types of impacts that have resulted from AR4D projects. It may also provide for co-learning and deeper capacity building for researchers, funders, evaluators and practitioners.

This guide has been developed with complex and systems-oriented projects in mind, in recognition of the wide array of resources available for guiding the design of impact assessments for more simple/bounded projects (for example, Davis et al. 2008).

We also acknowledge that economic assessments will likely remain at the core of impact assessments. The aim of this framework is not to displace the role of economic assessments, but to highlight how other considerations and aims can be integrated into impact assessments.

3 Principles and definitions

Adjusting our approach to ex-post impact assessment to capture different perspectives of impact can support a much greater understanding of whether, and how, research is contributing to development outcomes and impacts being sought.

This section sets out:

- the conceptual and theoretical principles that guide the practical steps laid out in Section 4
- some boundaries in scope based on the project context and priorities of key stakeholders.

Photo: Liana Williams

3.1 Key principles that have guided our approach

These principles set out the theories and assumptions that guide how we have defined impact, what kinds of questions are asked and how we interpret change. They were developed in recognition of the tension between providing flexibility in the framework, compared with a standardised approach.

Though the former allows for tailored (and therefore appropriate) design of impact assessments to meet the context and need, the latter supports consistency and comparison across assessments to draw out higher-level lessons. In outlining these principles, the team sought to ensure a broad consistency in the underpinning logic of the impact assessments.

1. **Interventions occur within a system:** This implies change is usually non-linear and dynamic. Though impact assessments usually centre on a project, multiple actors[3] involved in processes of change are often outside the 'formal' research system. Likewise, there are often multiple, intersecting pathways to impact. As such, it can be difficult to predict the outcomes of AR4D interventions, and to adequately measure these outcomes or how they happened without considering the context and broader system.

   This also implies that impacts should be investigated at different scales or units of analysis, the definition of which will vary depending on the project, anticipated impacts and resources available.

2. **Impacts are likely to be defined, valued and experienced differently by different actors:** Where possible and appropriate, impact assessments should aim to capture the views and experiences of a diverse range of people and groups to understand these differences, and to capture the perspectives and experiences of beneficiaries for themselves (in contrast to how project team members may define them). This is important, especially as AR4D projects tackle issues like gender equality and social inclusion. In presenting these different views, the aim is to acknowledge and highlight the multiple interpretations, rather than characterise or judge the perceived validity of these views.

3. **Interventions will have multiple outcomes and impacts:** Impacts might be positive or negative, expected or unanticipated. They will occur in different timeframes and may change across scales.

   Understanding the range of impacts, their interactions and trade-offs is important when considering the overall benefit of an intervention. This is also closely related to the previous principle on how impacts may be perceived differently by different actors. For example, increasing the intensity of food production in one area may have beneficial short-term impacts in food security and wellbeing, but may erode ecosystem health over time (a trade-off); or increasing the income and agency of women through market access for household produce may improve their access to money and household nutrition, but may have safety or cultural repercussions (an unintended outcome), because this challenges the role of men in the household.

4. **Intervening in complex systems means there are multiple drivers and influences that have an effect on development processes:** Some impacts may be directly influenced by an intervention, but, in many cases, they are likely to be either indirect, or due to a combination of projects, programs and events.

   As a result, the application of the framework needs to examine the various events, processes and activities that have contributed to impacts in addition to the intervention, and explore the causal links between project outputs, outcomes and impacts.

3 'Actor' is used throughout this document to refer to any entity that plays a role in social change—individuals, community groups, organisations, government agencies. When referring to groups (such as a government agency) it is important to remember that the individuals within these groups may hold diverse views, at times in contrast to other members or to the group itself.

3.2 Defining scope and boundaries

How impact is defined has significant implications for what is measured, the kind of indicators and methods used, and how results are interpreted. This section sets out the boundaries that underpin this approach, as agreed by UPLB, VSU, PCAARRD and CSIRO, and drawing on Hearn and Buffardi (2016).

The approach is designed to consider post-project impacts, largely for complex projects. They should be conducted after sufficient time has passed since the project finished to enable the effects to be observed and measured. This should be considered in the selection of cases for assessment.

Due to the long timeframes for change in many research-for-development projects, impacts may not be identifiable, in which case it may be possible only to consider intermediary outcomes. This document makes no assumptions about the project's monitoring and evaluation systems and subsequent data available. These obviously have implications for the assessment.

The definition of impact is broad, including positive, negative, intended and unintended changes that result from research projects. Most projects define the expected impacts from their research and strategies or pathways for how the project will lead to impact. Though this is an obvious starting point for an ex-post impact assessment, the framework does not focus only on these impacts or variables. Rather, it deliberately includes questions and approaches to support the exploration of unforeseen or unplanned impacts, be they positive or negative.

Where possible, impact is considered across levels of analysis. The definition of levels of analysis will vary depending on the project being assessed and resources available for the impact assessment. However, in principle, the framework encourages analysis and comparison of impacts across a wide range of groups (for example, household, community, networks, government agency, business) and levels (local, regional, national).

Importance is given to understanding *why* and *how* projects have had impacts, in addition to measuring what those impacts are. This allows for researchers, development practitioners, funders and other key stakeholders to learn from what has worked, or hasn't, and guides improvements in approaches used. The intention is not to critique the performance or design of the project at the centre of the assessment, but to trace the outcomes and impacts since its completion, and derive lessons to inform future practice.

3.3 Defining impacts

Classification of outcomes and impacts[4] into categories such as social, economic or environmental is a useful way to make sense of different types of impacts. However, these categories are also relatively arbitrary, presenting closely connected concepts as separate and distinct. For example, an increase in access to markets could be categorised as economic, but is also closely related to household and community wellbeing, providing increased opportunities and options to earn a living and improve living standards.

This dynamic is represented in Figure 3, which presents the three standard categories of impact and how they overlap and complement each other. It's worth noting there are many ways in which to categorise impact, some of which may be more relevant depending on the project being assessed, such as further differentiating cultural impacts under the broad category of social impacts.

Capacity sits at the centre in Figure 3, because it is the overarching enabling element to 'triple bottom line' impacts. Implicit in capacity are different scales of capacity, from individual to institutional capacity that enables, facilitates (or hinders) change.

There is increasing concern for not only what the impact is, but who is benefiting from AR4D projects, and ensuring that these benefits are shared. This is expressed, for example, in goals for gender equity and women's empowerment, or inclusive value chains, which seek to overcome historical barriers and inequities (for example, ACIAR 2018).

Beyond identifying the types of outcomes and impacts a project has had, impact assessments also need to consider extent and quality of this impact—that is, the depth (difference made to an individual), breadth (the benefits are experienced by a large number of people in absolute or proportional terms) and sustainability of impacts over time (for example, Nielsen et al. 2010).

4 Throughout this report, we use 'outcome' to refer to observable changes in behaviour, relationships, activities and/or actions of individuals, groups or organisations as a result of a project, piece of research or other intervention (for example, use of new farming practices or integration of recommendations into government programs). We use 'impact' to refer to the result of an outcome, the lasting change in a situation as a result of a project, piece of research or other intervention (for example, poverty reduction).

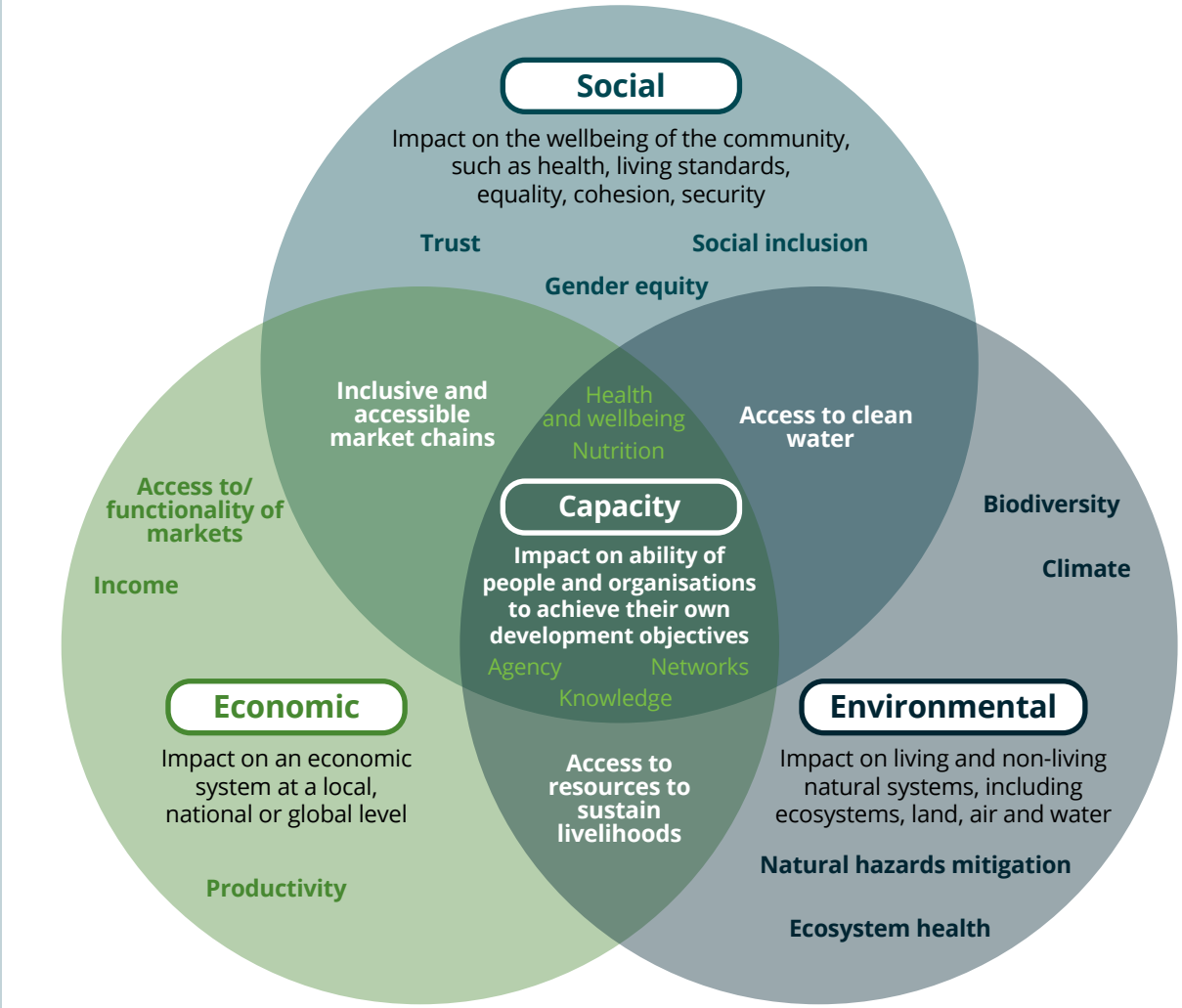


Figure 3 Connectedness between types of impact

Source: Authors, with definitions of impact drawn from CSIRO 2015, Davis et al. 2008 and UNDP 2010.

4 Practical steps and tools

4.1 Overview

Figure 4 provides an overview of the steps and process of preparing for and undertaking an integrated impact assessment. The steps within each stage are not part of a strict, ordered sequence. The steps inform each other and can be conducted iteratively.

For example, the theory of change and impact pathway steps can be done in parallel, or sequentially. Likewise, the arrows indicate a feedback loop, with outcomes or findings informing a refinement and adaptation across stages along the process. The open arrow at the end of the implementation phase indicates an ongoing process of learning and adaptation (across impact assessments and to inform future assessments).

The aim of an iterative approach is to allow for adjustments and improvement as our understanding changes. For example, scoping activities may indicate that the key benefits from an intervention are environmental, but initial data collection may highlight significant social benefits. In this case, it may be necessary to adjust the impact assessment design and methods to include a greater focus on social benefits. In this case, few projects will have the resources to run additional surveys, but may be able to adjust subsequent activities or include additional interviews to supplement insights into social benefits.

Iteration does not always mean significant changes to the evaluation plan—it can be as simple as updating an impact pathway with new information, or making minor adjustments to survey questions, or simply be acknowledged as part of the discussion in reporting.

Though it contributes to the quality of the assessment, in practice, having an iterative design process can be challenging, with the temptation to continuously refine and improve the assessment. In practice, decisions on how much iteration is required, and when to stop refining is a matter of professional judgement on the part of the impact assessment team, within the constraints of the timeframes, labour resources and other practicalities (for example, remoteness of sites).

Considerations for team composition

Integrated impact assessments require teams that include a range of disciplinary skills and perspectives. Working across disciplines takes added time and resources. It requires time to develop common understanding and language to prevent misunderstandings or miscommunications. Often, different disciplines can be using different language or terminology, but in fact mean similar things (and vice versa).

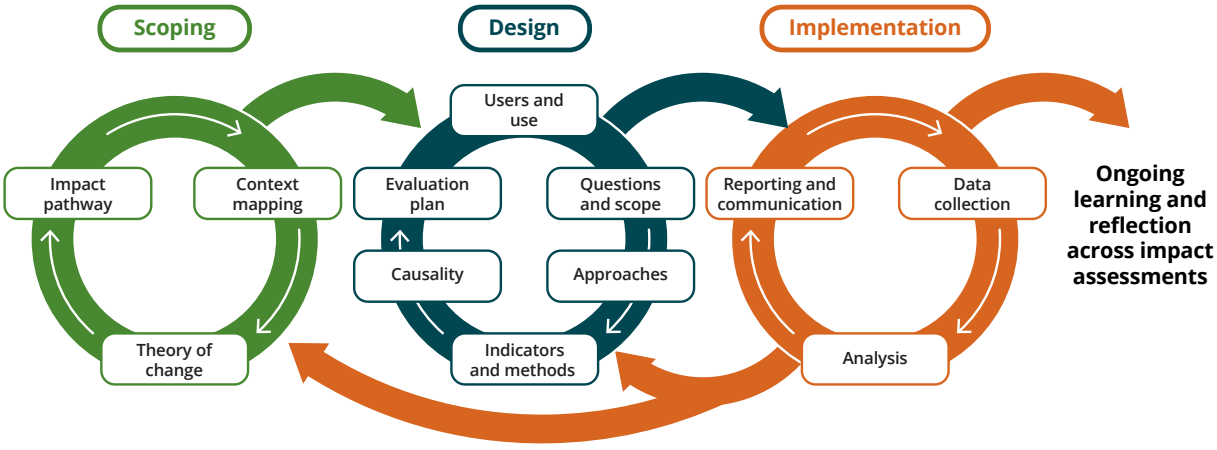


Figure 4 The iterative process guiding the ex-post impact assessment

Spending some time to explore and understand how different disciplines influence what and how questions are being asked is important, but often overlooked in the rush to respond to short deadlines.

Explicitly discussing the teams' disciplinary strengths, biases and gaps at the outset of designing an impact assessment is important and can lead to insights and opportunities to strengthen the design of an assessment. Engaging team members from across disciplines and sectors in discussion of results and analysis early and often through the scoping, design and implementation of the assessment will support a more robust and valuable assessment. Reflecting on how cross-disciplinary teams work together may provide useful insights for future funding and design of impact assessments.

The constitution of the team needs to take into consideration the expected impacts that are going to be investigated and may need to change over time as the understanding of the project and its impacts deepens. At the very least, consideration of whether the right skills are included in the team after the initial scoping is recommended.

4.2 Stage 1: Scoping

This part of the document covers steps to support impact assessment teams to have a basic understanding of what projects were trying to achieve and how, as a basis for the design and implementation of the assessment. The three steps outlined are closely related and require an iterative process, where the insights from one inform revision or adjustment of other activities.

Context mapping

The purpose of this step is to create a shared understanding about the broader context within which the project or program that is being assessed sits. For example, what else has happened during or since the project that may have contributed to or impeded impact? This is particularly important where the project being assessed is complex or 'systems-orientated' (see Figure 1), and where influencing aspects of the system outside of the immediate project are critical to enabling impact (Garcia and Zazueta 2015).

Consideration of broader system drivers or challenges may include (for example) policy change, incentives or investments, changes to markets or trade access, or major disasters during or since the project. Revisiting these drivers and events during the scoping of an impact assessment is useful, because a project's context is constantly evolving. So, this enables the assessment to uncover where less-obvious impacts may have occurred (Garcia and Zazueta 2015).

Table 3 contains a series of questions that can elicit these contextual factors. It can be valuable to discuss these questions with key stakeholders or key informants with relevant contextual knowledge. The information generated can contribute to the following step, which clarifies the impact pathway and those outcomes or impacts that will form the basis of the evaluation questions and assessment process.

Theory of change and impact pathways

These steps clarify the intended impacts that were sought from the project and how these were expected to happen to help frame the scope of the impact assessment. It is important to note that the terminology used to describe mapping impact pathways and causal links differ and are often used interchangeably. In AR4D projects, the terms 'impact pathway mapping' and 'theory of change' are most commonly used.

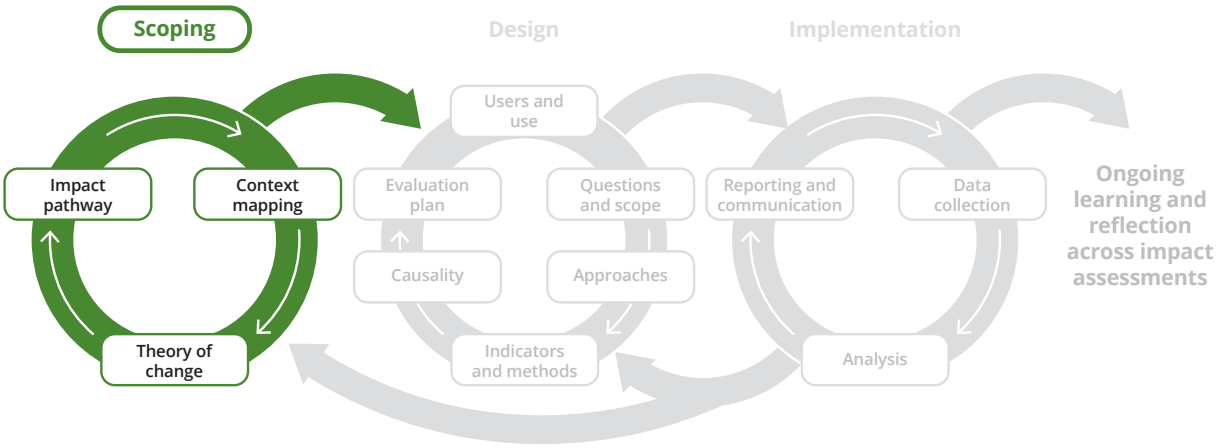


Table 3 Questions that can elicit context to help frame the impact assessment

Questions	Tools that may help facilitate/document discussions
What external factors or events may have influenced the project? During the project? Since the project? Were other programs or organisations active at the same time? How did they interact? Were they complementary? In competition? Did they work with similar participants/stakeholders? Have there been any wider systems changes? For example, changes in legislation, new technology, change to market dynamics, social drivers (such as migration) Have major weather or climate changes impacted the project locations?	Timeline mapping (Lowry and Mullins 2016). In a group, visually capturing qualitative data about processes of events and unpack multiple variables can help researchers make connections between events, developing potential causal explanations and draw conclusions (Miles and Huberman 1994). Impact planning/stakeholder mapping (Better Evaluation 2014).

Source: Authors.

Theory of change and impact pathway mapping can help define the impact assessment objectives, pathways and indicators. These steps also help to identify key stakeholders that could be involved (for example, as key informants, or as end users of the assessment results).

Concepts

Theory of change

The language used to explain a theory of change varies and is often also called 'program logic', 'program theory' or 'results chain'. There are many formats to present a theory of change based on what makes sense for the context and impact assessment team.

A theory of change provides the conceptual framing for an impact assessment. It enables exploration of hypotheses about what needed to happen and why for a project to achieve the desired impacts. It provides a comprehensive description and illustration of how and why a desired change was expected to happen in a particular context.

In the design of the project being assessed, a theory of change provides the rationale for which pathways the project will pursue, and helps the teams identify which actors need to be involved to influence or enable the changes sought by the project.

In the context of an ex-post impact assessment, understanding the project's theory of change provides an understanding of why the project team chose particular pathways and the underpinning assumptions of how these would lead to impact.

A theory of change is essential for identifying the data that need to be collected in an impact assessment and provide some insights into how it may be analysed. Reviewing and revising the theory of change to guide data collection, analysis and reporting is often required during the implementation of an impact assessment, as the understanding of what actually happened in a project deepens.

Box 1 provides an example of a complex project theory of change, the assumptions and broad pathways by which impact would occur.

Impact pathway

An impact pathway sets out the plausible steps of how research outputs will contribute to an outcome or set of outcomes. The foundation is (or should be) laid for this during the original project design, linked to the theory of change.

Being able to trace how research outputs have led to an outcome since the project has finished is a crucial part of understanding impacts. If no impact pathway mapping was developed before a project, the team can retrospectively do this based on what was delivered as part of the project.

The impact pathway identifies:

- the different phases
- the actors involved
- their networks and interactions
- the flow of resources
- the progressive integration of different forms of knowledge and know-how into outcomes and impacts.

It may include proposed mechanisms for scaling up and scaling out, as well as processes for communication and negotiation among networks of stakeholders.

Impact pathways tend to be criticised for implying linear processes of progressing outputs to outcomes and impacts, when in reality it is an ongoing process of innovation as new ideas emerge, more actors become involved and external drivers influence the situation.

Acknowledging the limitation of impact pathways as tools which should be revised helps alleviate this concern.

Box 1: Example of theory of change and impact pathways for the Adapting to Climate Change in Asia (ACCA) project

Theory of change

The ACCA project did not explicitly articulate a theory of change as part of its original design, but analysis of project documents and discussion with project team members allow for a theory of change to be constructed after the project has finished.

Across South-East Asia, the poorest households are those most likely to be affected by climate change, due to their dependence on agriculture for livelihoods and the lack of state-based support mechanisms.

Adaptation to climate change is critical for productive farm-based livelihoods into the future. Mechanisms to support climate adaptation in rice-based farming systems have been limited by a failure to:

- adequately engage with stakeholders across scale
- understand adaptive capacity and adaptation options in context
- develop capacity of stakeholders across scale to support adaptation.

Changes are required in how donors, policymakers, extension agencies, and non-government organisations operate to improve climate adaptation programming and planning.

ACCA aimed to facilitate these changes by:

- using an integrated design (involving multiple disciplines, and engaging stakeholders and end users) to develop adaptation options, while acknowledging the different capabilities of different households to adapt
- engaging with stakeholders to promote the benefits of this approach and guide practice change.

The theory of change assumes that:

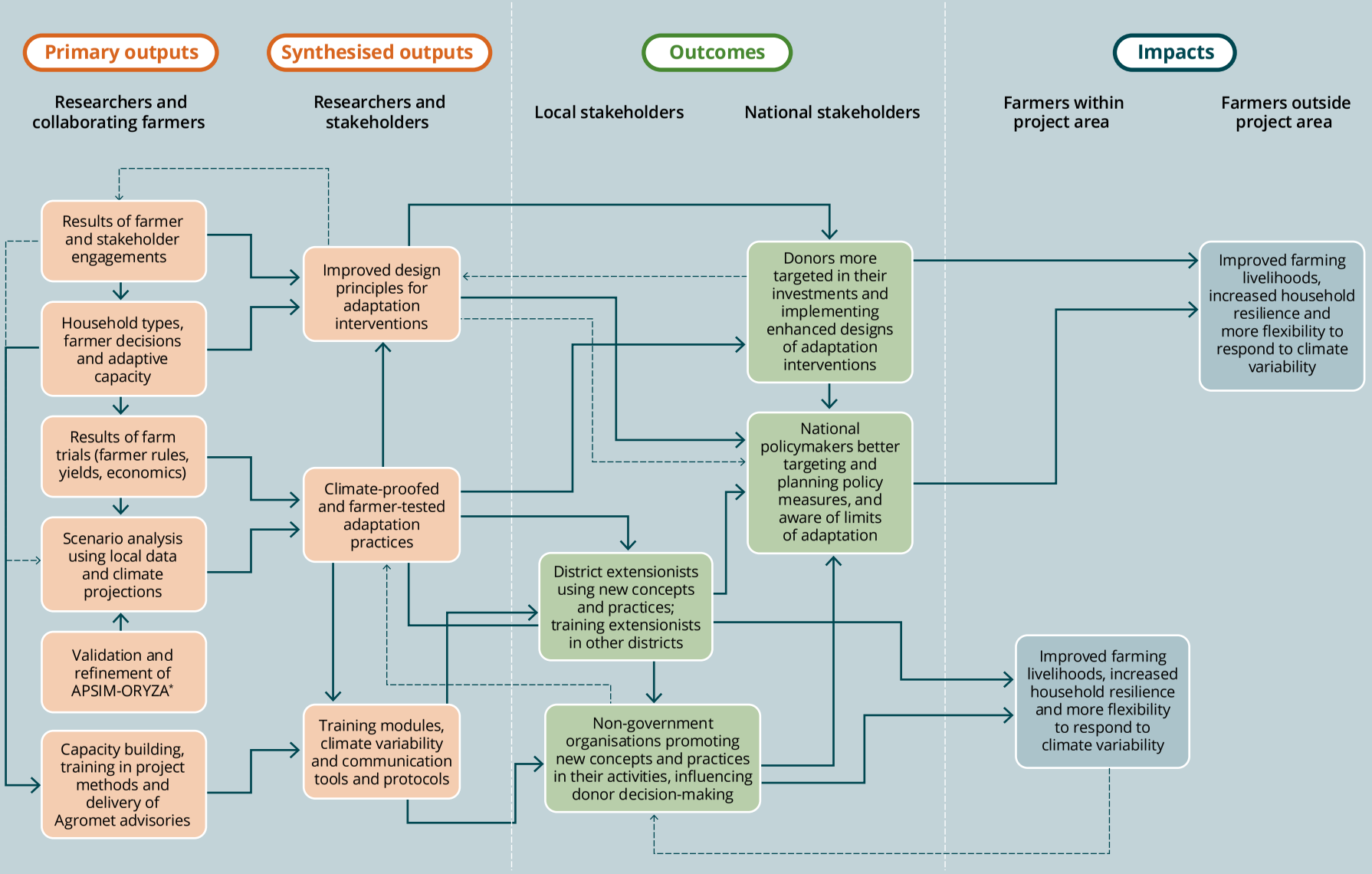
- a focus on rainfed, rice-based cropping systems is adequate
- farmers (and other stakeholders) will see adaptation to climate variability as a priority and plan to stay in agriculture
- practices that are developed and tested with farmers are more likely to be adopted, and will have relevance beyond project sites
- stakeholder engagement will lead to policy and practice change—resources and political will is present to support changes, and will align with other lines of information and/or influence in decision-making.

Building on the theory of change, two broad **pathways to impact** are represented in this diagram, and can be summarised as follows:

- In the first pathway, the project team aimed to influence how farmers receive information, and what type of information they receive, to support adaptation. The team tried to do this by providing tested adaptation practices and training modules that support farmer engagement to non-government organisations and district extension agencies. This would support improved capacity of households to adapt within the communities the project was directly working in.
- In the second pathway, the project team aimed to influence how adaptation programs and policy are designed, by taking lessons and insights from the integrated approach used in ACCA, and sharing these with donors and national-level government agencies involved in climate adaptation policy, planning and program design. Through this engagement, ACCA hoped to influence program design, and contribute to improved farming livelihoods outside the initial project areas.

Note: The adoption study of ACCA is used as an example throughout this document. Though an adoption study is far more modest in scope than an impact assessment, many of the same challenges and approaches are relevant.

Source: Authors, based on Williams and Van Wensveen, forthcoming.



*APSIM-ORYZA is a farming system model used to simulate and evaluate rice production in tropical systems given specific inputs and management practices.

Constructing theories of change and impact pathways

Ideally, the project being assessed will have an impact pathway built on a theory of change, which is accompanied by a monitoring evaluation and learning system that was updated throughout the life of the project. If this is the case, these can form the basis of the impact assessment.

A range of approaches (such as participatory, desktop) can be used to construct or revise existing theories of change and impact pathways. We suggest drawing on the skills within the team, and using the process that works best given the circumstances.

For example, where there are good relationships with key members of the original project, and where it is feasible to do so, it might be appropriate to take a participatory approach and involve former project members and beneficiaries in defining and/or revising the theory of change and impact pathway.

Where a project has a well-defined theory of change and impact pathway as part of their original monitoring and evaluation system, it may be sufficient to update these without a participatory approach. A number of key questions (Table 4) can help guide the discussions when building a theory of change and mapping impacts, having also considered the context within which the project sits.

These discussions can be far-ranging and there may be a temptation to try to capture all potential effects from a central intervention. This can be overwhelming for impact assessment teams and ultimately may not support a focused evaluation plan.

The CSIRO uses a results chain approach that considers impacts in relation to project activities, rather than considering all potential effects from a central intervention. In reality, all projects have key objectives and goals that they set out to achieve, and focusing (though not limiting) analysis to this core line of logic makes the investigation more manageable (Heard and Buffadi 2016).

In complex projects, there will be multiple pathways to impact based on the different outcomes that were sought. Identifying these pathways is important to guide the research design and for testing the causal links between the project and outcomes (see discussion on 'Establishing causal links' in Section 4.3).

Table 4 Guiding questions and considerations to develop theory of change and impact pathway

Building the project's theory of change	Developing the project's impact pathway
What were the long-term 'big goals' and intended impacts that the project was trying to contribute to? (Note: these are always bigger than one project can address.)	What are/were the intended impacts?
What changes needed to happen to achieve the big picture impacts?	How was it planned that they would happen?
Who was involved in making those changes happen? (Note: these may range from individual to institution or policy scale.)	Who was involved? Who needed to be influenced?
If enabling changes did not occur, were there (other) ways the project could still be effective?	Who did what differently?
What outcomes has this project contributed to? That is, of all of the changes required, which ones has the project meaningfully contributed to?	What was it that was done differently? Where? When? (Potential evidence sources.)
For each outcome, think about what changes were needed before it could happen, and whether and how it relates to other changes.	What changes had to occur for impacts to happen? (This is important to establish causal links.)
What outputs were most effective in bringing about desired outcomes, and when were they delivered/where/by whom?	Is this significant? Why is this significant? Was it the first time? Does it link to systemic or policy change?
Were there outputs that were only possible through collaboration/or may have relied on other agencies/ partners delivering activities first?	What was the contribution of the project that led to the change?
What assumptions are made in defining how the project would have impact? Were these assumptions valid? Were there other influences?	Were there other drivers of change? Influences on outcomes and impacts?
What were the risks of external factors? How were these mitigated?	

Source: Adapted from Church 2016; CSIRO 2015; Funnell and Rogers 2011; NCVO 2019.

Some of these pathways will relate to encouraging behaviour change and/or use of new technology ('adoption'[5]), while others may focus on the broader system changes that support greater impact (Table 5).

A related concept is that of scaling or taking impacts 'to scale', or the processes required to increase the impact of a research project to ensure benefit to many people (Menter et al. 2004). Different terms represent slightly different processes, but all three concepts are closely linked:

- Scaling out is typically used to refer to geographical spread and dissemination of information and resources that are necessary for widespread impact. For example, a project might be introducing new cattle management practices to improve livelihoods. Scaling out may refer to farmers teaching other farmers about the practices and sharing required resources, or could refer to the project itself expanding and replicating demonstration sites in new areas (Millar and Connell 2010).
- Scaling up refers to institutional and policy changes that, in turn, enable further adoption or changes in behaviour at the local level, in line with greater project impact (Carter and Currie-Alder 2006). With the cattle management example, scaling up could refer to influencing local extension services to include training on new cattle management practice into their programs, or influencing local government policy to create incentives for farmers to use the new practices.
- Scaling deep refers to the changes in culture and values that enable greater impact. It represents a process of learning and adjustment, recognising that people have diverse perspectives and not everyone may want to make changes recommended by the project (Ridell and Moore 2015). In the cattle example, this could refer to changes in farmer perceptions of cattle as a 'walking bank account' to a viable and profitable livelihood option. For policymakers, it could mean a shift in how they prioritise cattle compared with other commodities.

Table 5 Typical pathways to impact

Impact pathway	Aim	Common stakeholders	Evidence
Commercialisation	Engages market actors in distribution of product or practice.	• Actors along the value chain (domestic and export chains). • May also include government actors.	• New products, licences. • Changed market policy, regulation, incentives along value chain.
Adoption of new/ changed practices	To facilitate improved practice that benefits those who are changing practice.	• Input suppliers. • Farmers. • Processors, traders.	• Change in practice. • Increased yields. • Increased efficiency of inputs. • Reduced environmental harm. • Efficiencies in labour.
Capacity building	To increase participants' capacity in a defined area that will provide widespread or deeper benefit.	• Can include anyone participating in a project. • Stakeholders. • Institutional environment.	• Increase in individual capacity/skills. • Improved organisational capacity. • Institutional changes that support impact.
Regulation/policy	To create an enabling environment for change, such as regulatory frameworks or incentives.	• Government (at different administrative scales). • Other organisations with relevance to the change targeted.	• Policy change in organisations or governments that supports greater project impact. • Incorporation of aspects of the intervention into policy, programs.

Source: Based on Davis et al. 2008, p. 39.

5 The term 'adoption' often implies simple 'yes' or 'no' decisions relating to the use of a technology or practice. By referring to adoption in this report, we include processes of experimentation, adaptation and learning that are inherent in decisions to incorporate new knowledge and practices (see Pannell et al. 2006 for a review).

Concepts of scaling are closely linked with impact pathways. While an impact pathway explains how the project activities and outputs lead to impact, scaling strategies outline whether and how this impact expands beyond initial project participants to the wider community. Where projects already plan for large-scale, systemic change, scaling strategies will be incorporated into its impact pathways.

For example, in Table 5, 'commercialisation' is a pathway that implies scaling out—by commercialising an output, companies will promote use of that output as part of their business plan.

Regulation and policy capture the concept of scaling up. Capacity building contributes to scaling deep, as well as potentially out and up, depending on the context. In the case of the adoption pathway, this may include scaling, if the methods and mechanisms for supporting adoption support widespread dissemination.

4.3 Stage 2: Design

Stage 1 focused on understanding the project or program that is the subject of the impact assessment, and the logic underpinning changes sought and anticipated paths to impact. In Stage 2, we use this understanding to guide the design of the impact assessment. Note that, as for Stage 1, many of these steps are iterative and inform each other.

Compared to scoping and implementation, the design section has the most components. Evaluation activities rarely go as planned as part of the design, but having a clear and well-developed design to support the impact assessment will enable teams to adapt and respond to unforeseen circumstances while maintaining rigour. Likewise, where those involved with the impact assessment have ownership and good understanding of the design of an impact assessment, they will be better able to adapt in the field and ensure meaningful and efficient evidence collection.

Understanding the users and use of the assessment

Impact assessments can require significant investment, both in human and financial resources. There are a multitude of reasons assessments are done. A generic purpose around accountability or learning can miss the opportunity and value of investment in impact assessments. Spending time on understanding the purpose of the assessment—the why, for whom and how the impact assessment will be used—is critical to ensure that the findings of the assessment can be applied or understood (Guijt 2010).

The user of an impact assessment can best be described as anyone who has the willingness, authority and ability to put learnings from the evaluation process or findings to work, to inform decisions or actions (IDRC 2012).

Importantly, the audiences for which an assessment is done are often different to the user group. The client, other agencies or programs may be interested in the findings of the evaluation for reporting or accountability, but may have a more passive role than the intended users of the evaluation (IDRC 2012).

For example, the Landcare in the Philippines case study was commissioned by ACIAR, who have an interest in understanding the impact, and lessons learned from the case. However, organisations involved in Landcare in the Philippines, such as the Landcare Foundation of the Philippines Incorporated (LFPI), who were central to administering and sustaining Landcare, may be a key user, with lessons from the case directly relevant to their ongoing work.

Table 6 provides examples of questions that can be used to facilitate discussions about the users and use of the assessment.

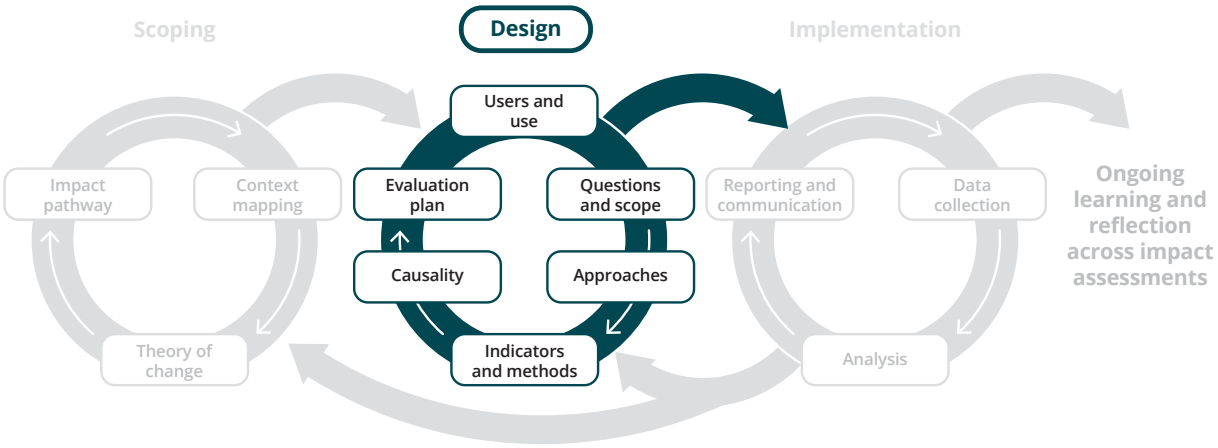


Table 6 Questions to identify and understand users/uses of impact assessments

Establishing the users of the assessment	Understanding the uses of the assessment
• Who (groups/individuals) is/are likely to be affected by the process or findings of the assessment? • Who (groups/individuals) is/are most likely to make decisions about the project being assessed? • Whose actions or decisions might be affected or influenced by their engagement with the assessment process and/or findings? • How can the users be involved in the assessment process? • What challenges might be faced in identifying/involving users? • Are there ethical considerations in their participation? • Who are the target audiences of the assessment? Why are they interested in the findings/how might they use them?	• How can the assessment contribute to the improvement of the project, future projects, other programs? • How might the assessment contribute to making decisions about the project/future projects? • What outcomes do you expect from the assessment process? • What do you expect might be done differently because of the assessment? By whom?

Source: Adapted from Guijt 2010; IDRC 2012.

Defining the evaluation questions and scope of the impact assessment

Defining evaluation questions

The impact pathway defined in Stage 1 sets out a broad map of the expected impacts, and how the project intended to achieve them, which provides the foundation for the evaluation questions asked.

Defining broad evaluation questions provides clarity and focus to make decisions on data collection, analysis and reporting, and is especially important for complex projects where the potential scope of work is significant. It is important to keep in mind what is manageable within the resources and time available.

Table 7 lists generic questions asked in different types of impact assessments. It illustrates the different emphasis in an assessment of economic return compared with impact and process assessments.

It can be used to guide the definition of questions based on the outcomes of the impact pathway and theory of change exercises.

It is important to remember, especially for complex projects, that the intent of the assessment is to also look for what didn't work, or what didn't happen as anticipated or planned. This is part of learning and improving our understanding of research-for-development processes. In complex projects it is also probable that the findings on the ground may not match the theory of change or impact pathway. Where this happens, it is important to investigate why. This is also part of establishing causality.

Table 7 Typical questions for ex-post impact assessments

Area of focus	Questions
Impact	What outcomes and impacts has the project achieved? Have impacts been sustained/are they sustainable? Who benefited from the project? Who did not? What unintended outcomes and impacts have been observed (positive and negative)? To what extent can outcomes and impacts be attributed to the project? What was the influence of other factors?
Process	How and why did the project lead to impact? What features of the project/process made a difference? What didn't work? What happened that was unexpected? Did the process unfold as expected in the theory of change/impact pathway? If not, why?
Economic return	What has been the benefit:cost ratio? Has the intervention been cost-effective? Was it a good use of resources?

Source: Adapted by authors from Better Evaluation 2018; New South Wales Government 2018.

Prioritising which questions and impacts to focus on

In most cases it will not be possible to explore, in detail, all the impact pathways, or to measure all outcomes and impacts that a project has had.

An important step in making the assessment manageable is to define a focus for the assessment by making considered judgements about which pathways or impacts will be the focus of the assessment. Considerations for this includes:

- conditions set by the commissioning agency
- data availability
- the opportunity to contribute to areas of interest.

These are explained below, and an example is provided in Box 2.

Conditions set by the commissioning agency

- **The purpose(s) of the impact assessment** (accountability, investment, advocacy, learning): The purpose of the impact assessment sets a direction for what kinds of questions need to be asked and data collected. If the purpose is purely accountability, for example, a focus on impacts (the 'what', rather than process, the 'how' and 'why') might be appropriate.
- **Needs and interests of end users:** End users may have a particular interest or research area they want the assessment to explore. Though the assessment need not be limited or constrained by this, inclusion of these needs and interests increases the relevance and utility of the report.
- **Resources and expertise available** to conduct the impact assessment. This sets the boundaries for what is feasible in terms of time, data collection, and types of analysis that can be done by the team (noting disciplinary expertise, time available for data collection and analysis, and other factors).

Box 2: Example of refining evaluation questions and scope—ACCA project adoption study

The adoption study of the ACCA project had a small team of two researchers, modest operational resources and short timeframes between contracting and delivery of the report (4 months). The project had two broad impact pathways (Box 1) that were implemented across four countries, with different technical focus areas, project partners and stakeholders. Defining a reasonable scope for the research that would meet the interests and requirements of funding organisations and key stakeholders in each country was crucial.

- ACCA was one of the first major investments in a multicountry, multidisciplinary research project for ACIAR and CSIRO. As such it was important for the study to try to understand the value and insight of the project across countries, rather than focusing on just one country in depth.
- One of ACCA's sister projects in Bangladesh had been the focus of an adoption study the year before. Because of the strong connection between the two projects, the team decided there was limited benefit in including Bangladesh in the ACCA study, as not much would have changed in the space of a year. This enabled the team to narrow their focus to Cambodia, Laos and India.
- Former ACCA team members continued to work in India, and so the adoption study team had reasonably up-to-date information about what outcomes ACCA had in that country. In contrast, little was known about the outcomes in Laos and Cambodia. It was decided to focus field work in Laos and Cambodia, while a largely desktop analysis, with phone interviews would be sufficient in the Indian case.
- The focus of ACCA had been to influence extension programs, and the design of adaptation programs and policies (Box 1), which would in turn influence farmer behaviour. Being members of the original ACCA project team, the adoption study team had knowledge of the project, connections to former team members, and access to project documentation. This put them in a good position to examine the extent to which the expected extension and policy outcomes had materialised, and, to a more limited extent, to explore what the initial impacts of this had been.
- A key limitation for the adoption study was its ability to quantify household adoption of project practices. Because ACCA had focused on influencing extension services and adaptation program design, there had been limited effort during the project to collect household-level data on adoption and impacts of practices beyond field trials. The adoption study did not have the resources to run surveys or other wide-scale methods to try to estimate household adoption, and instead relied on being able to find this information through other sources (for example, evaluations of programs that had been influenced by ACCA). These were often either not available or too broad to identify specific ACCA technologies. The team drew on these to the extent possible, and made the limitations of the study in relation to this point clear.

Source: Authors, based on Williams and Van Wensveen (forthcoming).

Data availability[6]

- **Access to existing data, such as previous evaluations or data collected by stakeholders:** This can inform the design in different ways. First, previous assessments provide a data point on which to build, allowing the current assessment to compare impacts now with what has been measured in the past and illustrate changes (positive or negative). For example, if a previous study has found increases in income have led to reduced poverty, the current study can compare whether this is still the case, whether and how impacts have been sustained or changed over time, and whether new impacts have emerged. Alternately, existing data could highlight gaps, as discussed below.
- **Lack of data and/or constraints on gathering of additional data:** In an ideal case, projects at the centre of an impact assessment will have had their own monitoring and evaluation systems, and the data and/or findings from this system will be accessible to the impact assessment team. In practice, however, this is not always the case. Projects being assessed may not have had effective systems in place, or, due to the time that has passed since the project, this data may no longer be accessible. The absence of such data presents challenges for impact assessment teams who are trying to determine the extent of change over time. The absence of baseline or results data will influence the type of impact assessment that is possible, and may suggest a focus on particular methods or lines of inquiry—for example, favouring qualitative or participatory assessments on the extent of change over time, rather than statistical measures. In cases where the lack of data presents significant challenges for the assessment, it is worthwhile discussing these with the commissioning agency. In such cases, the scope of the impact assessment may need to change to align more with progress evaluations, whereby the progress toward impacts is assessed. Each case will be different and project teams and funders need to make this call early on, before too much investment is expended to an impact assessment.

Contributing to broader practice and knowledge gaps

- **Gaps in knowledge, data or understanding:** This is related to the data points above, but takes a broader view—given the data and evaluations that have been done, where can the impact assessment add to gaps in knowledge or provide different interpretations? For example, previous research may have focused on quantifying household adoption and livelihood benefits, while the current study may choose to focus on the previously unexamined outcomes and impacts of government policy that was influenced by the original project, rather than repeating adoption surveys. Implicit is an understanding of the time-lags for different impacts to emerge. For example, productivity changes may have been evident within the life of the project, but an ex-post assessment provides the opportunity to follow up how these productivity changes have contributed to other outcomes over time.
- **Significant, unusual, or particularly instructive impacts and impact pathways:** Where a project takes a different approach (for example, building institutions for sustainability, cross-sectoral partnerships), or has had particular successes or challenges, there may be value in focusing on this to explore what could be learned for others considering a similar approach. It is worth noting that what is novel or unusual is likely to be very context specific.
- **Ensuring a range of outcomes and impacts are considered (that is, not just economic):** It is rare that a project would have purely economic, purely social, or purely environmental impacts, due to the interconnected nature of the social and ecological systems that projects occur in. However, as the tradition has been to prioritise the measurement of economic impacts, it is worth reminding ourselves of the value of deliberately looking at other types of impact (and not just measure them in economic terms).

6 There are a range of considerations for commissioning agencies in determining which projects within their portfolio are the subject of an impact assessment, including the anticipated impacts and scale of impact, and the availability of data to conduct a rigorous assessment.

Approaches to understanding and analysing impacts

This section looks at different examples of existing frameworks and approaches that suggest how to analyse and interpret changes. Having a clear idea of this is essential for data analysis, as it highlights specific themes or interactions for analysis, and how to make sense of the data collected.

This is closely related to, but not the same as, the impact pathway. The impact pathway steps out the project team's plans for how change was expected to occur, while an analytical framework provides guidance for how to identify and understand these changes. This section provides some guidance and further references for different frameworks which may be useful to use or draw on to guide the impact assessment.

Application of the previous steps in this document will have provided the scope and emphasis of the impact assessment, including the types of impacts that the project intended to have. Working backwards from the type of impact, Table 8 provides examples of different frameworks that could be used to inform the design of the impact assessment.

Table 8 Summary of selected approaches to understand and measure different types of impact (based on impact pathway and theory of change)

Impact focus	Premise of framework
Capacity building impacts: Ability of people and organisations to achieve their own development objectives	
Capacity	*Capacity measurement framework* (UNDP 2010). A results-based approach to consider capacity changes and impacts. Focuses on higher-level (national) organisations, recognising individuals contribute to that. Links resources and outputs to levers of change and shifts in national institutions. *Adaptation pathways* (Butler et al. 2016). Focuses on measuring whether/how development projects contribute to capacity of key stakeholders to influence institutional (policy, governance) change.
Livelihoods	*Sustainable livelihoods framework* (Ellis 2000) An integrated approach to understanding and addressing poverty. Household livelihoods are placed in the broader context, including norms, institutions and policy, as well as shocks and trends that influence households' decisions and options. Household capacity is moderated by access to resources (natural, human, financial, physical, social), institutions governing use of resources, and household strategies.
Social impacts: Impact on wellbeing, institutions, culture, health	
Gender equity	*Women's economic empowerment* (for example, CARE 2014; Oxfam 2017) The basis of this framework is that many structures, institutions and norms are biased against women, inhibiting their capacity to benefit from development interventions. Women's economic empowerment focuses on improving women's autonomy in managing resources, finances, and their own lives as a key component to achieving wellbeing. The framework highlights changes within personal, relational and environmental domains that are required to support women's economic empowerment, and explicitly highlights who has control over what in each of these.
Wellbeing	*Wellbeing frameworks* (for example, McGregor et al. 2015; Woodhouse et al. 2015) Wellbeing consists of different dimensions at both the individual and societal level (for example, material conditions, health, social relations, freedom). Though it can be measured externally, how people perceive their own wellbeing is highly subjective and often relative to cultural context. Participatory processes are used to record how the targets of an intervention feel and define how their wellbeing has been changed (and why).
Nutrition-sensitive agriculture	Food and Agriculture Organization of the United Nation's *Compendium of indicators for nutrition-sensitive agriculture* (FAO 2016) Nutrition-sensitive projects try to improve nutrition by tackling some of the underlying causes and problems that lead to poor nutrition outcomes, including health, sanitation, food access and care practices. The compendium sets out a simple framework for how agriculture, rural development and food systems interventions can contribute to impacts in nutrition, and suggests a range of indicators that could be used to track impact. Looking at nutrition outcomes is also linked to other areas like income, women's empowerment and natural resource management practice.

Table 8 Summary of selected approaches to understand and measure different types of impact (based on impact pathway and theory of change) (continued)

Impact focus	Premise of framework
Environmental impacts: Impact on living and non-living natural systems including air, land and water	
Ecosystem health	*Ecosystems and human wellbeing* (Millennium Ecosystem Assessment 2003) Human wellbeing is intricately linked with environmental health and ecosystems services (that is, the benefits from functioning ecosystems that support human health and wellbeing, such as fresh water, fibre, climate regulation, and others). Ecosystem health is affected indirectly by drivers such as population, economics and governance structures, and directly by land use, species loss, technology use and climate change. These direct and indirect drivers affect human wellbeing by changing the resources available to support material and psychological health. Interactions take place over different geographical scales, as well as different time scales.
Economic impacts: Impact on an economic system at a local, national or global level	
Cost versus benefits	*Cost–benefit analysis* (Asian Development Bank 2013; Davis et al. 2008) This technique is used to compare the total costs of a project with its benefits. It involves quantification of project inputs and impacts, using a common unit of measurement. In impact assessment, it makes use of applied welfare economics as the theoretical basis, measuring costs and benefits of the project under assessment against a situation without the project. Moreover, it measures the real present values of streams of costs and benefits over time, using the gross domestic product deflator and taking the year of impact assessment as the base year. It makes use of the following measures: benefit:cost ratio, net benefit–investment ratio and internal rate of return.
Cost-effectiveness	*Cost-effectiveness analysis* (McEwan 2011) This method is an alternative assessment technique to cost–benefit analysis, especially when the monetary value for project benefits cannot be established. It calculates a ratio of cost to a specified non-monetary measure of impact. It is commonly applied on healthcare projects (for example, cost per life saved, cost per sickness prevented)

Note: Frameworks are provided as examples only; this is not an exhaustive list.

In cases where there is a clear focus on a particular type of impact, it may be appropriate to apply one approach as a whole. However, it is likely that the impact pathway exercise and other steps in this document have suggested a variety of impacts and indicators being explored and measured as part of the impact assessment. In this case, the approaches outlined in Table 8 may provide options to draw on, and ways to think about measuring impacts in different ways.

It is important to consider how different types of impacts relate to each other (see Figure 3). This is reinforced by the examples in Table 8, which span across different types of impact, such as the Millennium Ecosystem Assessment, which considers environmental and social impacts.

When the team has determined what information they will be looking for, the next question is how to approach collecting it: participatory, top-down or a mix of both? This is not the same as considering whether qualitative or quantitative approaches are used—participatory approaches can be quantitative (Chambers 2010). Rather, it is about who is involved in each stage of the evaluation, and how their input is integrated.

Participatory approaches are commonly used in data collection, but there are significant potential benefits to involving stakeholders (project implementers, beneficiaries and others) in the broader processes of design, analysis and reporting (Guijt 2014). These benefits are not automatic, and careful consideration needs to be given to who, how and why stakeholders would be involved at different stages. Table 9 provides a brief summary and comparison of these options.

Regardless of the model used, careful consideration of the cultural context within which impact assessments are to occur is critical to ensure the process of data collection and analyses generated captures and reflects participant input appropriately. This is particularly relevant where the impact assessment team may be from another country, ethnic or cultural group to the end users or beneficiaries of the project under assessment (see Box 3).

Table 9 Comparison of different options for definition of indicators and data collection

	Description	Strength	Weakness/risks
Participatory	Engaging stakeholders in the process of design, data collection, analysis and/or reporting of the document. (Does not require all stages to be participatory.)	• Stakeholders can express impacts and process in own terms. • May reveal new insights hidden in top-down approaches. • More relevant, and accurate reporting. • Can capture diverse views of different stakeholders. • Supports capacity building, learning and empowerment of those involved.	• Time and resource intensive. • Requires skilled facilitators and ongoing commitment. • Trade-off between deep understanding of local context and generalisability • May not always be feasible to create 'safe' or appropriate environment for meaningful participation (can 'legitimise' non-participatory processes).
Non-participatory	Researchers/evaluators define each stage of impact assessment.	• Can be done with limited resources, often 'simpler' to execute. • May be required to protect sensitive information about participants or where practical considerations (time and financial resources) makes participatory approaches impossible.	• Does not capture full range of perspectives, experiences or insights. • Does not support learning by broad range of participants/beneficiaries

Source: Authors, based on Guijt 2014; Mayoux and Chambers 2005.

Box 3: Consideration of cultural context when designing evaluations and choosing methods

World views, values, knowledge and ways of understanding can be profoundly different across different social and cultural groups. Researchers who uncritically step into different cultural spaces without recognising these differences risk misinterpreting data (for example, by projecting their own world views and values onto the interpretation of data) and causing distress or offence (for example, by unintentionally breaking taboos or cultural practices).

As the value of Indigenous knowledge systems and cultural practices are acknowledged in western science, Indigenous research methodologies are becoming established as an element of qualitative research, and increasingly taken up by both Indigenous and non-Indigenous researchers (Singh and Major 2017). In many evaluations, Indigenous and western methodologies are being used effectively to complement and support each other.

For example, conventional approaches to health research have not delivered expected benefits to Aboriginal and Torres Strait Islander people. So, the South Australian Health and Medical Research Institute's Aboriginal and Torres Strait Islander health research unit, Wardliparingga, engaged with Elders, Aboriginal peak bodies and other stakeholders to define principles for how research should be conducted, and set priority research areas (SAHMRI 2014). These principles put Aboriginal and Torres Strait Islander values at the heart of research strategies, and (implicitly) set out expectations for how research impacts are evaluated.

Likewise, the Interplay Project provides another example of how different values and priorities between Aboriginal and Torres Strait Islander communities and the Australian Government can be integrated into a holistic model that acknowledges and respects different perspectives. This is available at: **https://old.crc-rep.com/wellbeingframework/**

It will not be possible for all impact assessments to take these sorts of approaches. However, consideration of the cultural context can be as simple as seeking information on appropriate ways to seek permission to conduct research in a community, or using methods that ensure the values and perspectives of participants are captured and reflected in the research findings (for example, Maclean and Woodward 2013)

Developing the evaluation plan

Refining indicators

By using the term indicators, we are referring to the qualitative or quantitative measures that would indicate achievement of, or progress towards, outcomes and impacts. This step is about defining the changes that will be looked for as part of the data collection process. Definition of indicators is an iterative process.

In the application of this framework to Landcare, we brainstormed indicators during impact pathway mapping. We redefined them as part of the conversation to prioritise our research questions, and this was refined and adjusted as we thought about the frameworks and methods to collect and analyse data.

Having a set of indicators helps to guide data collection and to provide a basic level of evidence that change has occurred. The intent is not to stop the team from asking additional questions or ignoring evidence of other changes that emerge as the research progresses.

Importantly, teams need to consider resources and time, to establish what is 'doable' in the context of the assessment. Often, decisions need to be made about a hierarchy of indicators and which are more critical to measure based on practical constraints.

Conventional impact assessments have favoured quantitative indicators to demonstrate change. There was some concern in the process of developing this framework that, given the choice, those conducting impact assessments would preferentially define qualitative indicators and neglect quantitative, resulting in impact assessments of poorer quality (in terms of being able to draw generalisations or put findings in a broader context).

Having an integrated approach to impact assessment does not prioritise qualitative or quantitative data. Both are valued equally. Which indicators are used depends on the questions being asked and the nature of the impact being assessed. Some considerations to ensure a balanced approach to defining indicators are outlined in Box 4.

Box 4: Considerations for defining indicators

- **Using existing data and standard data collection formats**, such as local existing data on household income, and formats of data collection for agricultural departments is useful. Aligning the definition of indicators of change with standard indicators/measurements (where appropriate) potentially makes it easier to compare changes over time.
- **Complementing/adding depth/meaning/checking interpretation** of quantitative indicators with qualitative indicators (and vice-versa) is useful. For example, the number of farmer groups and number of group members is a good quantitative indicator for measuring changes in institutions for Landcare. However, the qualitative indicator of the value of being a member of a group, from a member's perspective helps to provide better understanding of the true impact of the group.
- **Proxy indicators** may sometimes be used as a way of assessing variables that are difficult or costly to measure (for example, using vegetation as a proxy for biodiversity, or using nutrient cycling as a proxy for ecosystem condition).
- **Create impact assessment teams with skills and expertise**, and capabilities to collect/analyse data relating to the indicators defined.

Establishing causal links

Ensuring that the outcomes and impacts measured are causally linked to the project being assessed is one of the key responsibilities of an impact assessment.

For complex projects, it is unlikely that it will be possible to quantify the exact role played by a project (attribution) due to the extent of other influences, other projects, and drivers of social and economic change. These other influencing factors make it impossible to isolate a single cause for an observed change.

It is more realistic in such cases to:

- examine the different contributing factors to a change—tracing plausible causal links from a project to an impact—which investigate the role of the other drivers like policy or regulatory change, other programs, or migration
- consider the **contribution** the project being assessed has had on an outcome and why or how this influence has led to change (Box 5).

This section discusses different strategies that may be helpful in determining causal links between the project and the impacts and changes being observed.

Having a clear idea of how the project was expected to lead to impact (and what kinds of impact) is important to framing how causality is demonstrated. For ex-post impact assessments, strategies for establishing causality will also highlight the extent to which the impact pathway is valid, and the extent of scaling.

Inconsistencies may highlight errors, omissions (unexpected impacts) in the impact pathway, and do not necessarily indicate the project has no causal links to the impacts (rather that those links are different than anticipated). Essentially, the aim is to test and confirm how the impact pathway has played out, which is closely linked with ruling out possible alternative explanations for the changes.

Without establishing causal links between a project and the measured impacts, there is a risk that what is being observed is simply coincidence or related to another driver or project all together.

For example, a World Bank project aimed at improving infant nutrition in Bangladesh was expanded, as monitoring data suggested substantial decreases in malnutrition in pilot areas. However, more careful analysis confirmed that while malnutrition rates were indeed falling in project areas, this was consistent across the country driven by increases in rice yields and incomes, and a decrease in the price of rice, and not linked to the nutrition program (White 2009).

There are three broad approaches to determining causality, and they all benefit from having a clear pathway of impact identified at the outset. These are:

- counterfactuals
- checking consistency of evidence with causal relationships
- ruling out possible alternatives (Rogers 2014).

The strategy (or strategies) used needs to be determined based on what is being evaluated and the context (recognising it will not be possible to investigate every causal link). Applying more than one strategy will support greater confidence, but will not always be possible.

Contribution analysis is a framework that integrates each of these three strategies as part of the impact assessment (Mayne 2012). Whatever strategies are chosen, it is important to clearly articulate and justify the methods used, and the limitations, when making causal claims in the impact assessment report.

An overview of each strategy is provided below, while Table 10 provides a summary of different methods appropriate to the strategies. Many of the methods (for example, surveying, interviewing or case studies) used in establishing causality are likely to be methods used to explore impacts themselves. As such, it is important to consider data needed for causality as part of the evaluation design to align data collection activities.

Implicit in these approaches is a need to test the degree to which a particular event or external force has contributed to a particular change. This is often challenging and subjective, but can be considered as part of the strategies outlined below.

Box 5: Different emphasis of attribution and contribution

Attribution—quantifies the proportion of benefit that can be directly linked to the activities of the project. Has the project led to the outcome/impact? What quantitative proportion of impact can we attribute to the program?

Contribution—acknowledges the range of other influences, and considers what role was played by the project. Has the program influenced the outcome? Has it contributed to the result? How and why? What role did the program play in bringing about the impact?

Like other methodological choices, the decision to demonstrate either attribution or contribution, the methods used and limitations of these methods needs to be included in the final report. There is increasing recognition that it is often not feasible to demonstrate that attribution and contribution is a valid alternative to pursue, especially in complex project where there are multiple influencing factors.

Source: Based on European Science Foundation 2012 and Rogers 2014.

Table 10 Methods used for testing causal links, identifying alternatives and developing counterfactuals

Method and description		Causal links	Alternatives	Counter-factuals
Qualitative methods				
Comparative case studies/ qualitative case analysis	Detailed analysis of several cases (could be an individual, household, group, organisation or other depending on the project) to explore the context and process. These are compared to explore which features or components might influence/lead to observed impacts.	✓		
Key informant interviews	Asking key informants to provide explanations based on their experience, expertise and perspective.	✓	✓	
Review existing literature	Checking whether the results are consistent with literature in the same area. This needs to make explicit the limitations of the literature	✓		
Process tracing	Collection of data to rule out alternative explanatory variables at each step of the process.	✓	✓	
Quasi-experimental designs				
Judgemental matching, matched comparisons	Researchers and evaluators use their own judgement to create comparison groups based on the variables they view as important or relevant.			✓
Propensity score matching	Statistical method to construct a comparison group, which acts like a control. The comparison group is constructed based on having the same probabilities of participating in the project to reduce selection bias inherent in non-randomised trials. It requires an experienced statistician and a large sample size, which may be a limiting factor for some impact assessments.			✓
Regression discontinuity analysis	Can be used for evaluating programs that have a clearly defined threshold or cut off score to determine who is eligible or not (so relaxes the need for randomised allocation to treatment and control groups). The regression discontinuity design estimates impact around the cut-off points as the difference between the average outcome for units who are eligible (treated) and the average outcome for units who are ineligible (comparison).		✓	✓
Instrumental variable estimation	Instrumental variables provide the possibility of dealing with selection bias among program participants and are especially helpful when the source of the bias is likely to change over time. A valid instrumental variable needs to fulfil two conditions: • It should be relevant, meaning they need to be strong predictors of treatment. • It should be exogenous, meaning the instrumental variable should not be correlated with the impact indicator.			✓
Other				
Hypothetical counterfactual	Demonstrating that conditions would have remained the same without the intervention.			✓
Modelling	Using models (for example, regression, general equilibrium) to estimate what would have happened without the intervention		✓	✓

Source: Authors, based on Rogers 2014.

Checking consistency of evidence with causal relationships

The impact pathway (Stage 1) provides a basis for the expected causal links of how the project activities were to lead to outcomes and then impacts. One way of testing for causality is to check whether there is a consistency between the *anticipated* outcomes and impacts defined in the impact pathway and the *observed* changes on the ground.

This means gathering evidence from a range of different sources to test the impact pathway and consider, given the evidence, whether the steps along the chain make sense and are supported by the evidence. For example, in households that experienced the 'final' impact, is there evidence they also experienced the intermediary outcomes? Is the timing of impacts consistent with the time since the project? If evidence does not match the impact pathway, it is important to explore why and revisit the impact pathway.

If conducting interviews as part of this strategy, questions should work backwards from an impact, and avoid assuming or suggesting in the questions that the impact is a result of the project. For example, if policy influence was an outcome, the question should be about the process of how the policy was formed, rather whether the project influenced it.

Ruling out possible alternative explanations

This strategy aims to identify, and then test alternative explanations that may have causal links to impacts. This can draw on the context mapping, which identified other significant events or drivers of change that may indicate alternative explanations, but most likely would involve additional data collection.

If conducting interviews as part of this strategy, the focus is asking experts (for example, community members, government officers, non-government organisations or other stakeholders) to:

- identify other possible explanations or causes of the impacts
- provide an opinion or judgement as to whether, to what extent, and why they attribute changes to the project, or what other explanations there may be.

Measuring (or estimating) what would have happened without the project—counterfactuals

Counterfactuals compare differences between a group or population that has been involved with an intervention, and a similar or comparable group that has not been involved—that is, what would have happened in the absence of the intervention?

Using a counterfactual in the example of the nutrition program discussed above would have meant comparing the difference in malnutrition rates between the households involved in the program, and other households who were not.

A subsequent evaluation used propensity score matching to construct a comparable group of households who had, and had not, received the intervention. This highlighted decreases in malnutrition for both sets of households, and raised questions about the causes of those decreases beyond the project (White 2009).

There are several methods for constructing counterfactuals. The options available for an ex-post impact assessment are often driven by design of the original project (for example, whether they used experimental design (randomised control trials) or quasi-experimental design) and the availability of monitoring and evaluation data from the original project.

Advanced statistical techniques may be limited by data availability (existing data, and the resources available to collect additional data).

Where counterfactuals are not possible or difficult to do well, combining this strategy with the other strategies can help to strengthen confidence in the links between the intervention and the impacts.

Qualitative and quantitative methods

The use of mixed methods in impact assessments has become common as a way of overcoming the limitations of purely quantitative or qualitative studies (Table 11). While quantitative studies have the advantage of providing data that can be generalised and used to estimate costs and benefits, they often exclude contextual information important to understanding results (Bamberger 2012).

While qualitative methods are more flexible and can better capture detailed information and diverse perspectives and experiences, they often do not provide generalisable results. Some clients or funders of impact assessments may feel uncomfortable with qualitative methods due to perceptions of subjectivity or lack of rigour (Bamberger 2012; Rogers 2014).

Using mixed methods as part of a considered evaluation design can help to overcome these limitations. Mixed methods are also useful to consider interactions in complex and evolving contexts, ensuring context-appropriate measures, and capturing multifaceted changes in behaviour and institutions (Bamberger 2012).

Because of this ability to capture and interrogate interactions and evolving contexts, mixed methods should be incorporated into impact assessments of complex projects where time and resources allow.

Table 11 Comparison of strengths and weaknesses in qualitative and quantitative research

Strengths	Weaknesses
Quantitative	
• Provides information on extent/scale of impact. • Allows for aggregation and comparison of data. • Findings can be generalised. • Sampling methods can ensure representativeness. • Allows for costs/benefits to be estimated. • Study can be replicated and results compared. • Can control for extraneous variables in causality.	• Cannot capture processes, how or why questions. • Provides limited contextual information to interpret findings. • Structured questionnaire may be alienating and/or uncomfortable for participants. • Modifying instruments can be difficult once study begins. • Reduction to numbers loses information.
Qualitative	
• Provides in-depth understanding of the problem context, and complex issues and processes. • Captures intangible outcomes and impacts that are difficult to quantify or may not be 'visible' in quantified assessments. • Gives voice to participants and beneficiaries of research. • Explains 'how' or 'why' behind impact numbers.	• Can be difficult to replicate. • Has limited generalisability (that is, only within certain conditions). • Is resource (especially time) intensive. • Multiple (conflicting) perspectives can be difficult to reconcile in reporting.
Mixed methods	
• Can be triangulated across datasets. • Uncover deeper research findings. • Results from one method can inform the design of subsequent methods. • Generate new insights from different methods, highlighting areas for further analysis and exploration. • Incorporate greater diversity of perspectives and values. • Can capture complex interactions and changes.	• Can be resource intensive. • Require mix of skills and expertise. • Finding shared understanding and language in interdisciplinary teams is time consuming and requires teams with a willingness/shared belief in the value of mixed method/respect for other methods.

Source: Compiled by authors from Bamberger 2012; Carpenter and McGillivray 2012; Onwuegbuzie and Hitchcock 2017.

Considerations for design of mixed methods for impact assessment

There are different ways mixed methods can be used in impact assessments (USAID 2013):

- **To answer different questions**—for example, the use of surveys to determine whether, and by how much, household incomes have increased, and use of interviews or discussions to explore how and why incomes have increased (sequential or concurrent design).
- **To answer the same questions**—providing a means to triangulate or cross-check results. Where findings are consistent, there is greater confidence in results. Where there is disagreement, it may indicate bias, or other factors, such as social differentiation in access to benefits (sequential or concurrent design).
- **To inform the design or questions asked in different methods**—for example, using key informant interviews (KII) or focus group discussions (FGD) to identify key issues of importance, which informs the design of a survey. Or alternatively, using a survey to guide sampling strategies ensuring qualitative methods are representative of the broader population (sequential design).

Box 6 provides an overview of three different strategies for the implementation of mixed methods: concurrent, sequential, and multilevel. The choice of which of these is deployed should be guided by the research questions and approach, as well as pragmatic considerations of resourcing and timeframes.

Part of determining how the methods will be deployed is having a good understanding of what methods will be used, and how they can relate to each other. The methods used, and their design, will be guided by a combination of:

- the approach or framework guiding research
- the types of change and indicators identified
- the skills and expertise available to the team.

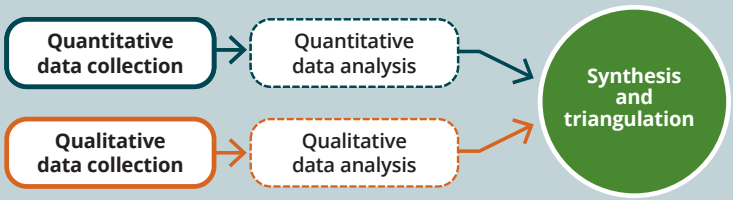
To make the most out of the impact assessment, it is important to have a clear rationale about when and how different methods are used, and for what purpose or to answer which questions (Jimenez et al. 2018).

Many impact assessments revert to FGDs, surveys and interviews, as these are familiar, proven and relatively easy to integrate.

Box 6: Concurrent, sequential and multilevel design for mixed methods

Concurrent design

Quantitative and qualitative data collection is conducted separately, and results are compared and integrated only after the initial analysis. This has the advantage of being faster to conduct (teams are not waiting for each other to finish). Drawbacks include stretching of human resources in small teams, difficulties coordinating field activities, and risks of not being able to adjust or adapt methods based on initial findings.

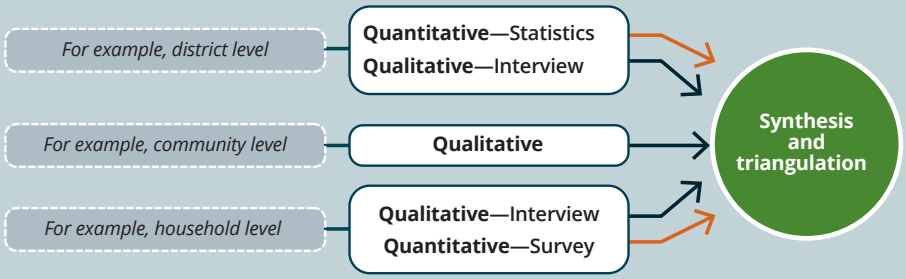


Sequential design

In sequential design, data collection activities are staged so that initial findings or insights are used to inform the design of the methods that follow. The advantage of sequential designs is that it allows for adaptation and refinement as teams deepen their understanding of the situation. They can also be logistically easier to plan, though more resource intensive (for example, requiring multiple visits to field sites).

Multilevel design

A multilevel design refers to the units of analysis, and consideration of the methods that will be used for the different units. In the context of complex interventions, and guided by the impact pathway analysis, it is likely that there are multiple levels where interventions have operated and/or had an impact. Qualitative and quantitative methods could be combined for each level, either in a sequential or concurrent design. However, it does not have to be the case.



Source: Based on Bamberger 2012; USAID 2013.

Table 12 makes some additional suggestions of alternative methods which may be of use. Table 13 provides an example of a research design combining qualitative and quantitative methods to improve understanding of the same questions.

Table 12 Comparison of common qualitative and quantitative methods

Method	Description	Strengths	Weaknesses
Most significant change (MSC)	**Qualitative** Asks stakeholders to provide their stories of the MSC resulting from the intervention—positive or negative. Stakeholders are then guided through a process to collectively determine which is the most significant and why.	• Rich descriptions by stakeholders of how they perceive the most significant impacts. • Can highlight unanticipated impacts. • Encourages group learning and reflection on impacts.	• Process for collective analysis needs to be carefully managed to ensure equal consideration to all views.
Time trend analysis	**Qualitative** Interviews and/or discussions to trace stakeholder perceptions of change over time, including drivers/causes of change, such as oral histories, timelines.	• Rich descriptions of how change is perceived by stakeholders. • May assist with causality analysis.	• Memories may be subjective and/or inaccurate.
Video/photo voice	**Qualitative** Asks stakeholders to record images in response to questions. For example, photo representing key impact from project, followed by discussion to understand how the image is meaningful to the stakeholder.	• Participants can easily document impacts in their everyday lives. • Flexible, in that questions can be specific (indicator focused) or open ended.	• Relies on technology that participants may not be comfortable with.
Proportional piling	**Mixed qualitative/quantitative** Participatory method to gather information on relative contribution or importance by asking participants to allocate counters to different categories, such as change in income from different activities over time. Follow up questions elicit further qualitative information that provides context.	• Provides quantitative information and qualitative context. • Accessible to wide range of participants, regardless of literacy.	• Often conducted in groups—needs care to ensure all perspectives are captured.
Contingent valuation	**Quantitative** Estimates value that a person places on a good or service. Asks people to report willingness to pay, or willingness to accept the loss of a good, through a series of questions.	• Can capture values people assign to public goods, such as air or water quality.	• Critics argue stated preferences are not an adequate measure compared with observed behaviour.

Source: Based on Chambers 2010; Tremblay and Harris 2018.

Table 13 Example of rationale for use of different methods, World Food Programme in Cambodia

Insights sought/areas of enquiry	Methods
• Overview of the World Food Programme's policy framework. • Related interventions in Cambodia. • Alignment to national policies.	• Desktop review
• Identification of current trends in education system and comparison between targeted and non-targeted households.	• Surveys (school and household) • Analysis of secondary data
• How to interpret trends within the system, and the role/contribution of school feeding programs. • Exploration of links between school feeding, individual beneficiaries and education systems.	• Stakeholder interviews • Participatory FGD

Source: Nielsen et al. 2010.

Research integrity and ethics

Impact assessments, like any piece of research, must adhere to principles of research integrity and ethical conduct.[7] Ethical conduct of research (including evaluation) seeks to minimise the potential risks or harm to those involved by upholding the principles summarised in Box 7.

However, ex-post impact assessments present particular challenges for research teams to think about and manage.

These challenges arise from the real or perceived power dynamics and relationships between those conducting the assessment, funders/donors, those who carried out the original research, and/or participants, and risks that these dynamics bring. How these considerations and challenges unfold, and options of how to manage them will depend on the context, but will likely rely on clear communication to manage expectations and carefully outline the aims and use of the impact assessment.

Box 7: Principles of ethical research

Research merit and integrity

Research is justified by the potential benefits, and design is appropriate to the research aims. Research is conducted with a commitment to recognised principles of research, such as advancement of knowledge, honesty and accountability and declaration of any conflict of interest.

Justice

Fair consideration is given to who is included or excluded from participating in research, and there is a transparent process to select participants. No unfair burden is placed on participants due to their involvement in the research. Participants and their communities have fair access to the benefits that arise from research. Research outcomes are made accessible to participants and the broader community.

Beneficence

The expected benefits from being involved in a research project should be appropriate to any risks of harm or loss. Risks and potential costs are clearly and openly communicated to participants, and steps taken to reduce risks as far as possible.

Respect

Respect should be given for the welfare, beliefs, values and customs of participants and their communities, as well as for privacy, confidentiality and any cultural sensitivities of participants and their communities. Participants have autonomy and free choice to make decisions about their involvement in research.

Source: NHMRC 2007.

7 It is the view of the authors that evaluation and monitoring evaluation and learning more broadly are fundamentally about contributing to knowledge, and are an integral part of research activities that seek to have an impact on the world. In this sense, we do not subscribe to the alternative view that evaluation and research are separate domains. Regulatory requirements vary in different countries. Australian research organisations conducting research that involves the collection of information from people are required to have approval from a Human Research Ethics Committee. In the Philippines, oversight is provided by the Philippine Social Science Council and the Social Science Ethics Review Board, though is not typically required for impact assessments commissioned by PCAARRD. Even where such requirements do not exist, it is important that impact assessments follow ethical research principles as part of ensuring research integrity.

Relationships, power and participation

Invited participants may feel that they are obligated to participate due to their involvement in the original project (either as a beneficiary, as a project team member or other stakeholder group).

A participant's capacity to provide honest/free answers may be influenced by their relationship with the former project team or other stakeholders, and/or the perception that the outcome of the assessment will influence potential for additional funding or future projects.

This may affect their decision to participate, as well as their answers to particular questions (for example, they may give answers based on what they think researchers or stakeholders want to hear).

Risks to participants

Impact assessments are critical analyses of the extent of impact achieved. Former project members (for example, those employed by, or contributing to, the original project) may perceive risks to their personal or professional reputations, should the impact assessment highlight challenges, problems or lower-than-expected impacts, or where planned beneficiaries are critical of the project in some way.

This may also be the case for other stakeholders (such as government departments, non-government organisations or others) who have adopted aspects of the project being assessed.

Care in how data are managed and results are reported

Those conducting the impact assessment need to ensure the results are shared back to participants and stakeholders in a considered manner—some results may be of benefit, but some may pose a risk.

For example, given the potential for issues of power and risk to affect participants, particular care needs to be taken in protecting the anonymity of participants. This may mean limiting the 'descriptors' used when including quotes or perspectives.

For example, 'expert' interviews with former or current project staff are often important contributors to impact assessments, but may be easily identifiable by their position, even if their name is not used (such as, mayor, local program coordinator).

Unless specific consent is sought for them to be identified, more generic descriptors should be used (such as government official, key informant). Where permission is sought to identify informants, impact assessment researchers should be aware this may affect the nature of information provided, and be particularly aware of any implications or risks of identifying the individual.

Photo: Jeoffrey Maitem

4.4 Stage 3: Implementation

This section provides some guidance on navigating some of the issues that may arise during the processes of data collection, analysis and reporting and communication. It does not attempt to explore all possible aspects of collecting and analysing data, or provide in-depth instructions based on different disciplinary practices.

The scoping and design of the impact assessment are based on the understanding of the team at the time. As data are collected, it is likely that additional impacts (positive or negative) will emerge, or that new insights emerge on the pathways and processes that have led to impact. After all, the aim of the assessment is to test the assumptions and links between project and impact.

As the teams' understanding of the processes and impacts evolve throughout the data collection and analysis steps, it is important to periodically revisit the theory of change and impact pathway, and in some cases the research design. The idea is not to entirely discard what has been done previously, but to check in as new information emerges to make sure the right questions are being asked, or to check whether previous assumptions about causal links and influences are still accurate or need to be revised.

Data collection

Dealing with the unexpected

Many aspects of data collection can lead to unexpected or challenging circumstances. How these are managed will depend on the overall design of the impact assessment and vary greatly from case to case. It is essential that there is a clear evaluation plan and supporting information (for example, data collection protocols) to ensure a consistent approach across the team, and ensure transparency and replicability of the impact assessment.

The plan can (and should) be adjusted as needed, but what is changed and why should be recorded. This not only ensures transparency and integrity, it can also contribute to overall learning and improvement across different impact assessments.

Taking the opportunity to record and reflect on challenges experienced as part of the impact assessment's data collection process (and the assessment more broadly) can help facilitate improvements to future processes, and enable deeper insights for the team(s), for funders and for stakeholders over time.

Unexpected results

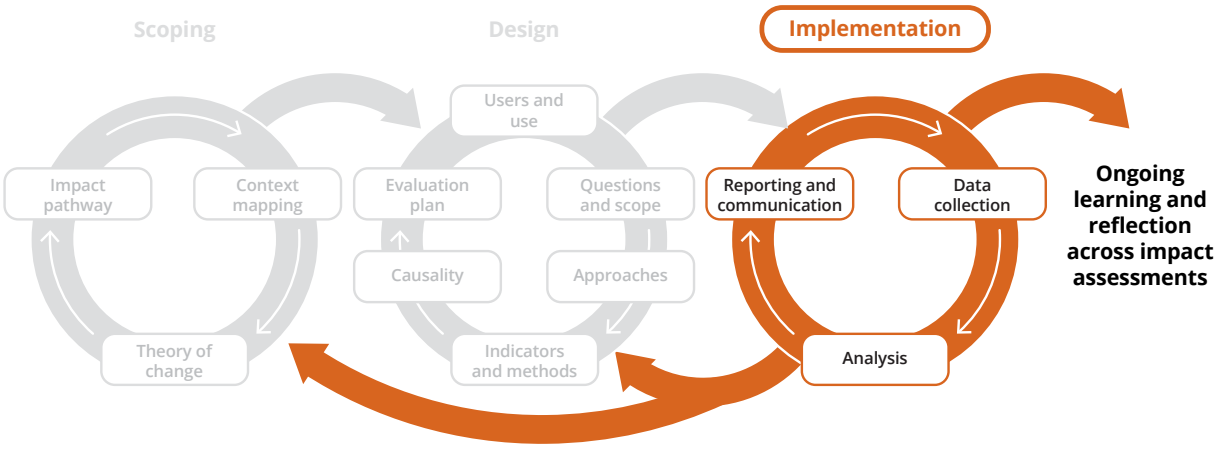
Where data collection activities begin to highlight different results than expected, it may indicate a need to update and refine the impact pathway and theory of change, and highlight modifications that are needed to the design of the impact assessment.

This may include in-field adjustments (such as modifying survey questions or participant groups for proportional piling activities to better explore differences), but, in the case of sequential mixed-method design, will also influence the design and questions included in subsequent data collection activities.

Contradictory findings

As data are collected, it is likely that different perspectives on the same impact or process become evident, which may require further exploration—for example, if different stakeholders give contradictory responses in interviews, or if household surveys indicate different results than those from the scoping interviews used to inform the design.

This does not necessarily indicate that either set of data is wrong, but further exploration may be required to help explain and understand the reasons behind these differences.



Negative impacts, less-than-expected impact

It may be the case that the data collection process highlights that:

- limited, no, or negative impacts have resulted from the project
- impacts have been limited to a small group
- impacts have not been sustained over time.

If this is the case, it is important to try to understand why this has happened as part of learning what can be done differently in future projects.

Operational challenges

Issues like adverse weather, poorly maintained roads and unreliable phone coverage can present safety and logistical issues for impact assessment teams.

This is the case for all research, but in impact assessments—where timeframes are often very short and opportunities to go to the field are limited—these issues can have significant impacts on the teams' ability to conduct activities as planned.

In such cases, the team's safety and wellbeing is paramount, and data collection plans may need to be adjusted to account for these realities (for example, by reducing the number of sites visited). This is justifiable, but the effect of these decisions should be considered as part of the analysis and reporting. For example, if security concerns limited the access to sites in a conflict area, then a note should be made that the impact assessment is not reflective of project impact in these areas.

Considerations for data sources and sampling

There will be different strategies and considerations for sampling based on the different needs and aims of the impact assessment. For example, surveys commonly use probability sampling to allow for statistical generalisation of results, while qualitative research methods may use purposive sampling to ensure perspectives from key interest or stakeholder groups are captured. Time, resources and ability to access different participants are likely to be moderating factors for overall sampling strategies in impact assessments.

Given the goals of many projects to improve livelihoods of the very poor, or to increase women's participation and empowerment, it is important to consider whether the design of the impact assessment, methods and data collection allow for participation of these different groups. For example, if timing of data collection clashes with peak labour requirements in agricultural systems, participation of agricultural workers may require scheduling interviews or discussions in the evening or non-work times.

Similarly, where childcare responsibilities rest predominately with female household members, additional flexibility or support may be required to enable women's participation without compromising their other responsibilities or adding additional burdens.

Likewise, analysis of data can consider the 'position' of respondents, and how this might influence their experiences and ability to take advantage of project benefits. For example, lead farmers may be better positioned to take advantage of a program (for example, they might have better information networks, more resources and more flexibility in farm management, and be more able and willing to take risks) than more marginal farmers.

Analysis and writing the impact assessment report

As with data collection, standard protocols and methods apply for tasks like processing, data cleaning and analysis based on accepted disciplinary practice. Qualitative methods have a range of systematic review processes to identify patterns and how to interpret them, while quantitative methods rely on statistical analysis and calculations (Adamchak et al. 2000).

The key for these impact assessments is how to integrate data and findings across sources, and between qualitative and quantitative approaches and disciplinary perspectives.

Integrating results

O'Cathain et al. (2010) describe integration as 'the interaction or conversation between the qualitative and quantitative components of a study'. Facilitating this 'conversation' can be difficult and time consuming, because it often extends researchers outside of their areas of expertise to new ways of thinking that requires a common language or understanding.

But the effort invested can lead to richer ways of understanding the impact of a project, and more insightful lessons for funders, researchers, practitioners and communities.

The analytical framework to understand impact defined in Stage 2 provides the overarching guide for how to analyse the data collected—the themes, indicators and key areas of focus. The design will also have considered the rationale for using different methods and how the data from the methods will be used.

The sequencing of data collection activities also provides an indication of how data are analysed (for example, if a sequential design is planned, then analysis of initial data is purposefully used to inform the design of subsequent data collection methods), but this does not limit how data are analysed and reported.

If research is designed sequentially, it does not mean that findings need to be reported sequentially.

The role of the impact assessment team in integrating their analysis is to look across the datasets and identify themes, patterns and insights that cut across, to articulate an evidence-based narrative that synthesises and makes sense of the data.

That is, they aim to answer the key questions of the impact assessment and articulate the lessons learned—the 'what does it mean?' and 'so what?' questions—rather than simply articulating what was found.

Comprehensive guides on how to integrate data based on mixed-method designs can be found elsewhere (Bazeley 2018). For simplicity, three different techniques are outlined in Box 8, noting this is not exhaustive, and, in many cases, a combination of different techniques will be used.

Considerations

Interrogating and discussing data as a team

It is useful for team members to engage and discuss findings across the disciplines and approaches often. This helps to create a common understanding and language in discussing the impact of the project, and supports the ability of different disciplines and types of knowledge and information to inform and improve the overall understanding of the findings.

A sociologist looking at household-level survey data is likely to think about the data differently and ask different questions than an economist or an agronomist. Likewise, going through interview transcripts or pile sorting results, scientists from different disciplines bring different perspectives and interpretations of the data. These discussions can raise important insights and connections across the datasets available.

Dealing with discrepancies or different perspectives between datasets

Where the different types of data indicate conflicting or different findings, consideration should be given to why this is the case. For example, the differences may be due to the ability of the different methods to pick up nuances, as is the case in the example provided by Bonilla et al. (2017) (Box 9).

Alternatively, it could also be due to different power relations, beliefs or values between different groups, or different capacity to access programs (for example, between landless or landowning households). It is important to include these different perspectives, along with the analysis and considerations for why there are differences as part of reporting.

Recording lessons learned

There will be a range of lessons and insights to capture as part of the impact assessment, relating to the project being assessed, and the impact assessment itself (how it was designed, challenges in implementation and others).

Where possible, these should be included as part of the write-up. Unless these reflections and lessons are captured, they cannot be used and shared. It also provides the opportunity to synthesise lessons across impact assessments, which may help inform future investments and design and implementation of future projects, increasing the relevance and effectiveness of future agricultural interventions.

Transparency and acknowledging limitations

The process of collecting data rarely goes to plan, due to time constraints, field access issues and other issues. This is an expected and accepted part of research, but it is important that the write-up of the study acknowledges and makes clear these challenges and limitations. It is helpful in ensuring the interpretation of results is appropriate, and it helps other practitioners and impact assessors who may be facing similar challenges. For example:

- if challenges in data collection meant that the team did not get to gather perspectives from a key stakeholder group (for example, women), then it should be noted that the results do not include their views
- the degree of impact claimed must be appropriate to the methods and research strategy chosen—for example, in-depth case studies provide rich data on the experiences of participants within that case study, but are unlikely to be generalisable to the broader population, so it is important that the conclusions reflect this
- the degree to which a project has contributed to a set of impacts, based on the strategy for defining causality that was chosen (Stage 2) must be properly acknowledged.

Box 8: Three techniques for integration of qualitative and quantitative data

Following a thread

After initial analysis of each dataset, a theme or question (thread) is selected and then followed across the datasets. In other words, we take a finding from one dataset and then analyse or look for related information and insights in the other dataset.

Triangulation

This involves taking qualitative and quantitative data that have been analysed, and comparing results as part of the interpretation of the data. It is a process of comparison of results—looking for where the qualitative and quantitative datasets:

- tell the same, or a similar, story
- disagree
- offer completely new insights (alternatively, looking for agreement, partial agreement, silence or dissonance across findings).

Case-based analysis

Where the team have qualitative and quantitative data about the same 'case' (person, group, organisation, geographical area) then another strategy can be used to analyse and compare the different data for each case.

For example, if there are survey answers and interview transcripts for a household, the results between the two datasets could be compared, which can provide a rich understanding for each case. Results across cases can then also be compared to look for patterns or differences across the cases.

Source: O'Cathain et al. 2010.

Box 9: Impact assessment of cash transfer programs—an example of integrating qualitative and quantitative data

Bonilla et al. (2017) conducted an impact assessment of an unconditional cash transfer program in Zambia that combined qualitative and quantitative data to understand whether, and how, the program supported economic empowerment of women.

The research design was sequential, with quantitative survey data analysed earlier, and informing the objectives and questions asked in the qualitative interviews.

Quantitative surveys showed only small increases in the extent of women's participation in household decision-making. A comparison of the data from qualitative interviews supported this finding, but further analysis of the interview data also showed that women felt more empowered as a result of the intervention, even though their role in decision-making had not changed.

This tells us that there are bigger structural constraints to women's empowerment beyond that which the cash transfer can address (such as norms and expectations around gender roles), but that the program went some way to changing how women perceived their own position.

Reporting, communication and sharing lessons

Reporting of the results of the assessment includes the written report (with adequate information on the methods, analysis and limitations of the assessment), and the communication and discussion of the results with key stakeholders.

Considering how the findings of an assessment will be used, and by whom, is a critical part of the design of an impact assessment (see 'Understanding the users and use of the assessment' in Section 4.3). Building on those considerations, a number of steps can be helpful in ensuring the findings of the assessment meet the needs identified (Box 10).

Box 10: Steps in reporting and communication

1. **Clarify mandatory reporting requirements**
   This is usually about the contracted reporting with donors or funders. Work with the donor or funder must be clear on the timeframe and format required for official reporting.
2. **Develop a communication plan**
   This does not need to be a detailed document, but a strategic discussion with relevant team members, the funder and other stakeholders to work out the most effective ways to share the findings of the assessment with the range of users identified earlier. It may be relevant to develop a number of versions of the findings in different formats for different sets of stakeholders—for example, executive summary, web content, a short video or a longer documentary, online webcasts, fact sheets, postcards, verbal briefings or engaging the media to deliver the messages. There are a multitude of resources available to support the communication of the assessment findings (see Appendix 1).
3. **Supporting the broader use of findings**
   Considering the theory of change/impact pathway of the project, think about who else would benefit from knowing the findings to support further outcomes or impact. For example, if long-term policy change is a key path to impact, consider who may appreciate a verbal briefing of the findings, or ask them how else the project can support their analyses. Alternatively, a key finding of the assessment may focus on capacity of the stakeholders to affect change. Consider then (for example) how the project's finding could spark social learning among groups to continue to collaborate and share experiences.
4. **Develop and share recommendations and lessons**
   Lessons learned from conducting the impact assessment and throughout the project itself can provide valuable insights for participants and stakeholders involved in the project. Further, these lessons can generate value beyond a particular project to the broader AR4D community. Sharing these via publications, conference presentations or workshops are important to enable AR4D practice to evolve. Often funders of projects will require lessons to be captured as part of the monitoring, evaluation and learning system. The data generated in capturing lessons are subject to the same ethics considerations covered in this report.
5. **Consider the skills required to effectively and creatively share and communicate**
   Often, the skills required for some of the above elements may not exist with the project team. Consider the kinds of skills the team has and who else may provide diverse views, and bring different skills or experience in a different science domain. For example, if a project involves Indigenous groups or culturally diverse participants, consider working with an Indigenous media outlet or local theatre group to communicate findings in ways that meaningfully engages relevant participants.

Source: Adapted from Better Evaluation 2018.

5 Lessons and implications for designing and implementing integrated impact assessments

Throughout this document, we've highlighted the importance of capturing lessons learned or reflections in the process of conducting impact assessments.

In this section, we share some general lessons, reflections and insights from the team involved in developing and testing this framework. This section draws heavily on McMillan et al. (2019), which captures these discussions and implications in more detail.

We share these lessons and implications, because they cover aspects that underpin and influence the design of impact assessments more broadly and may be useful for others who are also interested in a more integrated approach to impact assessment. Additional lessons that relate directly to the application of the framework are presented in Part 2.

These reflections were gathered during dedicated facilitated team sessions to consciously reflect, discuss and document lessons. The discussions explored our norms, institutions, practices and how this shaped what we did, as well as what we would like to try to change.

The discussion was open, honest and a tribute to the trust built within the team.

5.1 Lessons

What worked

Teams acknowledged the value of having multiple disciplines, drawing on different methods and engaging with different participants as a way of looking at the results from different perspectives. It was important that team members demonstrated an openness and interest to learning about other disciplines and trying new ways of doing research.

The scoping activities (impact pathway mapping, context mapping and others) were useful in expanding the scope of the impact beyond economics. It was also helpful for defining the boundaries of the assessment. The framework, and multiple methods, helped to identify unintended impacts, and identify gaps in data.

The VSU and UPLB teams had long histories of working together, and strong local networks, which enabled the project to achieve significantly more than if the team members had been unknown to each other.

Both ACIAR and PCAARRD, as commissioning agencies, remained engaged in discussions about the framework throughout. Their interest and flexibility were important in enabling the teams to experiment with a different approach.

What didn't work

The project was designed to deliver big milestones early on. This put the focus of the team on delivering these milestones, rather than getting a shared understanding of how they would work, which created some issues and challenges in the first year.

The iterative and collaborative approach to developing and applying the framework was also challenging—implementing projects in an adaptive way challenged the standard performance frameworks of the organisations involved, and took significantly more time and resources than past impact assessments.

Team composition was set early on and needed greater flexibility to change as a better understanding of the case emerged.

Operationally, while there was a lot of project documentation and past evaluations of the Landcare work, it was difficult for the teams to access and often in formats that did not facilitate direct comparison with the impact assessment surveys (for example, no baseline survey).

What we would do differently

At the core of what the team would do differently is how the project was established and structured, which had implications for ongoing communication.

Given our time again, we would have put more time at the outset of the project to get a shared understanding of:

- where each individual and organisation were, in terms of expectations, skills and constraints
- how we could effectively work across distances to support the process of framework development, application and learning for all teams.

Though not surprising, this aspect is often overlooked.

5.2 Implications

Our experience in developing and applying the framework met with many of the challenges that other interdisciplinary projects face, such as needing to have time in planning the project to develop a common understanding and shared language across disciplines.

Undertaking this research to overcome these challenges requires a different approach to impact assessments, one that has implications for how they are commissioned, funded and how the skills of evaluators are valued.

Though there is momentum towards new ways of defining, measuring and reporting on impact, in reality, this represents a long-term organisational change agenda to support integrated approaches.

Having a framework that seeks to enable multiple impacts to be assessed with integrated approaches is useful to provide guidance, but is not sufficient on its own. In commissioning and planning for integrated approaches to impact assessments, the following considerations apply:

- **Establishing a shared understanding of impact is critical**—Understanding different assumptions that teams and funders may have in defining and measuring impact, and from whose perspective impact is measured is critical in establishing the bounds and purpose of the impact assessment. However, the consideration and design of the original project has a critical influence. Ideally these questions are explored as part of the initial project's investment and design, as these understandings of impact ultimately guide the development of the initial project's monitoring, evaluation and learning system and the opportunities for impacts to be tracked and evaluated over time.
- **Organisational norms and structures may need to shift to accommodate integrated approaches**—The adaptive approach proposed in this framework is not necessarily supported by organisational contracting, project management or monitoring systems, which are designed to support standard linear approaches. Organisational performance and accountability systems are often based on quantification of impacts in particular metrics. Broader cultural change agenda is required to ensure that organisational systems and incentives recognise and draw value from these types of assessments.
- **Integrated approaches are likely to require more time, more resources, teams with different skills, and new ways of working together**—Researchers with expertise in evaluation and impact assessment, in addition to diverse disciplinary expertise, all have important contributions in an integrated approach to impact assessment. The process of undertaking an integrated assessment across organisations and teams reinforced the difficulties of working across disciplines. Bringing teams together with different disciplinary strengths and different perspectives can better capture the complexities of project impacts, but also requires more resources (mostly time) for collaboration, especially if the assessment takes a participatory approach, engaging stakeholders and beneficiaries in the design and implementation.

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PART 2
Application of the integrated framework: Landcare in the Philippines

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The integrated approach was applied and fine-tuned to the impact assessment of the Landcare program in Claveria, Misamis Oriental, and in Pilar, Bohol. Essentially, the projects aimed to assess the impacts of the Landcare program, specifically on alleviating poverty. Photo: Jeoffrey Maitem

6 Context

Limited diversification and low productivity hinder agricultural development in the Philippines. Climate change also threatens productivity and production levels, as natural disasters and calamities disrupt operations in different agricultural sectors of the country.

Further, the country's natural resources continue to be degraded, rendering the agriculture, aquatic and natural resources sectors vulnerable (Brown et al. 2018).

There are also limitations in farmers' access to credit and insurance, and relatively low adoption of farm mechanisation. While various efforts to increase agricultural production through productivity improvement are being implemented, arable lands are continuously declining. Adequate extension support services for research and development, as well as strong market linkages, have yet to be realised.

The Harmonized National Research and Development Agenda for 2017–2022 of the Filipino Government highlights the aspirations of government to address research and development gaps for:

- crops
- livestock
- fisheries
- natural resources and environment
- climate change
- technology transfer
- policy research
- capacity building.

The agenda has five priority areas:

1. national integrated basic research agenda
2. health
3. agriculture, aquatic and natural resources
4. industry, energy and emerging technology
5. disaster risk reduction and climate change adaptation.

The agenda's main concern with the agriculture, aquatic and natural resources sector is to integrate the work of various government agencies conducting research and development activities. This covers development and promotion of new technologies, processes, knowledge and information about production in each sector, while ensuring sustainability in the management of natural resources and the environment.

Investments in technology, innovation and scientifically-based support services are deemed to assist the achievement of agricultural development goals for the Philippines.

The technology transfer subsector is highlighted in the agenda as being instrumental to the extension and application of research and development outputs among the target end users.

On the other hand, the socioeconomics and policy research subsectors are considered as being key to understanding the kind of community and environment in which research, development and extension (RD&E) is situated.

Focus on the subsectors involve review of current policies in the agriculture, aquatic and natural resources sector and policy research in relevant areas—like supply and value chains, impact assessments, institutions, enterprise models and local and global markets.

PCAARRD is a leading government agency responsible nationally for programming and allocating government and external funds for RD&E, as well as monitoring and evaluating funded programs and initiatives. As such, it puts a premium on the practice of impact assessment, particularly for agriculture, aquatic and natural resources RD&E projects in the Philippines.

Looking at whether RD&E programs and projects delivered on objectives and intended impacts is crucial to the socioeconomic and policy research agenda for agriculture, aquatic and natural resources. This gives way to informed policy decisions on RD&E plans for development.

Impact assessments can help determine whether particular programs should be recommended for upscaling or outscaling. In cases when an impact assessment does not indicate success of a program, the exercise still bears some value, as it can reveal any weakness in the program implementation that might call for some re-evaluation and fine-tuning.

Impact assessment in the Philippine agriculture, aquatic and natural resources sector has been guided by the collaborative efforts of PCAARRD and ACIAR. Since 2007, PCAARRD has adopted the ACIAR impact assessment guidelines, which apply the benefit:cost and results-mapping framework in tracing the progress from the RD&E inputs to outputs adopted by target users, and to outcomes and impacts.

Growing appreciation of agricultural research-for-development projects' complexity, multi- or transdisciplinarity, and occurrence in dynamic settings motivates PCAARRD's and ACIAR's intent to accommodate more holistic and multidimensional approaches to assessing the agriculture, aquatic and natural resources projects' livelihood, economic, social and environmental impacts.

An integrated approach to impact assessment can help capture a wide range of outcomes that flow in the pathway of impact from RD&E investments in the country's agriculture, aquatic and natural resources sector.

7 Project rationale

Khandker et al. (2010) emphasised that the major reasons for conducting impact assessment studies were to:

- help policymakers gauge whether a program is reaching its target goals
- promote accountability in resource allocation
- fill gaps in understanding what works, what does not, and how measured changes in wellbeing are attributable to a particular project or policy intervention.

There are two major methods in conducting a reliable and accurate impact assessment: causal inference and counterfactuals (Gertler et al. 2016).

Causal inference examines the cause-and-effect relationships of the intervention towards its target recipients. But most impact assessment studies use counterfactual analysis, where a treatment group is compared with a control group.

Consequently, an impact assessment might be purely qualitative or quantitative, or both. Bamberger (2012) strongly suggests the use of the mixed-methods approach, because:

- results from different sources can be triangulated
- results from one source can assist the development of another's instrument
- results from different sources can provide more comprehensive data that can deepen understanding about the topic
- different and new insights could emerge from different sources of data
- results from different sources can widen scope to cover for diversity of values.

At the program level, the research team aims to develop an integrated approach to impact evaluation that will be applied in assessing the impacts of the selected RD&E programs in the Philippines.

Specifically, it will:

- review, identify, adapt/develop and mix appropriate methods for an integrated approach in impact assessment of AR4D projects
- apply and fine-tune the integrated approach to the impact assessment of the selected RD&E programs implemented in the Philippines
- develop capacity among key research partners in conducting impact assessments, incorporating an integrated approach.

The integrated approach was applied and fine-tuned to the impact assessment of the Landcare program in Claveria, Misamis Oriental, and in Pilar, Bohol. Essentially, the projects aimed to assess the impacts of the Landcare program, specifically on alleviating poverty.

To meet these objectives, the project teams used appropriate mixed-methods approaches that can comprehensively assess the impacts of the Landcare program in both sites.

8 The integrated approach to impact assessment

ACIAR and PCAARRD has long been using an impact assessment framework developed by Davis et al. (2008) (Figure 5). The framework emphasises the importance of identifying links between inputs, outputs, outcomes and benefits. It uses a linear approach to understanding intervention impacts, focusing on the benefit:cost and results-mapping.

Although effective in assessing economic impacts of agricultural research and interventions, the framework has some limitations in providing the depth of analysis needed to assess social and non-economic impacts. Further, this framework is limited in capturing the full spectrum of outcomes and impacts that flow from RD&E investments.

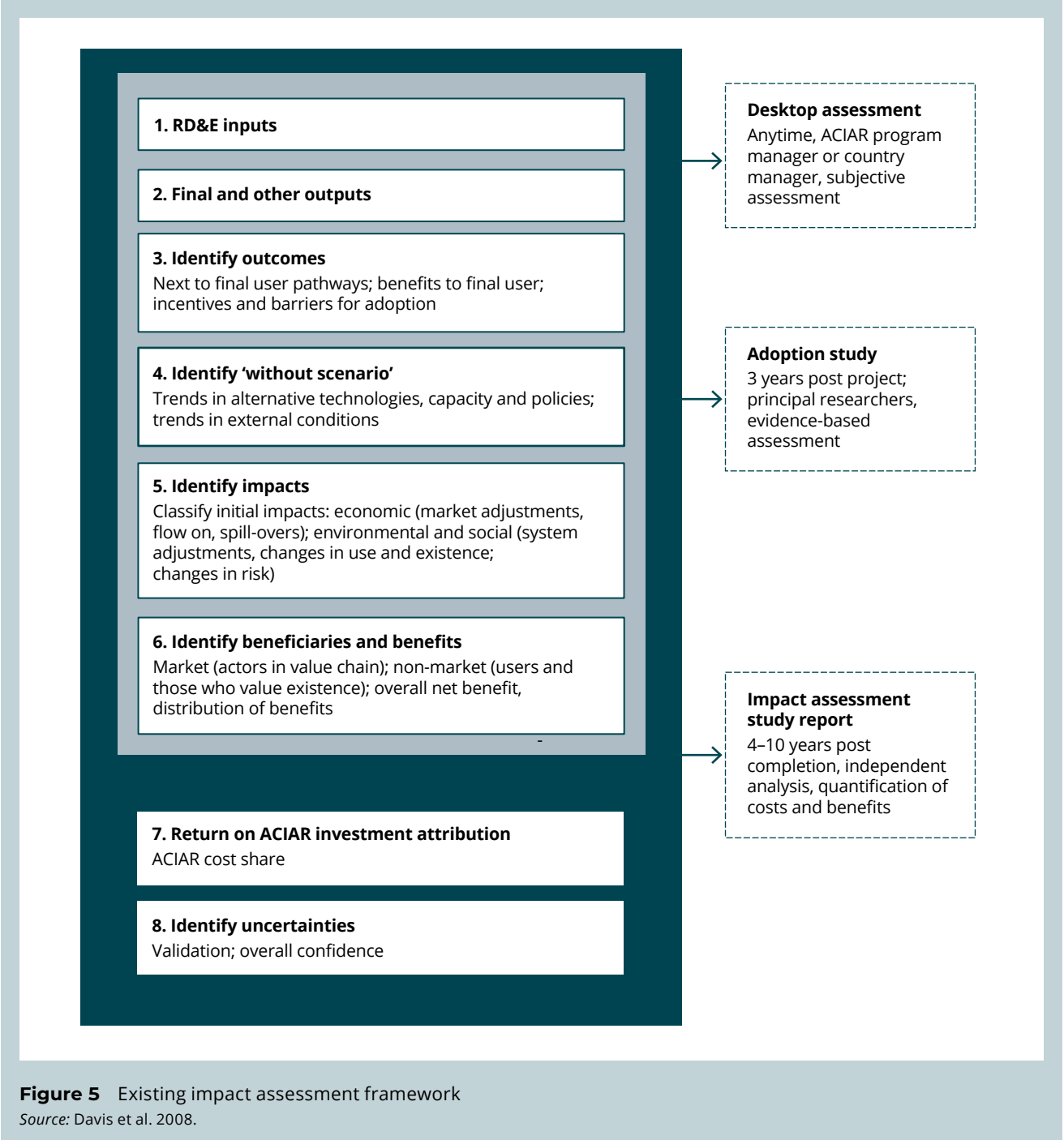

Figure 5 Existing impact assessment framework
Source: Davis et al. 2008.

Recognising that RD&E projects are becoming increasingly complex, multi- or transdisciplinary, and that they occur in dynamic settings, PCAARRD and ACIAR recognise the need for more holistic and multidimensional approaches in assessing projects' livelihood, economic, social and environmental impacts. So, CSIRO, UPLB, VSU, ACIAR and PCAARRD developed a mixed-method impact assessment framework.

CSIRO provided a more general iterative guide that illustrated the steps and processes of preparing for and conducting an integrated impact assessment (see Figure 6). This guide incorporated learnings and reflections, and documented the logical process carried out in impact assessments.

The general stages are scoping, design and implementation. Each has suggested steps to employ. These steps within each stage are not part of a strict, ordered sequence, implying that they can be conducted iteratively, either parallel or sequentially.

Likewise, the arrows indicate a feedback loop, with outcomes or findings informing a refinement and adaptation across stages along the process. The open arrow at the end of the implementation phase indicates an ongoing process of learning and adaptation (across impact assessments and to inform future assessments).

This guided the Philippine teams in developing the methodological framework that was first dubbed as a 'sub-framework', as it was envisaged as an expanded mid-section of the benefit:cost and results-mapping framework earlier adopted by PCAARRD from Davis et al. (2008).

Further refinements culminated in a new framework (see Figure 7) referred to as the mixed-method approach to impact assessment of RD&E interventions (MMAIA). In comparison to the general impact assessment framework of CSIRO, the MMAIA framework focuses on:

1. project design/project review
2. validating the theory of change and impact pathway
3. context mapping and impact scoping
4. selecting methods of data collection and analysis.

The mixed-method approach can start from a program's design phase or at any point in the period following the implementation phase.

Mixed-method approach is an integrated approach, designed for ex-post impact assessment. It can start at any point in the period following the implementation phase. It reflects the iterative nature of the integrated impact assessment approach and coincides with the benefit:cost and results-mapping framework in terms of the series of actions and considerations in the project review.

The framework emphasises the stages in the impact assessment process that precede data collection and analysis design, which are equally crucial to the construction of a more holistic understanding of the impact narrative.

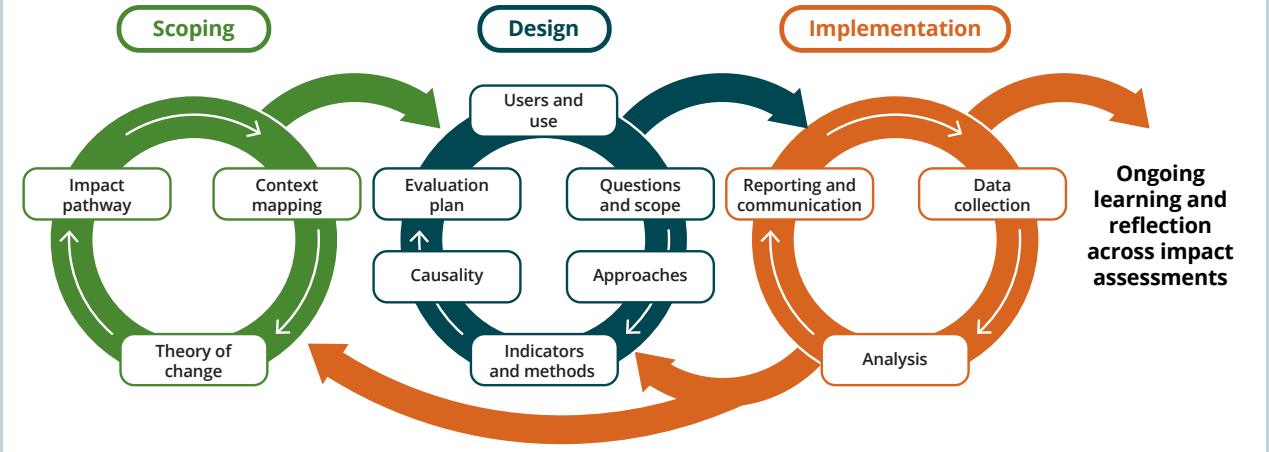

Figure 6 Iterative approach for ex-post impact assessment

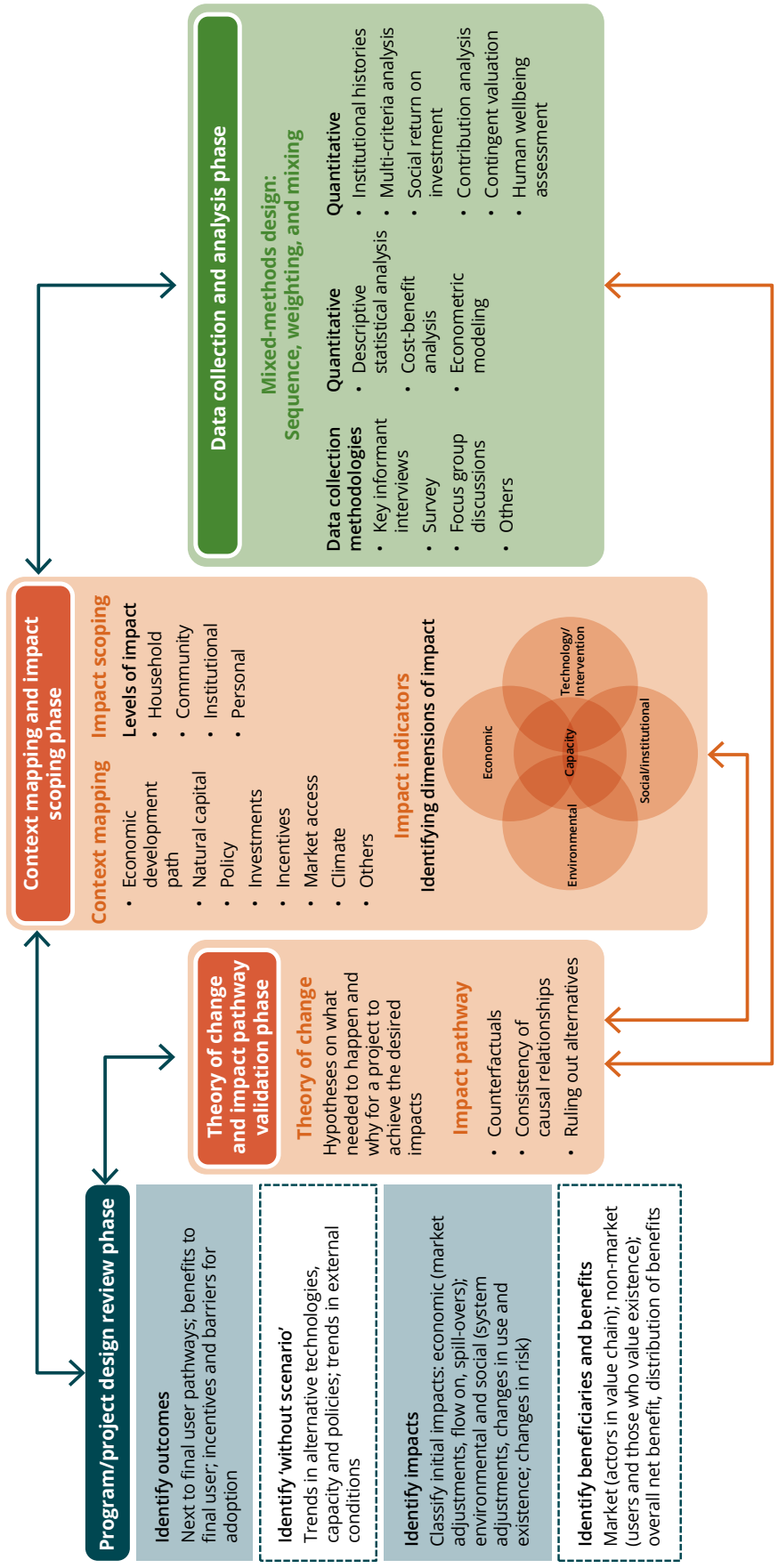

Figure 7 The MMAIA of RD&E interventions framework

8.1 Project review phase

The framework identifies the four key sets of information necessary as:

- outcomes
- the 'without' scenario
- impacts
- beneficiaries and benefits.

Outcomes can be changes found along pathways from outputs of the intervention all the way to the next-to-final user(s). Outcomes can be immediate changes arising from adoption of the outputs or consequent changes along the pathways toward final outcomes.

The 'without' scenario is also referred to as the counterfactual, and must be established from baseline conditions, such as trends in alternative technologies, capacity, policies and trends in external conditions like the market.

Impacts refer to changes across the different final user groups.

Beneficiaries are individuals or groups who are positively affected by the intervention impacts, while benefits refer to the sum of the net values of the impacts to the beneficiaries and to those made worse off as a consequence of the intervention.

The MMAIA framework presents this stage of the impact assessment process as being understated yet primary. For the most part, project review is informed by prior information about the RD&E intervention drawn from project documents and related reports. It informs the stage of theory of change and impact pathway validation, which, in turn, reinforces or challenges the identified project review information.

8.2 Theory of change and impact pathway validation phase

This phase is where information from the project review is organised to reconstruct or revisit the conceptual framing of the intervention.

In reviewing the hypotheses on the premises for the attainment of an RD&E intervention's target impacts, the researcher gains understanding about how and why success was achieved.

On the other hand, mapping of the impact pathway is a means to organise and validate information about how the outputs of the intervention contribute to outcomes and impacts to beneficiaries.

In this part of the process, information about the counterfactual, and the consistency of causal relationships are important for ruling out alternative causes of impact.

In the MMAIA framework, validation of the theory of change and the impact pathway is the most tightly connected with the rest of the stages in the impact assessment process. It is at the centre of the iterative process, informing and being informed further by the project review, context mapping and the conduct of data gathering and analysis.

8.3 Context mapping and impact scoping phase

The MMAIA framework underscores the importance of creating a shared understanding about the broader context within which the RD&E intervention is located. Context involve, among others:

- the economic development path the country or region is on
- the stock of natural resource capital in the community
- the enabling policy and market environment
- climatic conditions.

Alongside mapping of context is the determination of the levels and dimensions of impact on which the assessment is concerned. The agriculture, aquatic and natural resources development agenda drives the impact variables that the MMAIA framework lays out for the researcher.

Since agriculture, aquatic and natural resources interventions are typically complex, the MMAIA framework follows the broader integrated approach to impact assessment in including variables along the dimensions of economic, social, environmental and capacity impacts.

Further, it includes a fourth dimension—the technological impact. This dimension of impact is highlighted to bring attention to how an intervention itself can bring about innovations in the use of the technology it delivered.

The overlapping dimensions indicate the tendency of impacts to interact with each other—for example, impacts taking on a sociotechnological character as society tends to influence back the form of the technology of concern.

This phase in the impact assessment process serves to inform the stages discussed previously while also subsequently guiding the design or approach of analysis.

8.4 Data collection and analysis phase

With a validated theory of change and impact pathway, a defined context, and an impact dimension in mind, the researcher is set to determine the appropriate data collection and analysis design for the impact assessment.

The choice of mixed-methods design is guided by the impact research question, as well as pragmatic considerations like timeframe and availability of information and other resources.

There are different configurations of mixed-methods design, but the most common in literature and practice are: concurrent, sequential and transformative types (Bamberger 2012; Creswell 2013; USAID 2013).

The researcher also chooses from a menu of data collection methodologies and analytical techniques (quantitative and qualitative or mixed) to complete an appropriate design for the impact assessment. Choice depends on suitability of the methods for answering the impact question, as well as the researcher's level of expertise.

The multidisciplinary characteristics of teams at the UPLB and VSU is ideal for the MMAIA. In the framework, the design stage of the impact assessment process can, in turn, inform the theory of change and impact pathway.

Elements of the MMAIA framework may be in the integrated impact assessment approach's first two steps: scoping and design. It does not extend guidance to the implementation concerns. Researchers can best be guided by discussion of the integrated impact assessment approach.

9 Application of the integrated framework to the Landcare program

9.1 A brief history and overview of Landcare in the Philippines

Soil erosion has been recognised as a key problem in the sloping agricultural fields of the Philippine uplands. Intensive farming practices combined with biophysical characteristics of sloped land can lead to loss of soil, decreased soil fertility, reduced yields or loss of all soil completely (Newby 2009).

In upland areas—which often have high poverty rates, and where households are dependent on subsistence farming for food—soil erosion can have rapid and profound impacts on household security.

Efforts to develop and test conservation farming practices to reduce or stop soil erosion in the Philippines have a long history. Cramb et al. (2006) document several key actors and moments in the Southern Philippines that provide the foundation for Landcare activities/program in the Philippines.

In the 1980s, the Mindanao Baptist Rural Life Centre, working in Claveria, developed the Sloping Agricultural Land Technology package, which was promoted by the Department of Agriculture.

In 1987, the International Rice Research Institute began a training program with the Department of Agriculture to encourage adoption of the Sloping Agricultural Land Technology package.

In 1993, The World Agroforestry Centre (ICRAF), took carriage of the International Rice Research Institute's research site, and in collaboration with the Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA) began experimenting with approaches to establish hedgerows that are less labour/skill intensive.

In 1996, ICRAF observed a farmer adaptation of the Sloping Agricultural Land Technology, which was the basis for the natural vegetative strips (NVS).

Soon after, ICRAF established a small team (one farmer, an extension agent and an ICRAF technician) to promote and train farmers on the NVS practice. Interest was high, with the team shifting from working with individual farmers to small groups.

A group of farmers who were participating in one of these training sessions decided to establish their own farmer organisation to promote conservation farming. They named themselves after a logo painted on an ICRAF project vehicle: the Claveria Landcare Association.

The Claveria Landcare Association established local groups and worked with ICRAF to deliver training and site visits, involving local government to ensure ongoing support.

The success of ICRAF, the Claveria Landcare Association, and local government in Claveria in supporting widespread adoption of conservation agriculture practices prompted expansion of the approach to other areas, and the crystallisation of Landcare in the Philippines as a 'farmer-led, group-based approach to agricultural extension and natural resource management that links farmers, scientists, local government, and other actors in collective efforts to solve resource degradation problems' (Cramb et al. 2006, p. 1).

Though it had emerged independently of Australian Landcare, in using the term 'Landcare,' a link was created between the two movements, and, with ACIAR support, came an interest in sharing lessons and insights (Metcalfe 2004).

The ACIAR-funded Landcare projects in the Philippines built directly on the foundations laid by the early technical research that had supported the development and testing of relatively low-cost, simple practices.

With tested and proven conservation agriculture practices, the ACIAR-funded Landcare projects over the next 10 years focused on the approaches and mechanisms that would support widespread adoption of conservation agriculture in project areas (Table 14). A key focus was the development and strengthening of institutional mechanisms and approaches to ensure Landcare in the Philippines would continue after the ACIAR projects finished.

The first ACIAR project (ASEM/1998/052) built on the 'core' sites established by ICRAF in Claveria (Misamis Oriental Province) and Lantapan (Bukidnon Province), as well as the SEARCA site in Ned (South Cotabato). It also expanded Landcare to new sites within these provinces. The second ACIAR project (ASEM/2002/051) began scaling to new provinces, including Bohol and Agusan Del Sur (Figure 8).

The core aspects of conservation agriculture promoted by the project were:

- the use of NVS (where farmers leave a narrow piece of land unploughed along the contour of sloped land)
- agroforestry (planting of productive trees along the strips) as a way of slowing water run-off, stabilising soil and diversifying the cropping system.

Over time, and as NVS became more established, the program expanded to encourage other practices like integrated pest management, use of organic fertilisers and exploring new market opportunities (Vock 2015).

Table 14 ACIAR-funded Landcare projects in the Philippines[a]

Project title/reference	Year	Broad aim(s)
Enhancing farmer adoption of simple conservation practices: Landcare in the Philippines and Australia ASEM/1998/052	1999–2004	• Test/evaluate the extent to which a farmer-focused participatory extension approach (Landcare) can facilitate/improve use of conservation agriculture techniques, and expand the scale of adoption.
Sustaining Landcare systems in the Philippines and Australia ASEM/2002/051	2004–2007 (Phase 1)	• Strengthen institutional mechanisms to sustain established Landcare groups, and scale to new sites. • Support and increase adoption at the farm level.
	2007–2009 (Phase 2)	• Mentoring and handover of key responsibilities to LFPI. • Secure sustainable economic benefits through production and marketing in agroforestry and vegetables.
	2009–2011 (Phase 3)[b]	• Strengthen LFPI's governance and processes to ensure stability and sustainability.
Enhancing development outcomes for smallholder farmers through closer collaboration between ACIAR's Landcare and other projects ASEM/2009/044[b]	2010–2011	• Build capacity within LFPI to ensure a sustainable platform for Landcare by the project close. • Support more effective collaboration between ACIAR projects operating in the same locations.

(a) Funding was also provided by the then Australian Agency for International Development. ACIAR supported relevant precursor projects that led to Landcare, and has a current project researching the value of the Landcare approach in conflict areas. Only past projects directly related to Landcare are listed in this table.
(b) Phase 3 of ASEM/2002/051 and ASEM/2009/044 were designed to be complementary in building capacity within LFPI.

Source: Based on Vock n.d.; Vock and Aspera 2013.

Figure 8 Map of original Landcare provinces (green) and scale-out provinces (blue) in the Philippines

Note: Provinces: 1 Misamis Oriental; 2 Bukidnon; 3 South Cotabatu; 4 Agusan Del Sur; 5 Bohol.

Source: Modified by authors from CartoGIS Services, College of Asia and the Pacific, The Australian National University.

9.2 The Landcare program

Landcare focused on the continuous implementation and expansion of the Landcare approach, as well as evaluating the impacts of Landcare on adoption of soil conservation farming practices.

Landcare is a 'farmer-centered and farmer-led group-based approach to agricultural extension, aimed at improving rural livelihoods on a sustainable basis', as defined by LFPI (2009).

Figure 9 shows the fundamental principles of Landcare. It is a three-way relationship among farmers as lead process drivers, local government units and technical providers.

In this three-way partnership:

- the farmers share their experience and knowledge with other farmers
- the local government units (LGUs) provide financial and policy support
- the technical facilitators provide technical support and engage with farmer groups to help them implement activities, from planning to evaluation.

Other principles of Landcare include:

- trained extension workers (Landcare facilitators)
- capacity building of farmers to innovate attitudes and practices
- sustainable improvement of farmers' livelihoods
- establishment of farmer groups (Landcare groups)
- high levels of community participation and leadership
- a focus on local solutions to address local problems (LFPI 2009).

What makes Landcare is the way in which technologies appropriate to farmers' needs are identified and applied. Depending on the farmers' needs and farm characteristics, the use of these technologies vary from farmer to farmer.

Some of the commonly used technologies introduced by Landcare include:

- soil surface protection technologies
- contour-based soil erosion control barriers/systems (such as natural vegetative strips)
- soil management systems
- alley cropping
- agroforestry
- production of plots of trees on non-cropping land
- production of high-value vegetable crops (such as onion, tomato, sweetpotato)
- nursery production of fruit and timber tree seedlings
- on-farm production and use of organic fertilisers using composting and vermicomposting techniques
- integrated pest management systems
- development of niche 'cottage' industries for competitive advantage
- marketing technologies in improving market access.

Balancing the use of these technologies helps farmers obtain sustainable livelihoods (LFPI 2009).

The two sites under this assessment are Claveria and Bohol. Claveria was selected because it is where the Landcare approach was first introduced. Bohol was selected as an upscaling site, and because of relative accessibility and comprehensiveness of the different program interventions applied in the area.

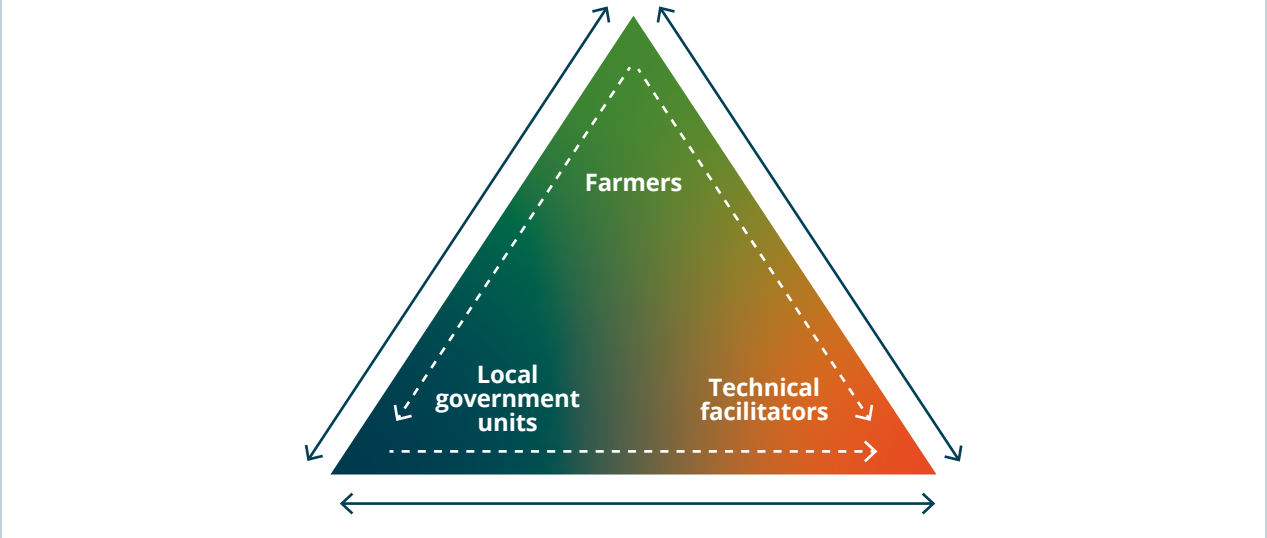

Figure 9 Three-way partnership as the main feature of Landcare
Source: Adapted from LFPI 2009.

Claveria is in the province of Misamis Oriental, northern Mindanao, and 42 km north-east of Cagayan de Oro City. It is divided into 24 villages, with high population growth. It is an agricultural municipality, and the only landlocked one in the province (LFPI 2009).

The farmers in Claveria adopted the term 'Landcare.' It gave the initiative an identity that focuses on the 'bottom-up' farmer-driven approach. High adoption of conservation farming technologies, along with the formation of Landcare farmer groups, was observed among Claveria farmers (LFPI 2009).

Bohol is one of the provinces in Central Visayas. In 2001, ICRAF, in cooperation with the Agencia Española de Cooperación Internacional (AECI), tested the applicability of the Landcare approach in promoting conservation farming systems in San Isidro, Bohol.

Both project sites are generally upland, characterised by hilly, rolling and highly sloping areas, which results in high incidence of soil erosion. This is further exacerbated by the fact that the communities are heavily dependent on farming—with corn and cassava as their main crops—and practise annual monocropping.

In assessing the impacts of the Landcare program in both sites, both project teams established counterfactual measures. This was done by identifying:

- treatment groups, who received the intervention
- a control group, with the same characteristics as that of the treatment groups, but who did not receive the intervention.

This 'with-or-without' approach was used to separate impacts of the program under assessment from possible contributory impacts in areas where other interventions were administered.

FGDs with farmers and farmer-leaders, and KIIs with Landcare Foundation, ICRAF officials, and LGUs constituted efforts of both teams toward addressing the challenges in designing the institutional and community levels of analysis.

Through these methods, the teams were able to understand the context of Landcare adoption in both sites, and explore how the program was implemented compared with other interventions in the municipalities.

9.3 Project review phase

The research process started with a desk research or gathering of relevant secondary data related to the Landcare program to identify program outcomes and the 'without' scenario.

KIIs with project implementers were also done to classify initial impacts. This phase involved coordination with CSIRO, PCAARRD, ICRAF, LFPI and VSU, which firmed up the methodology to be implemented.

9.4 Theory of change and impact pathways phase

The theory of change and impact pathway provide insights in framing the impact assessment. It is valuable in identifying data that need to be collected and the type of analysis to be employed.

The theory of change stemmed from the fact that the Landcare program is a farmer-centred and farmer-led, group-based approach to agricultural extension, aimed at improving upland livelihoods through sustainable soil conservation farming.

Landcare helped farmers address soil erosion, by involving them in the development of conservation farming technologies for steep slopes, particularly the more farmer-friendly systems such as natural vegetative strips.

KIIs, FGDs, and timeline analysis with project implementers and beneficiaries were conducted to conceptualise the theory of change and map the impact pathways of the Landcare program in both sites.

Based on the theory of change, the pathways to achieving the impact focused on:

- community-based work that builds the capacity of farmers, and supports the use of new farming practices (changed practices or adoption of new practices)
- linkage development and partnership, as well as formation of farmer groups and networks that build institutional capacity and policy (delivery systems or interventions at the institutional level).

For the pathway used in the impact assessment of the Landcare program in Claveria, the project looked at how the changes in practices (from traditional farming to sustainable farming) are facilitated at the household level (Appendix 3).

The second pathway underscored the role of the institution or delivery systems in creating an enabling environment for the adoption of recommended soil conservation practices in Bohol (Appendix 4).

Poverty reduction was identified to be the main target impact of Landcare program. In making the impact more specific, the livelihood outcome aspect was added, where the diversified sources of income of farmers will be explored and identified.

Based on the pathways, we identified change in practices, behaviour, skills, attitude and institutions brought by the program. We used this as the basis in identifying the specific indicators/variables to assess, the tools and the data collection methods.

9.5 Project site 1: Claveria

Context mapping and impact scoping phase

Context mapping and impact scoping were done through document review, FGDs, field visits and KIIs.

Context mapping showed that Claveria is generally upland, characterised as either hilly, rolling, and highly sloping areas, which results in high incidence of soil erosion.

Communities are heavily dependent on farming—with corn as their main crop—and farmers practise annual monocropping.

The scope of the impact assessment has been defined to focus on:

- the household impact (farming practices, household/farm decisions, social capital)
- institutional impact (models in delivering extension services)
- community impact (social capital among farmers, Landcare groups, intercultural relations).

Data collection and analysis phase

Mixed-method design

A wide range of methodological tools and approaches may be used in impact assessments. For this study, the mixed-method design was driven by the:

- timeframe
- availability of information and resources
- identified dimensions of impact
- impact pathways collected from the project review, validation of theory of change and impact pathway, and context mapping phases (Figure 10).

Sequence of data collection methods

The decision on selecting a sequence to adopt is informed by the review of project documents, theory of change and impact pathway validation phases, as well as the context mapping and impact scoping phase.

In reference to Figure 10, a researcher can choose from concurrent and sequential designs. The concurrent strategy requires a separate qualitative and quantitative data collection, results of which are compared and integrated only after the initial analysis.

The sequential design enables data collection in stages so that the initial findings are used to inform the design of the succeeding methods.

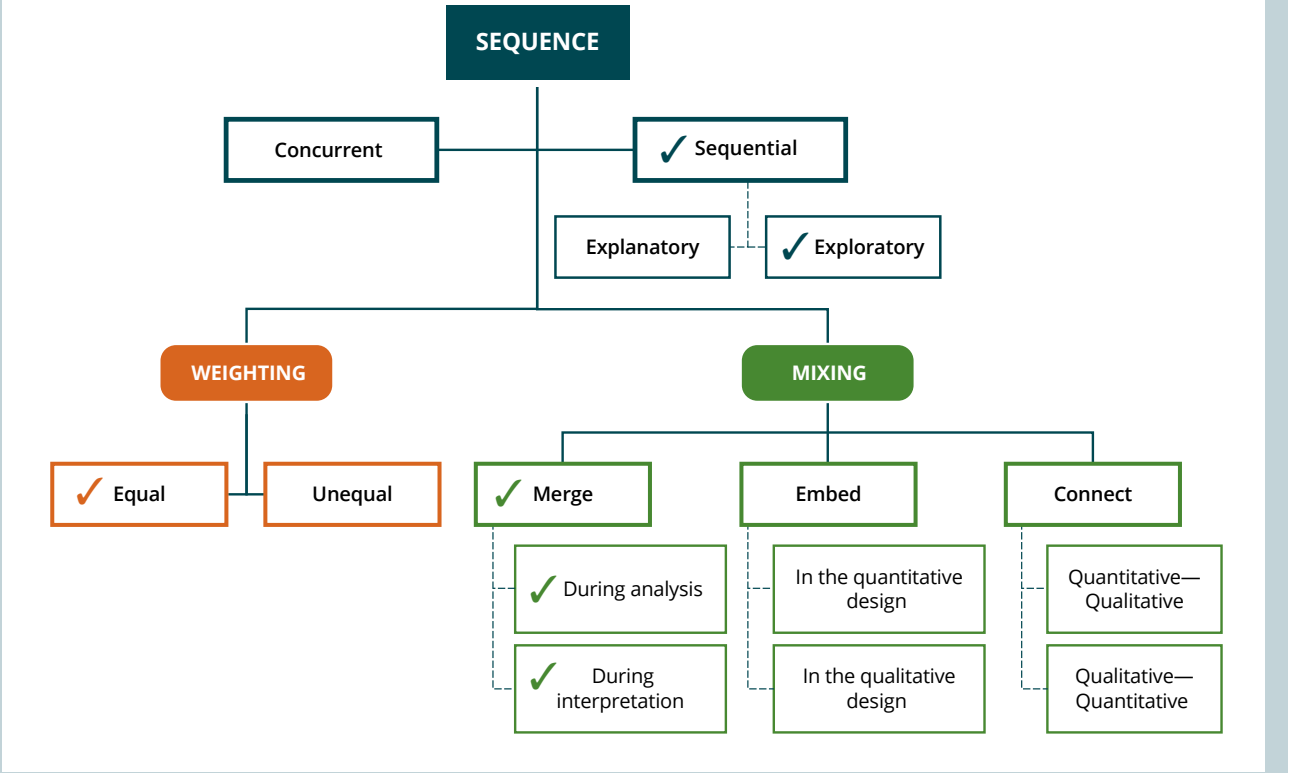

Figure 10 Decision tree for the choice of mixed-method design for the impact assessment of the Landcare program
Source: Modified from Creswell and Plano Clark 2011.

For this study, the impact assessment team opted to adopt the sequential mixed-method design—specifically, the exploratory approach—involving the collection and preliminary analysis of qualitative data followed by collection and preliminary analysis of quantitative data, for the following reasons:

- **The Landcare program was considered complex.** The program worked at multiple units of analysis and involved multiple actors to have impacts, resulting in more complex impact pathways. The use of the sequential exploratory approach helped the impact assessment team to identify and define indicators for the different levels and dimensions of impact.
- **The program lacked baseline information** such as socioeconomic characteristics of farmer-beneficiaries before and after Landcare, or list of beneficiaries. The exploratory approach addressed this issue. The impact assessment team was able to establish other forms of counterfactuals—by identifying treatment groups who received the intervention and a control group who have the same characteristics as that of the treatment groups, but did not receive the intervention. This 'with-and-without' approach was used in the analysis to separate impacts of the program under assessment from possible contributory impacts in areas where other interventions were administered.
- **Little information was known about the study area.** Through this approach, the team was able to understand the context of which the Landcare program was implemented compared with other interventions in the municipality, and was able to explore the context in which farmer-beneficiaries lived their daily lives.
- **Temporal considerations—that is, the timing of the impact assessment relative to the start of Landcare project implementation—**was one of the factors the team considered. Given the time passed, qualitative methods allowed the team to investigate the extent of changes over time. Specifically, the themes generated from the qualitative methods were used to define the focus for the impact assessment. These themes were also used to develop the quantitative instrument.

Weighting of the data collection methods

The decision on whether both methods will have equal emphasis or one method will have more emphasis than the other depends on the research question (Creswell and Plano Clark 2011).

For this study, the decision to give equal emphasis on both qualitative and quantitative methods was based on the fact that the Landcare program had a complex impact pathway, resulting in complex interactions and changes.

Actors involved in the implementation of the Landcare program had different priorities and perspectives on the impact, resulting in different definitions and interpretations of program's impacts.

Also, as the impact assessment team collected more information, more valuable qualitative impact indicators were defined, compelling the team to give equal emphasis on both qualitative and quantitative methods. This allowed the team to define all the expected and unexpected, long-term, short-term, negative and positive outcomes and impacts of the Landcare program.

Mixing of the data collected

In addition to the sequence and weighting decisions, another important decision for the researcher is to choose how to mix the data gathered from the mixed-method data collection. There are three strategies for mixing qualitative and quantitative data: they can be merged, embedded, or connected (Creswell and Plano Clark 2011).

Data can be merged by integrating qualitative and quantitative data in the analysis and discussion of results. Meanwhile, embedding data can be done at the design level. A researcher may decide to embed data from the complementary design whithin the primary design.

Finally, connecting the data is done when the analysis of one type connects to the need of another data type. This connection can happen when specifying research questions, selecting participants or developing data collection instruments.

For this study, the impact assessment team chose to merge the data during analysis and interpretation. The iterative analytical process and interpretation of the data from the data validation through FGDs, survey and most significant change (MSC) provided the important information on the emergent and unexpected themes. This allowed the team to cross-validate information from the data collection techniques.

Data collection methodologies

The following data collection methodologies were used for the impact assessment of the Landcare program. These were conducted during between 5 September and 9 October 2018 (Table 15).

FGDs and KIIs for context mapping and impact scoping

For context mapping and impact scoping, FGDs were done to gather data on the:

- different farming practices
- source of information about the Landcare program and its technologies
- practice of contour farming and its advantages and disadvantages
- changes perceived after adoption of contour farming
- obligations of Landcare group leaders
- the overall benefits of the program to the community, as perceived by farmers.

This also provided opportunities for creating a shared understanding on the context of impact assessment, and helping to further develop the impact pathway.

KIIs were conducted to:

- understand the program's implementation
- understand the targeted outcomes for the farmers, local government units and the community
- identify other parameters, variables and measures the implementers used to monitor the execution of the program.

Survey

As a result of the exploratory sequential design, themes were identified from analysing all qualitative data gathered from the FGD and KIIs. These themes were then used to develop the survey questionnaire.

The survey was conducted to explore the impacts of the Landcare program at the household level. The survey collected information about the respondents' sociodemographic profile, land and farm profile, production, household assets, household income, types of crops planted, technology adoption, perceptions and more.

The farmers in sloping areas served as the eligible population. It was found out during the course of context mapping that there were two primary institutions who spearheaded the implementation of the Landcare program: ICRAF and LFPI.

Based on the information gathered from this FGD, the population was classified into four groups:

- no Landcare or ICRAF intervention (control)
- with ICRAF intervention (treatment 1)
- with Landcare intervention (treatment 2)
- with ICRAF and Landcare interventions (treatment 3).

While both ICRAF and Landcare teams served as technical facilitators in the Landcare program, the decision for the classification of treatment groups stemmed from the differences on the modes and focus of technical support provided by each institution to the program.

To elaborate further:

- Landcare's activities focused mainly on the development of partnerships and networks, including the formation of farmer groups (delivery systems or interventions at the institutional level)
- ICRAF supported the development and built the capacity of farmer groups on the use of soil conservation and agroforestry practices (delivery systems or interventions at the community level).

A proportional allocation scheme with groups as stratification variables was used. The survey covered a total of 176 farm households that were generated using stratified random sampling.

FGDs for data validation

After processing and analysing all quantitative and qualitative data from the previously mentioned methods, discrepancies were discovered. To address these, data validation through FGDs were conducted in Claveria. It involved more than 60 participants. Each group had at least 11 participants.

The FGDs explored issues in the implementation of the program, reasons for not joining in Landcare groups, factors affecting adoption, and other social and environmental impacts. This method provided more in-depth context and detailed reasons for certain behaviours of farmers.

Most significant change technique

Responses were categorised based on dimensions of impact (economic, social, environmental) to see the variety of responses. The following two main questions were formulated:

- From your point of view, what is the most significant change that you have experienced because of your involvement with the Landcare program during membership in the Landcare program? Why is this change significant to you?
- From your point of view, what is the most significant change that you still experience at present because of your involvement with the Landcare program? Why is this change significant to you?

Table 15 Methods of data collection for the impact assessment of the Landcare program in Claveria

Method	Reason	Respondents	Strengths	Limitations
Focus group discussion[a]	• To understand the context of the program being assessed and identify its impacts at the community and institutional level.	• 6 farmer-leaders.	• Unravels unique/ individual and shared views of the participants on the subject matter.	• Results can't be generalised.
Key informant interviews	• To acquire a point of view of a well-informed source, to understand how the program was implemented, and what were the target outcomes for the farmers, LGUs and community. • To identify other parameters, variables, and measures the implementers used to monitor the execution and establish success of the program.	• 1 official from LFPI. • 2 officials from the municipal government of Claveria. • Various village officials and residents.	• Provides in-depth information on individual cases.	• Data may not reflect the general sentiment of the population.
Survey	• To understand the economic, social, environmental, and capacity development impacts of the program at the household level.	• Randomly selected farmers in sloping areas.	• Cost-effective and results can be generalised.	• Inflexible. • Lacks depth • Fails to account detailed reasons of behaviour.
Focus group discussion[b]	• To validate data gathered from the survey. • To explore what went wrong and what went right throughout the course of the program.	• Farmers who were not sampled, but were in the eligible population.	• Unravels individual and shared views of the participants.	• Results can't be generalised.
Most significant change stories technique	• To explore the significant changes brought about by the program as perceived by farmers.	• Selected farmer-respondents in the survey. • Farmers purposely selected using snowball technique.	• Effective in unravelling indirect and unforeseen impacts that were not covered in the impact scoping.	• Resource intensive. • Results can't be generalised.

(a) Done for context mapping and impact scoping.
(b) Done for data validation.

Collection of MSC stories was done through in-depth one-on-one interviews among beneficiaries. The research team selected farmers whose answers exhibited detailed impacts, consistent with the impact pathway identified in the earlier phase.

The participants were asked the two questions. The research team identified 13 priority farmers and 6 farmers as replacements or secondary priorities. During the collection of MSC stories, researchers asked the respondents for other potential key informants.

This method helped collect more stories from farmers who also experienced significant impacts from the Landcare program, but had not been sampled from the household survey. The narratives from the MSC were coded.

Responses were then categorised into general and specific themes. For MSC participants who were also respondents in the survey, MSC responses were cross-referenced with quantitative data from the survey.

Because of the travel restrictions posed by the COVID-19 pandemic, the impact assessment team was unable to present the collected stories to the participants. In lieu of this, the MSC stories gathered were ranked according to Bennett's hierarchy of program outcomes (Bennett 1975).

This was done to determine the hierarchy of significance of each stories. Bennett's hierarchy provides a logical model to assess the stories of change experienced by the adopters in the two projects. As the MSC stories move up the hierarchy, the logical evidence of the impact of the program becomes stronger. Table 16 provides a description of each of the levels identified in Bennett's hierarchy of program outcomes to fit the logical model to project evaluation.

Through the MSC process, the impact assessment team was able to uncover valued outcomes not initially specified (that is, indirect, and unexpected outcomes). It also gave opportunities for the impact assessment team to reflect and facilitate dialogue about the outcomes of the Landcare program.

The initial set of participants were asked to name at least two additional participants (snowball method) who could also share significant change stories. The process continued until no new participants could be named.

Through this snowball method, the impact assessment team was able to expand the number or participants interviewed using the MSC technique. Also, with the flexibility of the technique, the team was able to collect negative changes that affected the participants significantly. This provided a more in-depth look on the Landcare interventions.

Data processing and analysis for quantitative and qualitative data

Descriptive, comparative, correlation and regression analyses were used in the quantitative stage of the study. Meanwhile, thematic analysis was used in the qualitative stages of the study, as presented in Table 17.

Table 16 Bennett's hierarchy of program evidence

Level	Description
7	End results/changes in conditions: changes in economic, civic and social conditions of the target group and other people in the community.
6	Action: changes in behaviour, practice, decisions, policies or others of the target groups.
5	KASA changes: changes in knowledge, attitude, skills and aspirations.
4	Reactions: changes in the stakeholders' opinion about the program.
3	Involvement: number of stakeholders who participated in the activities.
2	Activities: what activities were developed and delivered.
1	Input: changes in terms of what is invested.

Table 17 Data collection methods and analysis

Method of collecting data	Analysis used
Focus group discussions	Thematic analysis
Key informant interviews	Thematic analysis
Survey	Descriptive, correlation, and regression analysis
Most significant change stories technique	Thematic analysis

Thematic analysis in the qualitative stage generated themes derived from FGD and KII transcripts. Initial themes were recorded through the familiarisation of the evident topics discussed by the participants (Landcare farmers, Landcare implementors and local officials).

From this, initial themes were established and reviewed to ensure that the essences of the participants' responses were captured. The final themes were acquired through detailed labelling of the meanings attached and relationships implied.

Descriptive statistics were computed to report the basic measures or features of the data in the survey. This included simple summaries (such as frequencies and percentages) and measures of central tendency (mean, median, mode). With descriptive analysis, no inference can be made, because it only describes what the data show.

As a preliminary step towards building the regression model, correlation analysis, using Spearman's rank order correlation between income and poverty-related variables, was used.

Comparison of mean income was also done using t-tests to determine whether there were significant differences in income:

- across groups
- between Landcare members and non-members
- across farm sizes
- between adopters and non-adopters
- between households headed by men or women.

The regression analysis for the quantitative data was used to determine the effect or the relationship of independent variables to the dependent variable. Two types of regression analysis were used: multiple linear regression and binary logistic regression.

For both analyses, the independent variables were statistically tested before considering them to enter the model. The p-value of each independent variable was measured and checked to determine its significance. This p-value was compared at three significance levels (1%, 5%, 10%).

Results

Farm characteristics

Of all respondents:

- in the control group, more than half had farms measuring 1–2 ha (38%) or less than 1 ha (32%)
- in treatment 1, more than half had 1–2 ha of land (67%)
- in treatment 2, more than half (53%) had 1–2 ha of land
- in treatment 3, more than half (54%) had had 1–2 ha of land or less than 1 ha (19%).

Overall, many respondents across groups had small farm lots, measuring from 2 ha or less.

In this analysis, high-value crops included:

- major fruits (mango, banana, pineapple and durian)
- plantation crops (coffee, cacao, coconut, abacca and rubber)
- alternative staple food crops (cassava and sweetpotato)
- upland vegetables (cabbage and carrots).

Overall, more than half (71%) of the farmer-respondents had planted high-value crops (Table 18).

High percentages of farmers across groups had planted high-value crops:

- A majority (76%) of the farmer-respondents in the control group had planted fruit and timber trees.
- A majority of the farmer-respondents from treatment groups 2 (60%) and 3 (65%) had planted crops.
- In treatment 1, half (50%) of the farmer-respondents had planted crops and half (50%) had planted trees.

Adoption of technologies

Treatment 2 had the highest adoption percentages for NVS and hedgerows (Table 19). Treatment 3 had the highest adoption percentages for contour farming. Many farmers in the control group had adopted ridge tillage system in their farms.

Access to extension services

Overall, 70% of the respondents had no access to extension services, while 30% had access in the previous 3 years (Table 20). Similarly, across all groups, only small percentages of respondents had access to extension services.

According to the survey respondents, various seminars and training on soil conservation techniques, project proposal development, accounting, and postharvest practices were held occasionally.

Table 18 Distribution of farmers across groups planting trees or crops (%), and average income according to crop type (PHP)

Type of crop	Control	Treatment 1	Treatment 2	Treatment 3	Total	Average income
Crop	24	50	60	65	55	
High-value	65	100	80	69	71	128,142
Non-high-value	35	0	20	31	29	118,260
Tree	76	50	40	35	45	

Table 19 Distribution of farmer-adopters, by Landcare technology and treatment group (%)

Landcare technology	Control group	Treatment 1	Treatment 2	Treatment 3
NVS	40	67	78	69
Hedgerows	43	0	75	65
Contour farming	30	25	71	76
Ridge tillage system	91	N/A	75	73

Table 20 Distribution of farmers with or without access to extension services, by group (%)

Access to extension services	Control group	Treatment 1	Treatment 2	Treatment 3	Total
Had access	14	17	20	38	30
Had no access	86	83	80	62	70

There was high attendance to such seminars and training in barangays closer to Poblacion or the centre of town. This result underscores that public investment that aims to improve extension coverage can have a significant impact on adoption of soil conservation technologies. This result was supported by KIIs and village FGDs.

Soil conservation technologies: adoption patterns and determinants

According to Vock and Aspera (2013), during the early onset of the project, 65% of the farmers in Claveria were adopting Landcare conservation measures.

This finding was supported by the farmer-leaders during the first FGD. Participants said that most of the farmers in Claveria were adopting Landcare technologies. But the 2018 survey found that only 47% of the farmers were adopting.

There were farmers who reverted to their previous production practices. Results of data validation through village FGDs also revealed external factors influenced adoption. Farmers became exposed to contract farming with multinational corporations who promote contrary technologies. Evidently, the use of a single data collection method would not be able to capture this full spectrum of outcomes of the program.

A binary logit regression was done to estimate the probability of adoption of Landcare technologies based on some explanatory variables (Appendix 5).

Farm size, awareness of the Landcare program, trust in Landcare groups, type of crops planted, diversity of income and land ownership were found to be statistically significant at 5% and 10% levels of probability.

Farm size

Farm size exhibited a negative sign in the model (refer to Table 21), which implies that as farm size increases, the probability of adoption of Landcare technologies decreases by 0.86 times. Results of FGDs showed that adoption and sustainability of adoption were indeed highly dependent on the size of farm.

Data validation through village FGDs provided nuances to the survey results. FGD data also showed that, in most cases, those farmers who own small sloping lands tend to not adopt Landcare technologies, because it leads to a significant decrease in the cultivated area.

However, farmers who own large sloping lands were more likely to adopt since the gains of the Landcare technologies outweighs the cost of losing cultivated lands.

Further, farmers with sloping lands who also own the adjacent flat land tend to not adopt soil conservation technologies, since they can manage economic loss from erosion and fertiliser lost.

Farmers who only own sloping lands and do not own the adjacent flat lands tend to adopt soil conservation technologies to reduce fertile soil being lost to their neighbouring farmers' lands.

Awareness of the Landcare program and trust in Landcare groups

According to Akudugu et al. (2012), farmers' decisions about whether to adopt or not to adopt a certain technology are influenced by economic, institutional and social factors.

The result of the binary logistic regression conducted for this study supported this finding, particularly the influence of social factors in technology adoption. Logit regression results showed that both awareness of the program and trust in Landcare groups have a significant positive effect on adoption. This implies that farmers who are aware of Landcare and who have high levels of trust in Landcare groups were more likely to adopt technologies.

In the household survey, respondents were asked about the extent of their awareness of the Landcare program. A study conducted by Cramb et al. (2006) stated that Landcare membership has been continuously growing since 2000. On the contrary, it was found that although a majority (60%) of the farmers knew about the program, less than half (48%) joined in Landcare groups.

This may seem a low number, but results from KIIs and FGDs during the context mapping and impact scoping phase suggest that the farmers in Claveria before the Landcare program have a high level of distrust and aloofness in government and non-government programs. So, 48% membership can be considered a major success for the Landcare program, considering the history and context of the study area.

Respondents in the survey who were members of Landcare groups were then asked to rate their level of trust in those groups, with 5 being 'very much', and 0 being 'not at all'.

Table 21 Summary of the binary logistic regression analysis results with adoption of Landcare technologies as the dependent variable for the impact assessment of the Landcare program in Claveria

Independent variable	Odds ratio	Standard error	z	P> | z |
Household size	1.0645	0.1480	0.45	0.653
Farm size	0.8599*	0.0697	–1.86	0.063
Participation in farmer organisations	1.4632	0.6071	0.92	0.359
Awareness of Landcare	6.3197***	3.2736	3.56	0.000
Trust in Landcare groups				
Very little	0.6768	0.4772	–0.55	0.580
Somewhat little	1.2355	1.3086	0.20	0.842
Undecided if much or little	0.8251	0.5741	–0.28	0.782
Somewhat much	3.7970*	2.7110	1.87	0.062
Very much	5.6976***	3.2777	3.02	0.002
Type of crops planted 1	2.4576**	1.0511	2.10	0.036
Type of crops planted 2	0.4508*	0.1984	–1.81	0.070
Diversity of income	0.4525*	0.2151	–1.67	0.095
Land ownership	0.1785***	0.1011	–3.04	0.002
Constant	0.7763	0.6554	–0.30	0.764

*, **, *** means significant at 10%, 5% and 1% levels of probability, respectively.

Note: Z-values indicate that the regression coefficients for each independent variable is not equal to 0. Meanwhile, the P-values denoted as P> |z|, measure the evidence against the null hypothesis. Lower p-value indicates stronger evidence against the null hypothesis.

About 43% of the respondents gave a trust rating of 'somewhat much to very much', 46% answered, 'somewhat little to not at all', and 11% were undecided. These findings supported the results of the FGDs and KIIs that farmers have apprehensions for such programs, mostly due to risk-aversion.

Farmers who became members in Landcare groups were also asked in the survey about the problems they encountered during their membership in Landcare groups.

More than half reported that the Landcare program in Claveria just suddenly 'stopped'. The farmer Landcare program members had no idea when, how and, most importantly, why the program became non-operational.

The same reasons were raised by the farmers in the FGDs. There were speculations and rumours circulated among some farmers, but no one could really confirm the true reason behind the program's inactivity in the municipality.

Some of the farmers, in contrast, said that the program became less effective due to some irregularities in its implementation, specifically concerning budget and resource use.

The household survey and village FGD results contradicted some findings from the initial FGD with Landcare groups' leaders and KIIs among officials of the LFPI, particularly on the exit strategies of the program.

According to the LFPI, they ensured that adoption of Landcare technologies was sustainable before they had a 'graceful exit'. However, they admitted that on-site monitoring had not been done due to a few organisational challenges.

Increased knowledge, specifically on contour farming, was overwhelmingly cited by the farmers as the most significant change in their lives attributed to the Landcare program (refer to Table 29 and Table 30).

It is interesting to note that, along with increased knowledge, awareness of technologies was cited as more significant by farmers than changes such as increased and diversified income, increased social skills, increased money for daily household consumption and decreased soil degradation.

This is true during the Landcare project implementation in 1996 and true up to present. It indicates that farmers recognise that for other changes to materialise, awareness to technologies and increased knowledge must first be achieved. This may also indicate how farmers treat additional knowledge as valuable resource for them to enhance their farming.

Type of crops planted

Village FGDs revealed that adoption differs among crops planted, so the type of crops planted was also included in the logistic regression model. Farmers planting corn and vegetable crops are more likely to adopt Landcare technologies than farmers planting crops with thick canopy and extensive root systems, such as fruit trees, which make the land less prone to erosion.

However, the exact number and percentages of such farmer cannot be stated in the FGDs. This information and knowledge were not available during the development of the survey questionnaire, so were not explored in the household survey. This is a relevant finding on the use of the MMAIA framework. This case can be cited as one of the values of having participatory or qualitative methods before developing quantitative instruments.

Results of the binary logistic regression conducted for this study revealed that the farmer-respondents who were planting high-value crops were more likely to adopt Landcare technologies.

Meanwhile, those who were planting timber or fruit trees were less likely to adopt than those planting vegetables and/or root crops.

Results from the data validation through village FGDs supported this finding. It was found out in village FGDs that farmers who owned sloping lands but were planting timber trees or crops with thick canopies and extensive root systems tend to not adopt soil conservation technologies such as contouring, as they do not experience adverse effects of soil erosion.

Land ownership and diversity of income

Results of the binary logistic regression showed that land ownership had a significant negative effect on adoption. This means that farmers with full possession of rights on their land were less likely to adopt Landcare technologies.

Moreover, the regression revealed that diversity of income significantly affects adoption. Diversity of income represented off-farm and non-farm income streams that farmers may have apart from farming. The variable is significant, at 10%, and is negatively correlated with adoption.

In other words, the probability of a farmers choosing to adopt decreases by 0.45 times with the presence of other sources of income. Moreover, data validation through FGDs revealed that farmers have few non-farm income sources, suggesting that there is weak relationship between diversified incomes and adoption of soil conservation technologies.

Economic impact

After a series of workshops, poverty reduction was identified as the main impact of the Landcare program. According to Vock and Aspera (2013), significant impacts of the Landcare program included positive economic return from Landcare interventions, with adopters' income being 2–3 times higher than those of non-adopters. They also added that this significant increase in farmers' income was observed because of the successful development of new marketing innovations, such as cluster marketing and market chain intelligence. However, survey revealed that these gains were not sustained.

Farm income in this study refers to cash and non-cash income derived from farming activities. Total income on the other hand, refers to total cash and non-cash income derived from farm, on-farm, and off-farm activities of all the household members.

The average annual farm income, farm income per hectare, and total income across groups are presented in Table 22. Based on the survey, farmers who received both LFPI and ICRAF interventions (treatment 3) had the highest average annual farm income (PHP292,680) and highest average annual total income (PHP380,874) among the groups. On the other hand, treatment 2 had the highest farm income per hectare of land, amounting to PHP161,086.

Moreover, non-adopters had higher annual average total income (PHP401,748) than the adopters (PHP292,833). Similarly, non-adopters had higher annual average farm income (PHP310,000) than adopters (PHP203,000).

This result may be explained by the type of crops planted by each group (Table 23). Although the majority of non-adopters and adopters were planting high-value crops, the majority of the non-adopters (54%) were planting trees, while only 35% of adopters were planting trees.

Table 22 Average annual farm income, farm income per hectare and total income, by group (PHP)

Average annual	Control	Treatment 1	Treatment 2	Treatment 3	Adopters	Non-adopters
Farm income	266,509	199,052	252,456	292,680	203,000	310,000
Farm income per hectare	144,294	121,087	161,086	100,103	93,279	135,712
Total income	316,659	260,380	287,035	380,874	292,823	401,748

Table 23 Distribution of adopters and non-adopters according to type of crops planted (%)

Type	Adopters	Non-adopters
Crop	65	46
High-value	78	65
Non-high-value	22	35
Tree	35	54

Table 25 Summary of computed t-statistics for comparison of mean total income across groups

Group	p-value
Across groups	0.4912 ns
Membership	0.0333**
Across farm sizes	0.0003***
Adoption	0.3136 ns
Gender	0.3533 ns
Type of crops planted	0.1366 ns

***, **, * means significant at 1%, 5% and 10% levels of probability, respectively.

Table 24 further explains the difference in the farm income between adopters and non-adopters. The average farm income per hectare derived by non-adopters from planting crops was significantly higher than the average farm income of adopters from planting crops. Moreover, although non-significant at α=5%, the average farm income per hectare derived by non-adopters from planting fruit/timber trees is 3 times higher than the average farm income per hectare of adopters.

To determine whether there were significant differences in the income of farmers in these groups, a comparative analysis using t-tests was conducted (Table 25).

There were significant differences in total household income only between Landcare members and non-members and total income of farmers across different farm sizes. No significant differences in total household income were observed in the rest of the groups.

Multiple linear regression analysis was also conducted to examine the relationship between total income and various poverty-related predictors (Appendix 6).

Among the predictors (sex, age, educational attainment, farm size, household size, access to extension services, ability to get credit, participation in community organisations, adoption of Landcare technologies, awareness of the Landcare program, membership, trust and year of first involvement in Landcare groups), only farm size and education were found significant at 1% level of probability (Table 26).

Both predictors exhibited positive relationships with income. This finding implies that farmers who have larger lands tend to have higher income and that farmers who graduated in college tend to have a relatively higher income than the others.

The Landcare program, according to farmers, was focused more on the natural resource management measures rather than economic improvement. About 57% of the survey respondents stated that although the program had no direct impact on income, Landcare contributed to:

- making their livelihoods more resilient
- enhancing food security and availability
- improving their knowledge on sustainable farming.

In this study, livelihood refers to all sources of income of respondents. According to the FGD participants, through the seminars and training provided by the Landcare program, resiliency of local communities was developed.

Their ingenuity to cope with change was observed through the improvement of their farming system. They explored multicropping, grafting, organic farming, soil analysis, proper application of fertilisers and pesticides and more.

Further, because Landcare promotes agroforestry, farmers also considered planting fruit-bearing and timber trees and other high-value crops. Livestock raising also became an important component of their farming systems. The farmers realised that diversifying their livelihoods can enable them to adjust to difficulties.

Table 24 Average farm income per hectare, by source and group (PHP)

Average farm income from	Adopters	Non-adopters	Difference	t-test
Crop	103,236	129,925	26,689	Significant at α=5%
Tree (fruit or timber)	54,422	186,186	131,764	Non-significant

Table 26 Summary of the multiple linear regression analysis results, with total household income as the dependent variable for the impact assessment of the Landcare program in Claveria

Independent variable	Coefficient	t	P> | t |
Sex	–50811.76	–0.30	0.766
Age	–7280.31	–1.43	0.154
Education			
Elementary graduate	139061.50	0.81	0.420
High school level	–34404.22	–0.18	0.858
High school graduate	137624.6	0.76	0.451
College level	327694.70	1.48	0.142
College graduate	770803.4***	2.61	0.010
Vocational graduate	161456.7	0.36	0.718
Postgraduate	124933.3	0.23	0.819
Household size	48730.64	1.26	0.211
Farm size	122421.9***	4.58	0.000
Access to extension services	70138.79	0.52	0.601
Access to credit	–75426.35	–0.65	0.518
Participation in community organisations	–58177.41	–0.49	0.625
Adoption of Landcare technologies	–94978.2	–0.68	0.496
Awareness of Landcare program	170717.1	1.07	0.288
Membership in Landcare groups	–412326.2	–1.15	0.251
Trust in Landcare groups			
Very little	–41277.22	–0.20	0.839
Somewhat little	–46365.43	–0.13	0.897
Undecided if much or little	44643.68	0.21	0.835
Somewhat much	55339.93	0.26	0.798
Very much	–130415.8	–0.71	0.476
Year of first involvement	330024.4	0.92	0.361
Constant	222311.5	0.56	0.575

*, **, *** means significant at 10%, 5% and 1% levels of probability, respectively.

However, survey results showed that Landcare had no evident effect on livelihood improvement. A few respondents (3%) asserted that not all Landcare members had the same opportunities to such diversified livelihoods, because of some irregularities in the program implementation concerning budget and resource allocation.

Poverty reduction was identified as the main impact of the Landcare program. According to the Philippine Statistics Authority (2019), on average, a family of five needs no less than PHP7,337 to meet the family's food threshold and no less than PHP10,481 to meet the poverty threshold.

In this study, a comparative analysis of total household income between adopters and non-adopters was done. It was found out that 52% of adopters and 56% of non-adopters were below the poverty line. This finding suggests that the intended impact of adopting Landcare technologies, which was to alleviate poverty, was not attained.

However, non-quantitative indicator of poverty tells a different story. From the village FGDs, farmers made it clear that Landcare did not increase their income enough to change their socioeconomic standing.

There was a consensus among village FGD participants that adopting Landcare technologies had helped them to diversify income and food sources. One MSC participant shared, 'It is not immediate, but [Landcare] helped me in having a source of small income instead of just depending solely on income from corn. I would not be able to feed my family if I continued depending solely on corn. But with these crops, as long as they are growing, I can use it to help my family.'

This allowed them to access timely income sources to pay bills and loans, augment their household expenditure, send their children to school more regularly, and provide more food security to the household.

Social impact

In this study, social impact refers to impact on the wellbeing of the community, such as living standards, security and more. During the project's context mapping in Claveria, the FGD with the local farmer-leaders revealed that there were current active farmer groups organised under the Landcare program.

However, the survey results showed a decline in community participation in organised groups of farmer-respondents (Table 27).

Data validation through FGDs further found social impacts, such as off-shoot organisations that were formed from original Landcare groups. But these organisations have struggled with sustainability, possibly due to the low level of trust to extension workers, Landcare groups and farmer-leaders.

On the other hand, at the institutional level, FGD participants mentioned that there were 'champions' present in the villages. These champions, according to them, acted as technical facilitators who provided technical support and engaged with farmer groups to help them implement activities, from planning to evaluation. However, survey data revealed that these champions had no access to government institutions. This can be one of the reasons for their inability to sustain the program implementation.

Table 27 Relative participation of farmers in community organisations in past years (%)

Year	More	Same	Fewer
Compared with the past 5 years (2013)	14	15	71
Compared with the past 10 years (2008)	7	16	77
Compared with the past 25 years (1993)	4	9	87

At the household and farm level, Landcare members expressed that training provided by the program had increased their social skills and openness to government programs. FGDs among Landcare leaders and members said that before the program, they were reluctant about extension programs.

The Landcare program enabled them to gain social skills to engage with other farmers, which empowered them to exchange knowledge with other farmers and access new types and varieties of crops. This information was then supported by the MSC stories (Table 29 and Table 30).

Capacity development impact

Capacity impact is defined as the impact on the ability of people and organisations to achieve their own development objectives.

Aside from promoting adoption of various soil conservation technologies, the Landcare program, according to FGD participants, provided capacity-building activities such as farmer training and farm inputs dissemination.

Participants pointed out how these capacity-building activities improved their leadership. It is also interesting to note that farmers said in the MSC stories that a significant impact of the Landcare program to their lives is the ability to teach others about Landcare technologies and farming practices (Table 29 and Table 30).

Meanwhile, dissemination of farm inputs as an incentive for joining the Landcare program somehow created a culture of dole-outs. This was discovered in the survey and in village FGDs. A few respondents in the survey and FGDs mentioned that they only joined Landcare because of the inputs being handed-out in exchange for their participation.

As mentioned earlier, trends and themes in the MSC stories illustrated that farmers recognised that increased awareness and knowledge from the Landcare program were translated to more tangible results, such as diversified income sources, increased social skills, increased money for daily household consumption, and decreased soil degradation, among others (Table 29 and Table 30).

Environmental impact

Results of the survey revealed that the Landcare technologies were effective in minimising soil erosion. In addition, results of the FGDs showed that the environmental impacts of the program were relegated to less use of pesticides. This, however, was practised only when the program was at its peak.

Another environmental impact that the survey respondents mentioned was the improvement of soil quality in the area. According to them, the use of the natural vegetative strips improved the moisture and fertility of their lands, which increased their yields (Table 28).

Further, results of the MSC stories collection (Table 29 and Table 30) revealed that some farmers considered the improvement of soil quality as the most significant change brought about by the Landcare program.

Some farmers also mentioned the importance of having trees planted alongside their farms, as agroforestry was integrated in some of the Landcare technologies. Aside from being sources of fruit and timber, according to some, the trees also act as protection from strong winds (such as typhoons) that may destroy their crops. Some also claimed that the trees contributed to the improvement of climatic condition in their farms.

Some farmers still worked to protect the environment in their farming activities, by continuing the use of various organic fertilisers and pesticides.

It is interesting to note that farmers usually talk about the environmental changes as an impact they have felt recently during the collection of MSC stories, rather than during the early days of implementation of the program. This suggests that environmental changes in terms of soil quality seem to be a short-term impact, while changes in climatic conditions tend to be a long-term impact of the Landcare program.

Table 28 Distribution of farmer-respondents, by perceived environmental impacts (%)

Change	Increase	Decrease
Soil loss	19	81
Soil fertility	82	18
Soil moisture	83	17
Weed growth	18	82

Most significant change stories

Most significant change during the first 2 years

Each participant was asked about the MSC he or she experienced during the first 2 years of the Landcare program implementation, and the MSC he or she was currently experiencing. Other significant changes were also recorded.

During the first 2 years of implementation, out of 25 participants:

- 12 said their MSC was increase in knowledge
- eight reported changes in practices as a result of Landcare practices adoption
- three told stories related to end results, including increase in income, ability to support education of children and ability to improve housing.

Table 29 Frequency of MSC and other significant change themes cited during membership in the Landcare program

MSC themes	Frequency (*n*=25)	Other significant change themes	Frequency (multiple responses)
Knowledge and adoption of contour farming	10	Has ability to support education of children/ siblings	8
Adoption of Landcare technologies learned from seminars and training	4	Has ability to transfer knowledge to other farmers	4
Increased knowledge on farming	2	Acquired leadership skills	3
More use of organic farm input	2	Diversified income from fruits/vegetables/ trees	3
Others	7	Knowledge and adoption of agroforestry	3
		Use of agroforestry products for house improvement	3
		Gained self-esteem	2
		Improved access to basic needs	2
		Others	12

Table 30 Frequency of current MSC and other significant change themes that can be attributed to the Landcare program

MSC themes	Frequency (*n*=25)	Other significant change themes	Frequency (multiple responses)
Knowledge and adoption of contour farming	3	Has ability to support education of children/ siblings	3
Adoption of Landcare technologies learned from seminars and training	3	Continued application of Landcare technologies	3
Increased knowledge on farming	2	Decrease in soil erosion	2
Continued application of Landcare technologies	2	Diversified income from fruits/vegetables/ trees	2
Improved livelihood	2	Knowledge and adoption of agroforestry	2
Others	13	Others	9

Other significant changes included:

- reduction in soil erosion
- diversification of income sources
- expansion of farm area
- increase in food security
- increase in investment on farm equipment.

A substantial number of participants also cited changes in knowledge, attitude, skills, aspirations and practices.

From these results, we can say that participants put more importance on changes in knowledge, attitude, skills, aspirations and practices over the end results of the Landcare program. We could trace the reason for this in the results of the initial FGDs and KIIs in the context mapping phase of the impact assessment.

The majority of Landcare sites were remote villages without much prior intervention projects and extension activities. So, for them, the Landcare program was the first knowledge enhancement program they experienced in their lives. This explains the strong emphasis of change in knowledge, attitude, skills and aspirations as the most significant and other significant change in their lives.

Most significant change at present

About 20 out of 25 participants cited significant changes they were experiencing at present. Out of the 20, only two participants cited increase in knowledge as the MSC. This indicates that people value other changes more than an increase in knowledge at this stage.

It may also indicate that the increase in knowledge during the first years of project implementation had translated into a much more significant change in the participants' lives. Some participants may value changes in practices more, while some value changes pertaining to the end of result of the project more.

About 10 out of 14 participants cited change in practices as the MSC at present. This included the continued application of Landcare practices, improved crop maintenance and ability to transfer knowledge to other farmers. Eight participants cited changes that pertain to end results, including:

- improvement in livelihood
- increase in income
- reduction of erosion
- expansion of farmlands
- decrease in expenses on labour.

It is quite noticeable that participants reported more of other significant changes that pertained to end results than changes in knowledge, attitude, skills, aspirations and practices. About 13 out of 20 participants cited:

- a better ability to support education of siblings and children
- a decrease in erosion
- a diversification of income
- a better ability to cover family expenses, including health expenses
- an increase in community participation
- improvement in soil quality
- a lower dependency on loans.

The stories collected from the farmer-respondents were classified into themes (Table 29 and Table 30), which were then analysed.

9.6 Project site 2: Bohol

Context mapping and impact scoping phase

Context mapping shows that the study areas are generally upland, characterised as hilly, rolling and highly sloping, which results in high incidence of soil erosion. This is further exacerbated by the fact that the community is heavily dependent on farming (corn and cassava), with farmers practising annual monocropping.

The project in Bohol adapted and integrated Landcare into the Pilar Improvement through Landcare and Resource Development and Management (PILAR DAM) program. PILAR DAM was initiated to address soil erosion and severe siltation of the local dam, high poverty and unemployment. It is implemented through a mix of mandatory activities, and information and input provision to support participation.

The PILAR DAM program required that all households have a backyard garden for household consumption to increase access to a diversity of fruit and vegetables (households without land are encouraged to have pots/container gardens). The organisers of PILAR DAM chose to establish small Landcare groups (SLGs), each with about 25 households with an elected member to serve as a barangay farmer-technician (BAFTECH). The BAFTECHs act as a conduit between the program and the community, sharing new ideas and resources from training back to their groups, and supporting access to seeds and other programs from the municipal LGU.

Aside from the capacity-building activities of the Landcare project, the PILAR DAM program served as a model in delivering extension services that enhanced the adoption of soil conservation technologies and diversified livelihoods.

The program also promoted vegetable gardening, livestock integration, aquaculture and vermicomposting, among others.

Adoption of these practices provided additional livelihood opportunities and increased productivity, thereby increasing farm income and food security of the household.

Moreover, adoption of soil conservation technologies contributed to the reduction in soil erosion and improvement in land cover. The BAFTECHs employed by the PILAR DAM program generated additional income.

Aside from household impact (changes in farming practices and income), the assessment also covered institutional (social) and community (environmental) impacts.

Data collection and analysis phase

Data collection methodologies

The impact assessment team adapted the exploratory sequential mixed method. Both primary and secondary data were used in the impact assessment. Sources of primary information included the project implementers, farmer-beneficiaries and non-beneficiaries.

Primary data were gathered through KIIs with project implementers (LFPI, ICRAF-AECI, Landcare and LGUs) and FGDs with project implementers and farmer-beneficiaries.

A survey was also conducted to gather in-depth data from both project beneficiaries (including BAFTECHs and SLG members) and non-beneficiaries. Additional primary data were obtained from field visits and observations.

The KIIs and FGDs provided opportunities for:

- creating a shared understanding on the context of impact assessment
- helping to develop the theory of change and impact pathway.

Timeline mapping during FGDs was useful in helping further develop the impact pathway. A total of 29 farmer-beneficiaries and six project implementers participated in the FGDs.

Sources of secondary information included project reports and other resource materials from the concerned LGUs, as well as land cover data from the National Mapping and Resource Information Authority.

Sampling scheme

The 'with-and-without' approach was used to determine the economic impact of the Landcare project in Bohol. The counterfactual was established by identifying control sites, so sampling was based on two groups of:

- beneficiaries (upland farmers who participated in Landcare activities and attended in the capacity building activities) from the project sites in Alicia, Pilar and San Isidro
- non-beneficiaries from the control sites in Antequerra and Carmen.

The sampling procedure used in the study is probabilistic in nature. The following formula was used to determine the sample size obtained using simple random sampling:

$$n_o = \frac{Z^2_{\alpha/2}\ \sigma^2}{e^2}$$

where:

- n_o refers to the sample size to be determined
- $z_{\alpha/2}$ is the confidence interval
- σ^2 is the population variance
- e refers to the margin of error.

The study used a 99% confidence interval, which suggests that the sample is certain 99% of the time. The established Z-value for the 99% confidence interval is 2.585.

With regards to the population variance (σ^2), there is no prior information available. So, we estimated the population variance using proportions. It was assumed that the proportion would be 0.5, since there is limited information available. A 0.5 proportion is a conservative approach in estimating the required sample size.

For the margin of error, a modest 6% assumption is used. The bigger the margin of error, the lower the sample size and the smaller the margin of error, the bigger the sample size. Using these assumptions, the sample size (n_o) was determined as follows:

$$n_o = \frac{Z^2_{\alpha/2}\ (p)_*(1-p)}{e^2}$$

$$n_o = \frac{(2.585^2(0.5)_*(1-0.5)}{0.06^2} = 464 \text{ respondents}$$

Given the formula, result suggests surveying 464 farmer-respondents. However, it is necessary to adjust the computed sample size given that the population of the study is finite. To adjust the computed sample size, the following formula was used.

$$n = \frac{n_o}{1+\frac{n_o}{N}}$$

where:

- n is the adjusted sample size
- n_o refers to the initial sample size computed using equation 1
- N is the population under study.

The population in the study is the total number of farmers for each of the municipality under study. After on-site verification, the total number of farmers trained by Landcare in San Isidro, Alicia and Pilar, Bohol is 232 farmers. Using the equation above, the estimated sample size for the study area is computed as follows:

$$n = \frac{464}{1+\frac{464}{232}} = 155 \text{ respondents}$$

Based on the computation, a total of 155 farmer-respondents were surveyed for this study. The total sample size for the beneficiary group was proportionately distributed to the three municipalities covered in Bohol. The numbers of sample farmers were:

- 45 in Alicia
- 50 in Pilar
- 60 in San Isidro.

The selection of non-beneficiary group was based on the suggestion of the local experts. We aim to select control groups who are strategically located far from the location of the project to avoid potential spillover effects.

Based on the discussions with municipal agricultural officers, the potential farmers in the control group came from the municipality of Carmen and Antequera, Bohol.

Figure 11 shows the map of Bohol highlighting where the farmer-beneficiaries and the farmers in the control group (those who did not receive the training on soil conservation technologies and diversified livelihood practices) came from.

An in-depth survey was also conducted with BAFTECHs, and members of the SLGs managed by the selected BAFTECHs were randomly chosen—a total of 106 SLG member-respondents.

Data analysis

A mix of quantitative and qualitative analytical tools were employed in this project. The quantitative methods included descriptive statistics, propensity score matching and adoption analysis using probit regression. Qualitative methods such as Likert scale, use of maps and analysis of MSC stories were employed.

Propensity score matching

This application adopts a non-experimental evaluation strategy in assessing the impact of Landcare program to the changes in livelihood and income among upland farmers in Bohol. The study uses a cross-sectional household survey to document changes in farm income and practices among beneficiary and non-beneficiary groups of farmers.

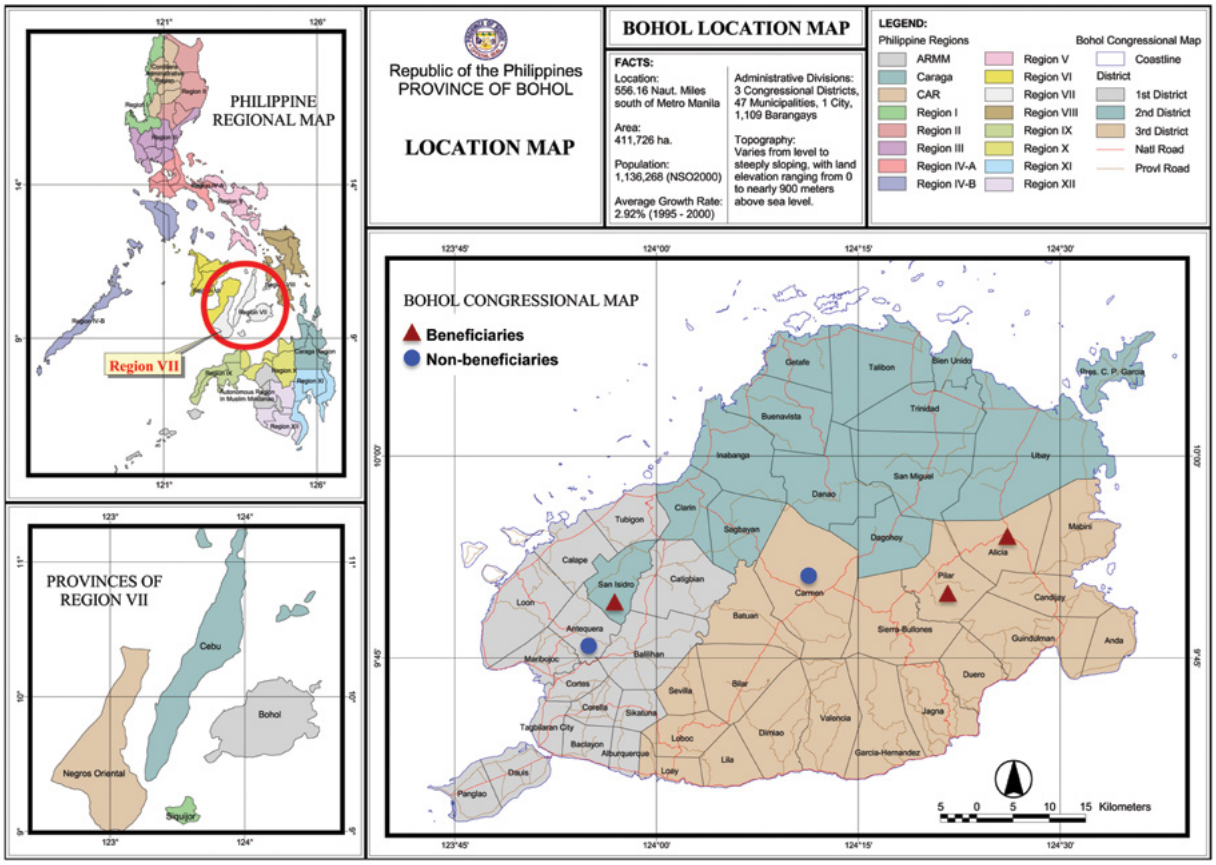

Figure 11 Location of the farmer-beneficiaries and non-beneficiaries in Bohol island
Source: https://ppdo.bohol.gov.ph/maps/basic-maps/location-map/

A crucial point in any impact assessment is coping with selection bias. This happens when there are systematic differences between groups. Households in the beneficiary group received assistance and support on livelihood activities, including technologies and innovations in crop production systems and natural resource management.

The main goal of the project is to improve profitability and promote sustainable livelihood. However, comparing the beneficiary and the non-beneficiary group without regard to its inherent differences might lead to a large bias.

If, for example, households in the beneficiary group are, on average, more educated, have bigger farms and own more assets than those in the non-beneficiary group (or the other way around), then the effect of Landcare program is biased upwards (or downwards) since education, farm and household assets have a most likely positive impact on profitability and income.

To control for such selection bias, the quantitative approach of the project is to match beneficiary and non-beneficiary households with the same observable characteristics before doing the comparison. Only similar households will be used in comparison; households that are systematically different will not be included in the analysis.

To reduce the differences on observable characteristics, Gertler et al. (2016) recommends constructing a more appropriate control group, using the propensity score matching technique.

The basic idea of matching is to find, for each household in the beneficiary group, a household from the non-beneficiary group whose socioeconomic indicators resemble the beneficiary households as closely as possible. This includes age, education, farm size and others.

An obvious problem is that it becomes difficult to match households manually as the set of indicators grows large. A solution to this problem is the use of propensity score matching, which reduces the problem to one dimension (Rosenbaum and Rubin 1983).

The propensity score (PS_i) can be interpreted as an estimate of individual *i*'s probability of receiving treatment. It can be estimated using limited dependent model such as the logit or probit models. For this evaluation of the Landcare program in Bohol, the following logit model was used:

$$P_i = E(Y_i = 1 \mid X) = 1 / (1 + e^{-z}) = \beta_0 + \beta_1 age_i + \beta_2 male_i + \beta_3 educhh_i + \beta_4 educsp_i \ldots + \beta_{14} asset_i + u_i$$

where:

P_i	= probability of a household i being part of the beneficiary group
E	= the expected value of being the program given the covariates
Y	= 1 if a household is a Landcare beneficiary and 0 for non-beneficiary
z	= is the predicted value from the logit regression given the factors that affect being part of the program
β_0	= is the intercept
β_i	= the regression coefficients
age	= age of the household head
male	= gender of household head (1 if male and 0 if female)
educhh	= years of education for household head
educsp	= years of education for spouse
hhsize	= household size
houseown	= house ownership (1 if house is owned and 0 otherwise)
access_elec	= electricity access (1 if they access to electricity and 0 otherwise)
farmarea	= farm area cultivated by respondents (in hectares)
toporoll	= topography of the farm (1 if rolling and 0 otherwise)
landown	= land tenure (1 if farmers own the land they till and 0 otherwise)
yrfarm	= years in farming
mem_org	= membership in organisations (1 if member and 0 otherwise)
farmkt_dist	= distance of farm to their immediate market
asset	= asset index deriving from polling agricultural and household assets
u	= remaining error.

Matching methods and average treatment effect of the treated

After estimating the propensity score, the second step is to match households in the beneficiary group to the non-beneficiary group. There are various and well-established algorithms available in the literature for matching two groups.

For this study, three common matching techniques were employed, namely *k*-nearest neighbour matching, radius matching and kernel matching.

When using *k*-nearest neighbour matching, the propensity score of the non-beneficiary group will be matched with the closest score of the beneficiary household. This study uses the two nearest neighbours as match ($k = 2$).

When applying kernel matching, each beneficiary household is matched with an artificial control, which is constructed from the non-beneficiary households, receiving different weights, depending on the distance of their propensity score from the score of the beneficiary household (Klasen et al. 2011).

Radius matching can be seen as a method lying somewhere in between kernel and nearest neighbour matching. For radius matching, the non-weighted mean of all non-beneficiary households within a defined distance (caliper) from the propensity score of the beneficiary households are used.

After estimating the propensity score, imposing common support region and ensuring that the balancing property is satisfied, the impact of Landcare program in Bohol can be estimated using the average treatment effect of the treated (ATT).

The ATT is calculated as the difference of means of the beneficiary and non-beneficiary group after matching. The average difference in outcomes between the beneficiary and their matched comparison captures the estimated impact of Landcare program.

In summary, the program's impact is derived by comparing the average outcomes among statistically matched subgroup of households using observable characteristics. The propensity score matching estimator for ATT is the mean difference in outcomes between beneficiaries and non-beneficiaries with common support imposed, appropriately weighted by the propensity score distribution of the beneficiary group. The estimated impact using ATT is expressed using the following form:

$$ATT = E\,[\{E[Y_1 \mid P(X_i), T_i = 1] - E[Y_0 \mid P(X_i), T_i = 0]\} \mid T_i = 1]$$

where:

- $P(X_i) = Pr(T = 1 \mid X_i) = E[T_i \mid X_i]$ = conditional probability or propensity score
- T = binary variable 1 for beneficiary group and 0 for non-beneficiary
- Y_1 = outcome variable (farm income) for the beneficiary group
- Y_0 = outcome variable (farm income) for the non-beneficiary group.

Assessing technology adoption

The Landcare project in Bohol promoted conservation farming technologies in the form of:

- contour farming using NVS and enriched NVS (planting of crops like pineapple, banana, coconut and fruit trees along with NVS)
- agroforestry.

The adopters were requested to assess the soil conservation technologies in terms of relevance, ease of adoption, compatibility, and trialability/replicability using rating scales.

These indicators were defined as:

- relevance—technology is useful, important and related to farmer's needs
- ease of adoption—technology is easy to adopt, easy to use, simple and easy to implement
- compatibility—technology conforms with farmer's interest and skills, does not compete with other farm and household activities and is compatible with other practices
- trialability/replicability—technology entails a small amount of loss in case of failure and can be adopted by others any time of the year and at any place.

The following rating scales were used:

- Relevance
  1—least relevant
  2—less relevant
  3—relevant
  4—very relevant
- Ease of adoption
  1—least easy to adopt
  2—less easy to adopt
  3—easy to adopt
  4—very easy to adopt
- Compatibility
  1—least compatible
  2—less compatible
  3—compatible
  4—very compatible
- Trialability/replicability
  1—least easy to try
  2—less easy to try
  3—easy to try
  4—very easy to try

Probit regression analysis was employed to determine factors affecting adoption of contour farming. This study used the following empirical model:

$$P_i = (adopter = 1 \mid X) = \varphi\,(Z_i) = \varphi\,(\beta_0 + \beta_1 income_i + \beta_2 train_i + \ldots + \beta_7 Landcare_i + u_i$$

where:

P_i	= probability of a household being an adopter of contour farming
φ	= cumulative standard normal distribution
Z	= predicted value from the probit regression given the factors that affect being adopter of contour farming
adopter	= 1 if a household is adopter of contour farming and 0 for non-adopter
β_0	= intercept
β_i	= regression coefficients
income	= annual income of household (PHP)
train	= dummy for attendance to training
farmyr	= years in farming
tenure	= tenure status (1 if owner and 0 otherwise)
credit	= dummy for access to credit (1 if household has access and 0 otherwise)
educ	= education of farmer (formal years at school)
Landcare	= membership in Landcare project (1 if member and 0 otherwise)
u_i	= error term

Analysis of most significant change stories

Aside from the quantitative measures of Landcare impacts, qualitative indicators were also determined through the stories of change narrated by farmer-beneficiaries of the Landcare project. The stories of change were gathered from respondents who agreed to tell about the significant changes they have experienced as a result of their involvement with the Landcare project.

Story collection was done through various means, including personal interviews, FGDs or informal conversations. To facilitate story collection, the research team used a story collection guide composed of:

- background of the study
- contact details of the storytellers and the story recorders
- confidentiality conditions
- guide questions for the storytellers.

The questions were open ended to allow the storytellers to freely share information about the changes they experienced as a result of their involvement with the Landcare project. These questions included the following:

1. Tell me how you (the storyteller) first became involved with the Landcare project. What is your involvement with the project? (PROBE: What services—training, technical assistance, information materials—have you accessed from the project?)
2. From your point of view, describe the most significant change that has resulted from your involvement with the Landcare project.
3. Why is this change significant to you?

To be able to produce the write-ups of the stories, the storytellers' narrations of their experiences were recorded, transcribed and encoded using word processing software. The stories were then grouped into domains or categories corresponding to the expected outcomes of the Landcare project.

After grouping, the stories were further subjected to thematic analysis to determine the specific kinds of change representing each of the identified domains. To determine the level of impacts of Landcare, as revealed by the stories of change, the stories were classified according to Bennett's hierarchy of program evidence (Leech et al. 2004) (Table 17 and Table 31).

Table 31 An adaptation of Bennett's hierarchy of program evidence used to analyse levels of change from farmer-beneficiaries' MSCs

	Level	Description
↑	7	End results/changes in conditions: changes in economic, civic and social conditions of the farmers (that is, increase in yield or farm production, increase in income, improved livelihood, being able to send children to school, being able to acquire assets and more).
	6	Behavioural changes: changes in the farming practices, decisions or others of the target groups.
	5	KASA changes: changes in knowledge, attitude, skills, and aspirations.
	4	Reactions to Landcare project: changes in the clients' opinion about the Landcare project.
	3	Involvement: number of farmers who participated in Landcare activities.
	2	Activities: what activities were developed or delivered (that is, training/seminars conducted, farm inputs shared to other farmers, and more).
	1	Inputs: changes in terms of what is invested (that is, staff, time, funds, materials, equipment, technology, and more).

Results

Characteristics of Landcare beneficiaries and non-beneficiaries

The beneficiaries are upland farmers within the project sites who participated in the Landcare activities and attended in the capacity-building activities of the project. The non-beneficiaries are upland farmers from non-project sites who were not exposed to Landcare activities during project implementation.

Both beneficiaries and non-beneficiaries of the Landcare project in Bohol were in their early 60s. About 95% of beneficiaries and 70% of non-beneficiaries were males. A great majority of both types of respondents were married.

On average, they finished the elementary level of education. They represented the typical Filipino households, with four to five members. They generally relied on farming as primary source of livelihood. On average, the Landcare beneficiaries generated more annual income (PHP137,190) from all sources than the non-beneficiaries (PHP90,971) (Table 32).

A little over three-quarters of the beneficiaries (76%) and a little less than half of the non-beneficiaries (47%) were affiliated with farming-related organisations. On average, they joined only one organisation.

A great majority of the beneficiaries (89%) attended farming-related training, while just over half of the non-beneficiaries (56%) did not. On average, those who attended had only one training activity. The majority of both groups of farmers had access to credit for production purpose, and the majority borrowed from informal sources like relatives and friends (Table 33).

The respondents generally had farming as primary source of livelihood. On average, they had been into farming for 37 years. More than half owned the farms they cultivated and were mostly uplands (Table 34). The respondents were generally smallholder upland farmers, but the beneficiaries tilled larger farms (1.64 ha) than the non-beneficiaries (1.27 ha).

Characteristics of Barangay farmer-technicians and small Landcare group members

On average, the BAFTECHs and SLG members in Pilar were about a decade younger than the other upland farmers in Bohol (early 50s). The majority were married but, in contrast with the other farmers, the SLGs were dominated by females. This implies that the PILAR DAM program has developed more female leaders and encouraged the active participation of women in its activities.

The BAFTECHs and SLG members also attended more formal years at school than the other upland farmers. On average, they reached the middle level of secondary education. They also represented the typical Filipino households, with five members and two children still at school.

Table 32 Socioeconomic characteristics of Landcare beneficiaries and non-beneficiaries in Bohol

Variable	Beneficiary	Non-beneficiary	All respondents
Age (mean years)	60	61	61
Gender (%)			
Male	94.6	66.9	79.6
Female	5.4	33.1	20.4
Civil status (%)			
Single	1.5	2.6	2.1
Married	90.8	80.5	85.2
Widowed	7.7	16.2	12.3
Separated	—	0.6	0.4
Education (mean years at school)	6	6.6	6.3
Household size (mean)	5	4	5
Main occupation (%)			
Farming	91.5	83.1	87.0
Barangay official/ barangay worker	1.5	1.9	1.8
Others	6.9	14.9	11.3
Estimated annual household income (PHP)	137,190	90,971	112,128

Table 33 Membership in organisations, training attended and access to credit by the Landcare beneficiaries and non-beneficiaries in Bohol

Variable	Beneficiary	Non-beneficiary	All respondents
Organisational affiliation (%)			
Affiliated	76.2	47.4	60.6
Not affiliated	23.8	52.6	39.4
Organisations (mean number)	1	1	1
Attendance to related training (%)			
Attended	89.2	44.2	64.8
Did not attend	10.8	55.8	35.2
Training attended (mean number)	1	1	1
Access to credit (%)			
Had access	78.5	84.4	81.7
Did not have access	21.5	15.6	18.3
Source of credit (%)			
Relatives	49.0	42.3	45.3
Friends	40.2	29.2	34.1
Credit cooperative	16.6	22.3	19.8

Table 34 Farm characteristics of the Landcare beneficiaries and non-beneficiaries in Bohol

Variable	Beneficiary	Non-beneficiary	All respondents
Farming experience (mean years)	38	37	37
Farm area (mean ha)	1.64	1.27	1.45
Upland area (mean ha)	1.43	1.08	1.26
Upland area (%)	87.2	85.0	86.9
Tenure status (%)			
Owner	55.4	53.2	54.2
Share tenant	25.4	31.8	28.0
Others	19.2	14.3	16.5

Similarly, they generally relied on farming as primary source of livelihood. On average, the BAFTECHs had been into farming longer (25 years) than the SLG members (20 years). Being leaders, the BAFTECHS were also involved in the PILAR DAM program a year ahead (8 years) than the SLG members (7 years). On average, the BAFTECHs generated a little more monthly income (PHP10,939) from all sources than the SLG members (PHP8,760) (Table 35).

Adoption of soil conservation technologies

The Landcare project promoted soil conservation technologies in the form of contour farming and agroforestry. Nearly all of the beneficiaries (96%) adopted these practices. Interestingly, about 40% of the non-beneficiaries also adopted these soil conservation practices (spillover adopters). The majority of the adopters used contour farming (Table 36), and adoption has been generally sustained over time.

Table 35 Characteristics of BAFTECHs and SLG members in Pilar

Variable	BAFTECH	SLG member
Age (mean years)	52	47
Gender (%)		
Male	35.8	29.2
Female	64.2	70.8
Civil status (%)		
Single	—	4.7
Married	92.4	89.6
Live in	3.8	0.9
Widowed	3.8	16.2
Separated	—	1.9
Education (mean years at school)	8	7.8
Household size (mean)	5	5
Number of children at school	2	2
Years in farming	25	20
Years of involvement in PILAR DAM program	8	7
Estimated monthly household income (PHP)	10,939	8,760

Table 36 Adoption of soil conservation technologies in Bohol

Variable	Beneficiary	Non-beneficiary	All respondents
Adoption of soil conservation practice (%)			
Adopted	96.2	39.6	65.5
Did not adopt	3.8	60.4	34.5
Type of soil conservation practice adopted (%)			
Contour farming	74.0	66.1	71.1
Agroforestry	5.2	23.2	11.8
Both contour farming and agroforestry	20.8	10.7	17.1

Adopters used three types of contour farming practices: NVS, enriched natural vegetative strips and using rock wall. A great majority of the beneficiary-adopters (81%) used the enriched NVS, while about two-thirds of the non-beneficiary-adopters (65%) used NVS (Table 37).

For the enriched NVS, farmers used coconut, banana, fruit and timber trees, as well as Napier grass as additional hedgerow materials. Meanwhile, the agroforest species planted by adopters included coconut, fruit and timber trees.

Factors influencing adoption of contour farming

Probit regression analysis was used to determine the factors affecting adoption of contour farming. Results show that annual income, attendance to training and membership in Landcare positively and significantly influenced farmers' decision to adopt contour farming (Table 38).

Table 37 Adoption of contour farming technologies in Bohol

Variable	Beneficiary	Non-beneficiary	All respondents
Type of contour farming adopted (%)			
NVS	15.4	65.1	31.3
Enriched NVS	81.3	32.6	65.7
Rock wall	3.3	2.3	3.0
Crop used as hedgerow material for enriched NVS (%)[(a)]			
Coconut	58.1	21.4	52.3
Banana	52.2	14.3	46.6
Napier grass	18.9	21.4	19.3
Timber trees	14.9	28.6	17.0
Agroforest species planted (%)[(a)]			
Coconut	36.0	73.7	52.3
Fruit trees	20.0	10.5	15.9
Timber trees	64.0	57.9	61.4

(a) Multiple responses allowed.

Table 38 Factors influencing adoption of the contour farming technology in Bohol

Variable	Marginal effects	Standard error
Annual income	3.24e–07*	1.83e–07
Attendance to training	0.083*	0.050
Farming experience	0.002	0.001
Tenure status	–0.023	0.046
Credit	–0.004	0.056
Education	0.001	0.008
Membership in Landcare	0.436***	0.032
Number of observations		*n* = 284

*,*** means significant at 10% and 1%, respectively.

Farmers with higher income who attended related training and members of Landcare groups were more likely to adopt the contour farming technology. Farmers had several reasons for adopting contour farming, the primary one being they believed that the practice prevents soil erosion. Those who did not adopt said that:

- their farms were not suited to contour farming
- they did not have time to apply the practice
- they found the practice a bit costly.

Assessment of the soil conservation technologies

The effectiveness and usefulness of the Landcare soil conservation technologies (NVS, enriched NVS and agroforestry) were assessed by the adopters. The beneficiary-adopters perceived all technologies as being very effective and very useful.

The non-beneficiary-adopters assessed said technologies were effective and useful (Table 39 and Table 40). This implies that the Landcare project was successful in introducing the technologies to reduce land degradation.

The adopters also assessed the technologies in terms of some identified characteristics such as relevance, ease of adoption, compatibility and trialability.

The beneficiary adopters perceived all technologies as very relevant. This supports their earlier claim that the technologies are very useful. The non-beneficiary adopters also found agroforestry as very relevant, and NVS and enriched NVS as relevant.

In terms of ease of adoption, the beneficiary adopters assessed all technologies as easy to adopt, but the non-beneficiary adopters had varying opinions. They found:

- agroforestry as very easy to adopt
- enriched NVS as easy to adopt
- NVS as less easy to adopt.

Table 39 Effectiveness and usefulness of the soil conservation technologies in Bohol

Technology	Beneficiary adopter		Non-beneficiary adopter	
	Weighted score	Description	Weighted score	Description
Degree of effectiveness				
NVS	3.64	Very effective	3.04	Effective
Enriched NVS	3.70	Very effective	3.21	Effective
Agroforestry	3.84	Very effective	3.00	Effective
Degree of usefulness				
NVS	3.71	Very useful	3.07	Useful
Enriched NVS	3.76	Very useful	3.21	Useful
Agroforestry	3.84	Very useful	3.00	Useful

Table 40 Assessment for relevance, ease of adoption, compatibility and trialability of soil conservation technologies by farmer-adopters in Bohol

Technology	Beneficiary adopter		Non-beneficiary adopter	
	Weighted score	Description	Weighted Score	Description
Relevance				
NVS	3.64	Very relevant	3.11	Relevant
Enriched NVS	3.70	Very relevant	3.21	Relevant
Agroforestry	3.88	Very relevant	3.95	Very relevant
Ease of adoption				
NVS	3.29	Easy to adopt	2.18	Less easy to adopt
Enriched NVS	3.31	Easy to adopt	3.07	Easy to adopt
Agroforestry	3.44	Easy to adopt	3.95	Very easy to adopt
Compatibility				
NVS	3.36	Compatible	3.00	Compatible
Enriched NVS	3.22	Compatible	3.07	Compatible
Agroforestry	3.28	Compatible	3.95	Very compatible
Trialability				
NVS	3.21	Easy to try	3.00	Easy to try
Enriched NVS	3.07	Easy to try	3.00	Easy to try
Agroforestry	3.68	Very easy to try	4.00	Very easy to try

Except for agroforestry, both beneficiary and non-beneficiary adopters believed that the soil conservation technologies are compatible with their interest and skills, as well as other farm practices. The non-beneficiaries perceived agroforestry to be very compatible. Both adopters found:

- the NVS and enriched NVS to be easy to try
- agroforestry to be very easy to try (Table 40).

Economic impact

Results of propensity score matching show that the Landcare interventions brought positive impact in farm income. On average, the positive change in farm income attributed to the Landcare project's interventions in Bohol was PHP43,000–PHP44,500 per farm per year (Table 41).

There is statistical evidence to support that farmers in the beneficiary group have higher income than farmers with similar characteristics in the non-beneficiary group.

The estimated impact of Landcare intervention was also evaluated by income group. Results show that the changes in farm income is more pronounced among poor households than non-poor households. In particular, the impact on farm income among farmers below the poverty line is statistically significant, at PHP9,000–PHP10,000 per year (Table 42).

This suggests that the Landcare project was more beneficial to farmers who are below the poverty line. Further, comparison of farm income between adopters and non-adopters of contour farming show consistently that adopting contour farming significantly translates to an increase in income of PHP38,700–PHP40,200 per hectare per year (Table 43).

The monthly income of BAFTECHs and SLG members significantly increased after participating in the PILAR DAM program. BAFTECHs generated an additional monthly income of at least PHP4,600 while the SLG members obtained about PHP3,000 more monthly income (Table 44). Part of these benefits can be attributed to the PILAR DAM program, as supported by the MSC stories.

One BAFTECH from barangay Buenasuerte revealed that aside from food for consumption (which in turn lessened household expenditures on food), the vegetable gardens provided her household additional cash income from the sale of produce. The vegetables produced are safe as they are free from synthetic chemicals.

The quantitative results are supported by findings from the FGDs and MSC stories of beneficiaries. The beneficiaries claimed that they generated additional income from vegetables, banana, coconut, fruit and forest trees.

Accordingly, the increased income enabled them to buy more food, acquire assets, send their children to school and build or repair their houses, among others.

Table 41 Impact of the Landcare program in Bohol on farm income, using matching estimates

Farm income	Nearest neighbour	Radius matching	Kernel matching
ATT (farm income)	43,097.36*	44,552.71*	43,493.28*
Bootstrap SE[(a)]	23,446.77	23,396.63	25,037.61
z	1.84	1.90	1.74
Beneficiary (number)	95	95	92
Non-beneficiary (number)	89	89	89

(a) Standard error (SE) was bootstrapped and replicated 100 times.

* means significant at 10%.

Note: In conducting the propensity score matching, the balancing property was satisfied and common support was imposed (that is, there was an overlap in the probability distribution between treated and comparison group).

Table 42 Impact of Landcare project in Bohol on farm income, using matching estimates for farmers below poverty line

Farm income	Nearest neighbour	Radius matching	Kernel matching
ATT (farm income)	9,675.25**	10,022.01***	9,049.61**
Bootstrap SE[(a)]	4,013.04	3,135.96	4,156.74
z	2.41	3.20	2.18
Beneficiary (number)	61	61	64
Non-beneficiary (number)	64	64	60

(a) Standard error (SE) was bootstrapped and replicated 100 times.

, * means significant at 5% and 1%, respectively

Note: In conducting the propensity score matching, the balancing property was satisfied and common support was imposed (that is, there was an overlap in the probability distribution between treated and comparison group).

Table 43 Impact of contour farming adoption in Bohol

Farm income	Nearest neighbour	Radius matching	Kernel matching
ATT (farm income)	38,752.88*	38,913.00*	40,195.39*
Bootstrap SE[(a)]	21,472.58	20,767.78	21,294.17
z	1.80	1.87	1.89
Adopters (number)	113	113	113
Non-adopters (number)	44	44	44

(a) Standard error (SE) was bootstrapped and replicated 100 times.

* means significant at 10%.

Note: In conducting the propensity score matching, the balancing property was satisfied and common support was imposed (that is, there was an overlap in the probability distribution between treated and comparison group).

Table 44 Monthly household income of BAFTECHs and SLG members before and after participation in the PILAR DAM program in Pilar

Type of respondent	Period	Mean (PHP)	z
BAFTECH	Before PILAR DAM	6,316	
	After PILAR DAM	10,939	
	Difference	4,623***	–4.617
SLG member	Before PILAR DAM	5,807	
	After PILAR DAM	8,760	
	Difference	2,953***	–4.813

*** means significant at 1%.

One FGD participant cited a Landcare beneficiary who experienced progress in planting banana in his contour farm and was able to send his children to school. The children have since become professionals.

Another beneficiary related this significant story of change:

> *'One change that I noticed is that the soil in the contoured farm has become fertile, and my farm harvest has been increased, because I am now able to plant different kinds of crops in my farm... It is a good change, because my farm yield has increased, we have more food in the house, and my farm income has also increased because the harvest which is in excess of our home consumption can already be sold in the market.'*

In Pilar, unemployment has been reduced, as women became BAFTECHs and earned a monthly honorarium, so were able to contribute to the household income.

The market dynamism was also improved due to lumber supply in the locality. While people used to buy lumber in Sierra Bullones in the past, they could now buy lumber at the Pilar market.

The municipality has a sawmill, lumber outlets, and furniture and molding factories. Also, vegetable buyers or compradors went to the vegetable farms to buy vegetables, unlike in the past when the farmers had to bring their products to the market.

Institutional/social impact

Results of the FGDs revealed that the formation of small Landcare groups has been strengthened, with the creation of BAFTECHs, who served as agents to maintain vegetable farms or gardens under the PILAR DAM program.

This is supported by survey results—SLG members claimed that the BAFTECHs were effective in providing information about new technologies.

Three-quarters of the SLG members surveyed said that BAFTECHs facilitated adoption of new technologies. A great majority (81%) claimed that they learned from the technical assistance provided by BAFTECHs and were confident to accept/implement their advice.

On average, the SLG members revealed that they were satisfied with the services of BAFTECHs.

Both BAFTECHs and SLG members exhibited positive attitude about the PILAR DAM program. All the BAFTECHs and a great majority of SLG members (86%) wanted to continue with the livelihood activities promoted by PILAR DAM program, should the LGU stop the program.

Since joining the program, all BAFTECHs became more comfortable working with others, and more open to receiving technical advice. Involvement in the program also enabled a great majority of BAFTECHs to:

- overcome shyness
- become comfortable speaking in front of other people (92%)
- develop positive attitude towards protecting the environment (96%).

A great majority of the SLG members also:

- overcame shyness (75%)
- became comfortable working with others (85%)
- became more open to receiving technical advice (75%)
- developed positive attitude towards the environment (69%).

As a result, all BAFTECHs and a great majority of SLG members (94%) recommended the implementation of PILAR DAM program in other areas.

The PILAR DAM program had 194 BAFTECHs across 21 barangays who held monthly meetings with the SLGs. They have been organised into a BAFTECH municipal federation and held a biannual BAFTECH congress since 2010. They had the 5th BAFTECH Congress on 9 August 2018, in time for the visit of Australian Ambassador to the Philippines, the Hon. Amanda Gorely.

Since its development, the PILAR DAM program has been given an annual budget allocation by the municipal LGU of Pilar (PHP600,800 for 2018).

There is also the barangay annual budget for 21 barangays amounting to PHP500,000. About 77% of the municipal annual budget goes to the honorarium of the BAFTECHs. The municipal LGU provides each BAFTECH a monthly honorarium of PHP200. The barangay LGU provides additional honorarium of PHP200–PHP400 (depending on the barangay's budget/income).

As a result, a BAFTECH receives monthly honorarium of PHP400–PHP600, which contributes to household income. The local government unit has also allocated annual budget for training of the BAFTECHs.

Women's participation in the program increased, as more women were encouraged to plant vegetables since their husbands were doing other jobs.

Farmers developed entrepreneurial, technical, and leadership skills, accessed harvest facilities by organising themselves into people's organisations, and gained self-confidence as shown in their willingness to attend training and serve as emcees in programs. At least one BAFTECH per barangay got elected as a barangay official, which boosted their morale.

At the institutional level, PILAR DAM has championed the Landcare concept, and earned the following awards/recognition for the Pilar LGU:

- certified Landcare Champion Program by the Landcare Foundation of the Philippines in 2017
- Rice Achievers' Award in 2010, 2011 and 2012 with PHP1 million cash prize per award year
- national finalist in the Galing Pook award of Land Bank of the Philippines and Department of Interior and Local Government in 2017
- Pabasa sa Nutrisyon award in 2012, 2013, 2014 and 2015 (Hall of Fame).

It has also served as:

- a learning program for other LGUs from Bohol, Cebu and Mindanao
- host for the study tour on sustainable best practices in agriculture, environment and tourism for a faculty and student from Western Sydney University in Australia.

Indeed, Pilar has become a well-known and high-profile demonstration area for Landcare. One farmer said this has provided him with feelings of self-worth and pride, as he is now:

> *'known as a farmer… many people are now visiting [my farm] always. There were even foreigners who visited my farm. The ambassador of Australia also visited my farm. In the past, nobody would visit my farm… It is an important change that my farm became a model farm, because I met more people with big positions who visited my farm, and it has helped me to become more popular in our place now.'*

Environmental impact

Aside from economic and social impacts, the Landcare program provides environmental benefits. Respondents in the FGDs said that landscape has improved, biodiversity has increased and soil erosion has reduced.

In the case of erosion, their indicator was that where it used to take 3 days for turbidity of the water in Malinao Dam to clear up after a heavy rain, it now takes less than a day.

Malinao Dam is the biggest dam in the irrigation system of Bohol that also supplies water for domestic use. Individual stories of significant change supported the observed reduction in soil erosion. For example, one beneficiary said:

> *'When I contoured my farm, I saw that the soil became fertile because it does not any more erode easily when there is rain…It's important that the soil would not erode easily, because I saw that my harvest has increased a bit. It was higher compared before when farm was not yet contoured.'*

This had contributed to a perceived reduction of the threat of landslides. As one participant said:

> *'It has also helped protect our community from landslides because it [contouring] helped in preventing soil erosion.... It is important because it provides safety to my family since the chance of having landslides in our place is lessened.'*

In 2006, a study from the Bureau of Soil and Water Management estimated that the dam's lifespan was likely to be halved at 40 years if the heavy siltation problem was not corrected. The dam was thought to have provided political incentive in ensuring funding and support for the PILAR DAM program as part of controlling soil erosion and protecting the dam.

Another environmental impact that FGD participants mentioned is improvement in the land cover, leading to greener landscape in the project sites. They claimed that cultivated areas increased, as sloping cogonal lands were converted to alleys and planted to crops.

The landscape turned green, as idle spaces were planted to forest and fruit trees, coconut, banana, abaca and others. This was measured using data from the National Mapping and Resource Information Authority for 2004 and 2015. Maps on land cover were developed from the data (Figure 12).

Results show that there is significant change in land cover of the watershed area where Malinao Dam is located. The cultivated area devoted to both annual and perennial crops increased, while the area of open forest decreased.

The reduction in the area of open forest could be due to the improvement of the forest cover. This could be generally attributed to the establishment of forest plantations in reforestation sites and in privately owned lots. Aside from the contribution of pure tree plantations, improvement of the forest cover could also be attributed to the implementation of integrated farming systems, with perennial crops like trees being one of the principal components, as was the case of agroforestry that was promoted by the Landcare project.

The farmers also believed that the threat of landslides was reduced because the forest protected the soil from strong winds and water. One story of significant change with involvement in the Landcare program relates:

> *'It has helped us a lot because it's not anymore cumbersome to work in our farm. It has also helped protect our community from landslides because it [contouring] helped in preventing soil erosion... It is important because it provides safety to my family since the chance of having landslides in our place is lessened.'*

Levels of changes and indicators of Landcare impacts as revealed by the beneficiaries' stories of significant change

To supplement the quantitative data on the impacts of the Landcare project in Bohol, qualitative indicators were also determined using the stories of significant change narrated by the project beneficiaries. Story collection was done through interviews with the selected respondents.

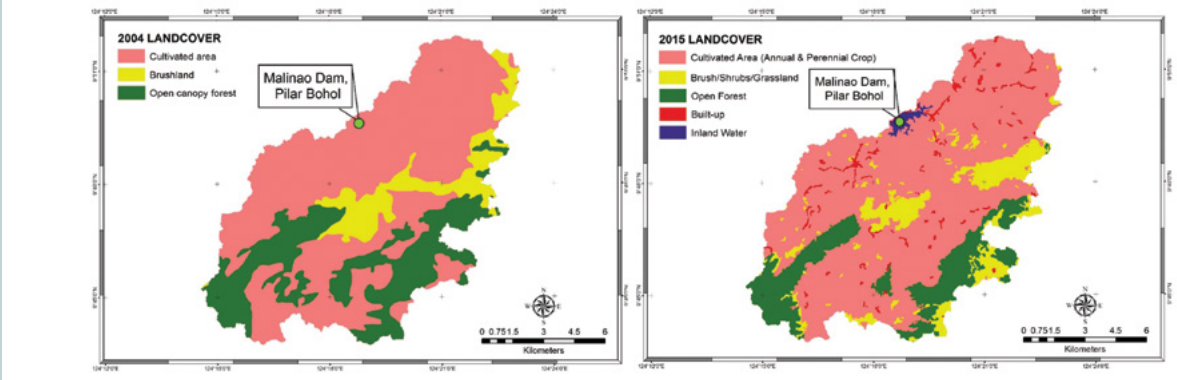

Figure 12 Change in land cover in Malinao Dam catchment area, 2004 and 2015
Source of basic data: National Mapping and Resource Information Authority.

A total of 42 stories were collected from the beneficiaries in Alicia, Pilar and San Isidro. Of those:

- 15 stories (36%) were from Alicia
- 14 stories (33%) were from San Isidro
- 13 stories (31%) were from Pilar.

To determine the range of changes experienced by the beneficiaries of the Landcare project, the collected stories were grouped into domains or broad categories of change. Although there were only 42 storytellers, 46 kinds of change were recorded, as four beneficiaries highlighted two kinds of important changes each.

MSC stories were a powerful way of expressing impacts from the household perspective, including unexpected impacts that were not unearthed in the scoping activities.

To determine the levels of impacts of the Landcare project based on the MSC stories, the themes of the significant changes narrated by the beneficiaries were classified based on Bennett's hierarchy of program evidence (Leech et al. 2004).

Results of the analysis show that a great majority (93%) of the changes described in the stories shared by the Landcare project beneficiaries were about positive changes that belonged to the higher levels of Bennett's hierarchy of program evidence (levels 5–7) (Table 45). This suggests that the Landcare project had already made positive impacts on the beneficiaries.

Specifically, 87% of the stories were about changes in the conditions of the program beneficiaries, which correspond to the highest level of Bennett's hierarchy of program evidence (level 7). This suggests that the Landcare project was able to contribute to the improvement in the farming, economic and social conditions of a great majority of the project beneficiaries in the three municipalities in Bohol.

The farmers' stories show that adoption of contour farming resulted in positive environmental changes (reduced soil erosion in their farms, improved farm conditions and less occurrence of landslide), which eventually provided farmers with the desired economic benefits, including bigger harvest, more food stocks, higher incomes, and being able to send their children to school.

Some beneficiaries even said that their participation in the Landcare project led to some social changes, including becoming known as a farmer (gaining recognition) and being able to overcome shyness (personality improvement).

Professor Andrew Campbell, Chief Executive Officer of ACIAR, and the Hon. Amanda Gorely, Australian Ambassador to the Philippines, visited the Bohol site in 2018. They found an 'inspiring example of grassroots community Landcare delivering benefits for livelihoods, nutrition and the environment'.

Table 45 Levels of program outcomes to which the changes experienced by the beneficiaries of the Landcare project correspond

Level of outcome	Theme of change	Number	%
5—KASA changes	Increase in knowledge about hilly land farming	2	4
6—Behavioural changes	Planted permanent crops in the farm (change in farming practice)	1	2
7—End results (changes in the conditions of the project beneficiaries)	Reduced soil erosion	7	
	Improved farm condition	20	
	Reduced occurrence of landslide	2	
	Increase in farm harvest	7	
	Additional income	2	
	Becoming known as a farmer	1	
	Able to overcome shyness	1	
	Subtotal	*40*	*87*
Other changes	Stopped farming	2	
	Pasture destroyed by carabaos	1	
	Subtotal	*3*	*7*
Total		**46**	**100**

9.7 Discussion

The Claveria case highlighted a decrease in use of key Landcare practices, and a decline in local groups over time, while Bohol showed a very high degree of continued use of contour farming practices and group membership. The institutional contexts in each of these sites for Landcare activities are quite distinct, and worth reflecting on.

In Claveria, a key focus of analysis from the survey was changes in household income (as part of poverty reduction). In contrast to what the team hypothesised, there was no significant difference in income between the different treatment groups (that is, control group, those in ICRAF project areas, those in Landcare project areas and those in ICRAF/Landcare project areas), or between adopters and non-adopters.

FGDs revealed that the more significant impact from a household perspective was increased food production, leading to improved food security for the household. Further, the use of soil conservation practices did not represent an increase in income, but may have prevented a decline in income over time.

In Bohol, small but statistically significant increases in income were observed, and this was found to be slightly more for poorer households. This is an important finding, given poorer households are at times inadvertently excluded from participating in similar programs.

Similar to Claveria, participatory methods highlighted household perspectives on impact relating to environmental health and food security. Both sites also found households identified significant changes in their capacity and social capital.

The main institutional mechanism for the promotion of Landcare in Claveria is the LFPI, the non-government organisation that ICRAF established to facilitate continued impacts from Landcare.

The LFPI is well established and still active in promoting Landcare. But, as an NGO, its activities and its geographic focus are driven to an extent by the funding available. In addition, the organisation of farmer groups was based around a limited number of facilitators, with local farmer champions. Other drivers of change are also pertinent, such as the increasing presence of multinationals and opportunities for contract farming arrangements that may discourage Landcare practices.

In contrast, in Pilar in Bohol, the Landcare project was able to garner support from the LGU, who has ensured ongoing funding and support for Landcare activities (as well as their local adaptation), by embedding key aspects within government structures.

The community-based BAFTECHs provide important support and information to farmer groups, which are compulsory for all households. It is important to note that a compulsory approach may not work in all areas. For example, it would likely be resisted in areas like Claveria where there is high degrees of distrust for government programs. However, it appears to have been effective in Pilar.

In considering what it was about Pilar that has made it so successful in ensuring ongoing funding and support for Landcare, the Malinao Dam, which provides irrigation and domestic water supply, was thought to have provided political incentive. Without controlling erosion, the lifespan of the dam was predicted to be significantly lower.

As such, the LGU could justify an annual budget for the implementation of the PILAR DAM program, including the provision of monthly incentives for the BAFTECHs, as part of controlling erosion and protecting the dam.

9.8 Conclusion

This study aimed to assess the impacts of the Landcare program in Claveria and Bohol, specifically how it contributed to reducing poverty in the two project sites. For both sites, the key focus of the analysis was changes in household income.

Based from the results, overall, the Landcare program had no pronounced impact on poverty alleviation in Claveria and had a marginal impact in Bohol. But it seemed to have impacts on the economic, social and environmental dimensions of community life.

Although these impacts were not translated into poverty reduction using income indicators, the Landcare program resulted in marginal to significant changes in different aspects of the lives of the members and non-members alike.

Impact refers to 'positive or negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended'.

Looking back at the application of the integrated framework, the use of different data collection methods has helped validate and verify discrepancies in the findings from individual data collection methods, and uncover indirect and unintended impacts of an intervention.

These serve as determining factors of the internal validity and integrity of impact assessment. They can be viewed as a proof of the significance of an integrated approach to impact assessment.

10 Practical considerations for implementation

10.1 A multidisciplinary team is ideal for MMAIA

A multidisciplinary team is ideal for the MMAIA. It is advantageous if an impact assessment team can include principal researchers from disciplines such as sociology, economics, anthropology and development studies.

For agriculture research and interventions, it is also ideal to include researchers from agronomy, horticulture, animal science, aquaculture and other fields of agriculture.

However, in many cases, resource constraints do not permit such a diverse composition of team members from different academic disciplines. To address this, teams may:

- go through additional training on areas that they need to be oriented to
- find ways to obtain the needed expertise through collaboration with other agencies
- invite practitioners from disciplines that they are lacking in to take part in workshops or consultation.

In the case of the Landcare program impact assessment, having a multidisciplinary team helped identify critical elements in the design and implementation of the impact assessment framework. These helped identify and assess direct, indirect, intended, unintended, short-term, long-term, positive, negative and multidimensional impacts of AR4D interventions.

While there are advantages in having a multidisciplinary collaborating team, there are also a few drawbacks. For instance, at the outset of the project, the teams and partner agencies had different understandings of which dimension of impacts each team wanted to prioritise.

At times, teams directed their focus to specific research results from specific data collection methods rather than seeing those results in reference to the larger relationships of results from other data collection methods and among results from other phases specified by the MMAIA framework.

Explicitly discussing the teams' disciplinary strengths, weaknesses, biases and gaps at the outset of designing an impact assessment is important and can lead to opportunities to strengthen the design.

Engaging team members from across disciplines and sectors in discussion of results and analysis early and often through the scoping, design and implementation of the assessment will support a more robust and valuable assessment.

The team needs to understand that impacts to be investigated can change over time, as the understanding of the project and its impacts deepens. So, the impact assessment team must also understand that the needed skills in the team can also change as more information about the project and the impacts becomes available.

As the MMIA framework capitalises on its iterative nature, impact assessment teams must also be willing to evolve, in terms of their composition, through the course of the impact assessment.

10.2 MMAIA facilitates triangulation of results

Triangulation has become one of the main features of MMAIA. It allows researchers to validate and to support the results relative to the same phenomenon through different methods, enhancing both internal and external validity in the process.

The use of the different evaluation instruments enabled the team to provide a precise and complete picture of the impacts of the projects under assessment.

There were instances when results of qualitative and quantitative collection methods complemented each other to provide a clearer evidence of impact. There were, however, instances where two methods of data collection yielded contradictory results—for example, FGDs and survey.

When this happened, a third method of data collection was implemented to explain the discrepancy. Examples of how triangulation was used in the impact assessment of the Landcare program are presented in Table 46.

Table 46 Triangulation in the impact assessment of the Landcare program

Impact assessment of the Landcare program in Claveria		
Topic	**Data from quantitative methods**	**Data from qualitative methods**
Landcare groups and participation	Survey results showed that there was a decline in community participation in organised groups among farmer-respondents. This contradictory finding called for another round of FGDs with farmers.	Context mapping through FGDs revealed active farmer groups were organised and operated under the Landcare program. **Confirmation:** Data validation through FGDs as a result of the discovery of discrepancies in the data, found that offshoot organisations were formed from original Landcare groups. But eventually these have struggled with sustainability, possibly due to the low level of trust for extension workers, Landcare groups and farmer-leaders.
Attendance to training and seminars	This result was supported by survey respondents. High attendance to such seminars and training were observed in barangays closer to Poblacion or the centre of town. **Confirmation:** Further analysis of the survey results confirmed the findings of the FGDs, but it provided a more nuance and detailed information about participation and location.	According to the village FGD participants and key informants, seminars and training on soil conservation techniques, project proposal development, accounting and postharvest practices were held occasionally.
Adoption of Landcare technologies	It was revealed that only 47% of the farmers were adopting. Some farmers reverted to their previous production practices.	From the review of project documents, it was found that 65% of the farmers in Claveria were adopting Landcare conservation measures during its early years. This finding was supported by the farmer-leaders during the first FGD. They revealed that at present, most of the farmers in Claveria were adopting Landcare technologies. **Confirmation:** Results of data validation through village FGDs conducted after the survey revealed that there were external factors that influenced adoption. Farmers became exposed to contract farming with multinational corporations who promote contrary technologies. This provided the explanation for the discrepancy between the qualitative and quantitative data on the proportion of adopters of Landcare technologies in Claveria.

Table 46 Triangulation in the impact assessment of the Landcare program (continued)

Impact assessment of the Landcare program in Claveria		
Topic	**Data from quantitative methods**	**Data from qualitative methods**
Characteristics of adopters and non-adopters	Survey results showed that farm size negatively influenced adoption of Landcare technologies.	FGD data that were collected after the survey showed that for most cases, those farmers who own small sloping lands tend to not adopt Landcare technologies because it leads to a significant decrease in the cultivated area. However, farmers who own large sloping lands were more likely to adopt, as the gains of the Landcare technologies outweighs the cost of losing cultivated lands. Farmers with sloping lands who also own the adjacent flat land tend to not adopt soil conservation technologies, as they can manage economic loss from erosion and fertiliser lost. Farmers who only own sloping lands tend to adopt soil conservation technologies to reduce fertile soil being lost to their neighbouring farmers. **Confirmation:** FGD data confirmed the result of the survey and provided more details about the relationship between land size and adoption. They also revealed other important details that influence adoption. Unfortunately, these variables were not included in the survey instrument, so no statistical and econometric analysis were made for these variables.
Types of crops planted	Results of the binary logistic regression conducted for this study revealed that the farmer-respondents who were planting high-value crops were more likely to adopt Landcare technologies. Meanwhile, those who were planting timber or fruit trees were less likely to adopt than those planting vegetables and/or root crops.	FGD data showed that farmers who owned sloping lands but were planting timber trees or crops with thick canopies and extensive root systems tend to not adopt soil conservation technologies like contouring, as they do not experience adverse effects of soil erosion. **Confirmation:** FGD data confirmed the result of the survey, and provided more details about the relationship between slope, types of crops and adoption. Unfortunately, because the survey was conducted before the FGD, these variables were included in the survey, so no statistical and econometric analysis were made for these variables.

10.3 MMAIA saves time and financial resources

Limited time and resources are always the constraining factors in any impact assessment. On the surface, a mixed-method impact assessment requiring multiple methods of data collection in different phases may seem resource intensive.

But the MMIA framework has the potential to save time and financial resources in impact assessments. The need to establish a well-defined theory of change, impact pathway, and baseline conditions during the development project design phase helps impact assessment teams to identify relevant indicators and variables that can be included in the evaluation.

Should there be resource constraints, the impact assessment team can also prioritise which important variables to assess as they already have a clear and educated theory and hypothesis about the relationships of variables.

This may lead to a more efficient use of research tools, like a more concise survey questionnaire and FGD and interview guides. This, in turn, may mean less time for data collection, lower costs, and less stress on the researchers and participants.

Impact assessment teams also immediately know the characteristics of the respondents or participants. This leads to a more efficient sampling techniques and decision-making about the logistics of the impact assessment.

10.4 MMAIA draws insights from one method to inform another

Many aspects of data collection can lead to unexpected or challenging circumstances. How these are managed will depend on the overall design of the impact assessment, and vary greatly from case to case.

A clear evaluation plan and supporting information are essential (for example, data collection protocols) to ensure a consistent approach across the team, as well as transparency and replicability of the impact assessment.

The plan can (and should) be adjusted as needed, and what is changed and why should be recorded. This does not only ensure transparency and integrity, but it also contributes to overall learning and improvement across different impact assessments.

In the case of the Landcare program impact assessment, different perspectives on the same estimate became evident and required further exploration. For example, survey results showed that farm size negatively influenced adoption—as farm size increases, the probability of adoption of Landcare technologies decreases. This called for a data validation through village FGDs.

The insights generated from the analysis of the survey data informed the FGD participant selection and guide questions. The data validation through village FGDs provided nuances to the survey results.

FGD data also showed that, in most cases, those farmers who own small sloping lands tend to not adopt Landcare technologies, because it leads to a significant decrease in the cultivated area.

Farmers who own large sloping lands were more likely to adopt, as the gains of the Landcare technologies outweigh the cost of losing cultivated lands.

Farmers with sloping lands who also own the adjacent flat land tend to not adopt soil conservation technologies, as they can manage economic loss from erosion and fertiliser lost. Farmers who only own sloping lands tend to adopt soil conservation technologies to reduce fertile soil being lost to their neighbouring farmers.

Village FGDs also revealed that adoption differs among crops planted. Farmers planting corn and vegetable crops tended to adopt Landcare technologies compared with farmers planting crops with thick canopy and extensive root systems, such as fruit trees, which make the land less prone to erosion.

However, the exact number and percentages of these farmers cannot be stated in the FGDs. That information and knowledge were not available during the development of the survey questionnaire, so were not explored in the household survey.

The aim of MMAIA is to allow for adjustments and improvement as understanding changes. For instance, scoping activities may indicate that the key benefits from an intervention are environmental, but initial data collection may highlight significant social benefits.

In this case, it may be necessary to adjust the impact assessment design and methods to include a greater focus on social benefits. Few projects will have the resources to run additional surveys, but they may be able to adjust subsequent activities, or include additional interviews to supplement insights into social benefits.

10.5 MMAIA facilitates the assessment of indirect, unexpected, long-term and multidimensional impacts

The traditional impact assessment framework can assess the direct, expected, and short-term impacts of research and intervention projects. It is in the assessment of indirect, unexpected, long-term, and multidimensional impacts that the MMIA framework adds value to impact assessments.

This is facilitated by the iterative phases in the framework, as well as the sequencing and mixing of quantitative and qualitative data collection methods and analysis. Table 47 illustrates the added value of the framework, as it was able to assess these types of impacts in the Landcare program. By doing so, the impact assessment can inform our policymakers, project managers and implementers to make better decisions regarding the use of the assessment in modifying and improving on the assessed project.

In the case of the Landcare program impact assessment, without diving deeper in the unexpected, indirect and the other dimensions of impact of the two projects, it would seem that the projects failed in achieving its impacts. The Landcare program would have seemed to have no impact on income among beneficiaries.

But through the use of framework, it was proven that the project facilitated diversification of household income sources, contributing to income security even without significant increase in household income levels. Indirect impacts also point to household food security from diversification of crop planted in the farm and other environmental and capacity building improvements.

Table 47 Value added by the MMAIA framework

Indicators	Methods used: weights and sequence	Mixing and analysis of data	Value added by the MMAIA framework
• Farming practices before and after Landcare. • Perception and trust toward Landcare groups. • Knowledge and awareness. • Membership and participation in community organisations. • Access to extension services. • Diversity of income. • Gross net/ income	• Sequential exploratory 1. FGD, KII 2. Survey 3. FGD 4. MSC. • Equal weight was given.	• Qualitative and quantitative data were merged. The following analyses were conducted: 1. descriptive analysis 2. thematic analysis 3. econometric analysis.	• Uncovered different characteristics of adopters and non-adopters and how they influenced technology adoption. • Provided nuance on the income difference, such as non-adopters having higher income than adopters. • Discovered household food and income security as an indirect impact of the program, even though there is no significant impact on income levels. • Proved that the Landcare program facilitated diversification of household income sources, contributing to income security even without significant increase in household income levels. Indirect impacts also point to household food security from diversification of crops planted in the farm and other environmental and capacity building improvements. • Discovered improvement on micro-climatic conditions as an unintended impact of the program. • Identified impacts beyond economic, including social, and capacity-building impacts.

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The mixed-method approach adds value to impact assessments by considering indirect, unexpected, long-term and multidimensional impacts. Use of the framework demonstrated that the Landcare program facilitated diversification of household income sources, contributing to income and food security, even though there was not a significant increase in household income levels. Photo: Jeoffrey Maitem.

Appendix 1: Useful resources

Examples of mixed-method impact assessments

These resources don't follow the phases outlined in this document, but they provide examples of impact assessments that look at different types of impacts, and do so in cross-disciplinary, mixed-method ways.

Bonilla J., Zarzur R.C., Handa S., Nowlin C., Peterman A., Ring H. and Seidenfeld D. 2017. Cash for women's empowerment? A mixed-methods evaluation of the Government of Zambia's Child Grant Program. World Development 95, 55–72. doi:**https://doi.org/10.1016/j.worlddev.2017.02.017**.

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Research integrity and ethics

The Australian Council for International Development and Research for Development Impact Network have collaborated on resources to support researchers and practitioners understand and apply principles for ethical research and evaluation, including guidelines, case studies and starter kits. At **https://rdinetwork.org.au/effective-ethical-research-evaluation**.

Context mapping, theory of change and impact pathways

- Timeline mapping—at **www.betterevaluation.org/en/evaluation-options/timelines**.
- Impact planning—impact planning toolkit at **www.sheffield.ac.uk/rs/impact/planning_toolkit**; Fast Track Impact (a range of tools and videos) at **www.fasttrackimpact.com/resources.**
- Stakeholder mapping—at **www.researchtoaction.org/2015/09/stakeholder-mapping-resource-list.**
- Outcome mapping—at **www.betterevaluation.org/en/plan/approach/outcome_mapping.**
- Theory of change—at **www.betterevaluation.org/en/resources/guide/theory_of_change** and **www.thinknpc.org/wp-content/uploads/2019/10/Theory-of-Change-10-Steps-Updated.pdf.**

Cross-cutting approaches, methods, professional development

- Better Evaluation website—a comprehensive summary of different approaches, methods and case studies for all steps of the evaluation cycle. At **www.betterevaluation.org.**
- Australian Evaluation Society—a member-based organisation which exists to improve the theory, practice and use of evaluation in Australasia for people involved in evaluation, including evaluation practitioners, managers, teachers and students of evaluation. At **www.aes.asn.au**.
- Resources for Program Evaluation and Social Research Methods—lists links to websites with all sorts of information about program evaluation—such as general sites about evaluation methodology—and sites specific to certain methods, including surveys, observations or data analysis. There are also links to free statistical software and sites about how to present information.
- Clear Horizon—qualitative-based methods. At **www.clearhorizon.com.au/resources.aspx**
- Partnership Brokers Association—The Journal of Partnership Brokering 'Betwixt and Between' contains some interesting papers from a practitioner perspective on topics that span aspects relevant to conducting impact assessments. At **https://partnershipbrokers.org/w/journal/**.

Appendix 2: Glossary of terms

Agricultural research -for-development	Refers to a broad suite of programs and projects that aim to contribute to scientific knowledge, and apply that knowledge to contribute to rural development goals.
Attribution	The act of establishing direct links between an impact and an action or intervention. Usually involves trying to isolate/quantify the direct proportion of impact that can be claimed by a particular funder. Typical questions: • Has the program/project led to the impact? • What quantified proportion of impact can we attribute to the program?
Contribution	Considers the role or influence of a particular actor and/or program, but acknowledges the range of actors, events and drivers that played a role. Does not seek to isolate or determine the exact share of impact.
Framework	Reference point to guide what questions are asked (that is, design, data collection) and how data are analysed.
Impact assessment	Analysis of short and long-term changes (positive or negative, intended or unintended) that stem from research projects at different scales. Includes consideration of process underlying the intervention, as well as outcomes and impacts. The ultimate goal is the use of the information by others (funders, researchers, stakeholders) to improve future work.
Impact	The lasting change in a situation (intended or unintended, positive or negative) as a result of a project, piece of research or other intervention—the result of an outcome.
Indicator	Evidence that impact has occurred—the specific change that you are trying to identify. Can be either qualitative or quantitative.
Mixed method	Deliberate use of qualitative and quantitative approaches in different stages of the impact assessment process.
Outcome	Observable change in behaviour, relationships, activities and actions of actors (individual, group, organisation) as a result of a project, piece of research or other intervention.
Impact pathway	An impact pathway sets out the plausible steps of how research outputs will contribute to an outcome or set of outcomes.
Theory of change	Taking a systems view, defines long-term goals around the issues the project is trying to influence, and then maps backward to identify necessary preconditions. Describes how and why a desired change is expected to happen in a particular context. This provides the basis of thinking about which pathways the project will pursue and helps the teams identify who else needs to be involved in the project activities and engagement to influence or enable the changes sought by the project. In the context of an ex-post impact assessment, understanding the project's theory of change provides an understanding of why the project team chose particular pathways and the underpinning assumptions of how these would lead to impact.

Appendix 3: Impact pathway, Claveria site

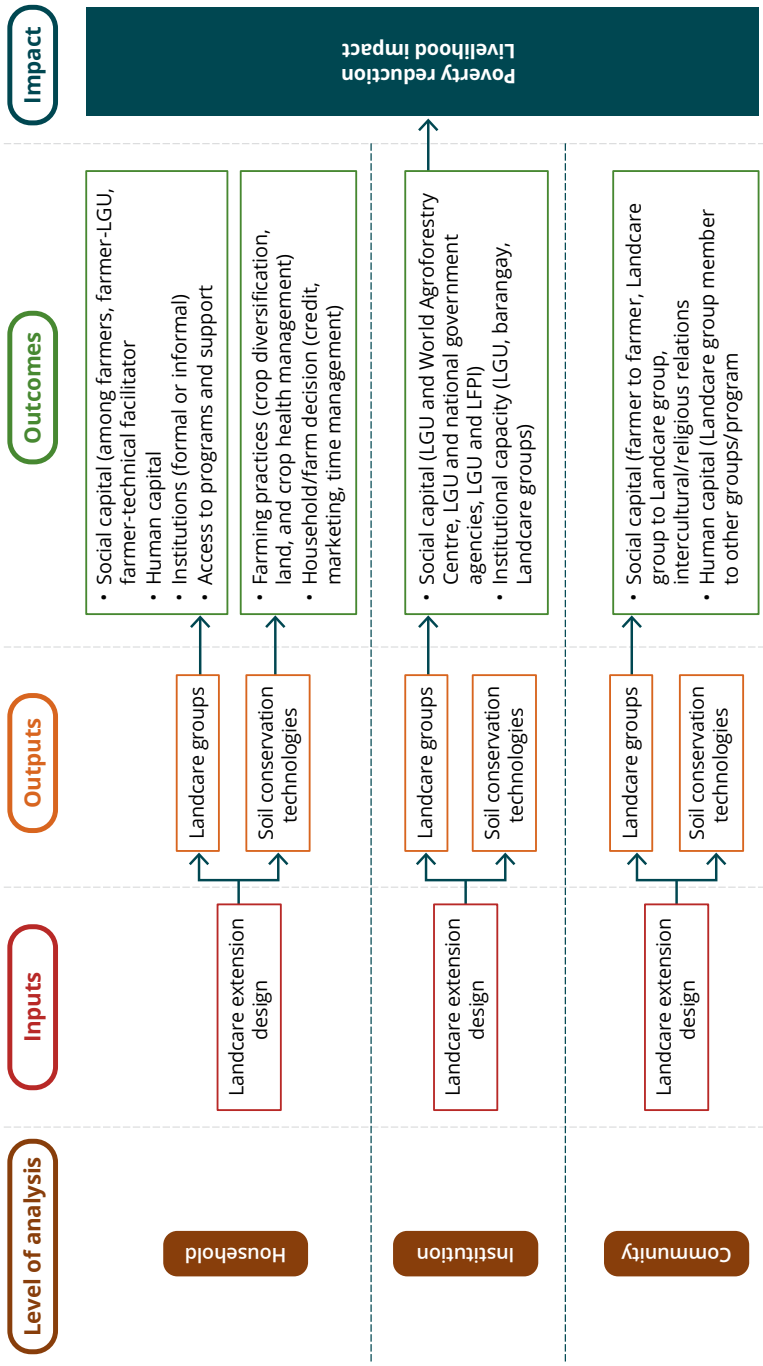

Figure A1 Impact pathway defined for the impact assessment of the Landcare program in Claveria

Appendix 4: Impact pathway, Bohol site

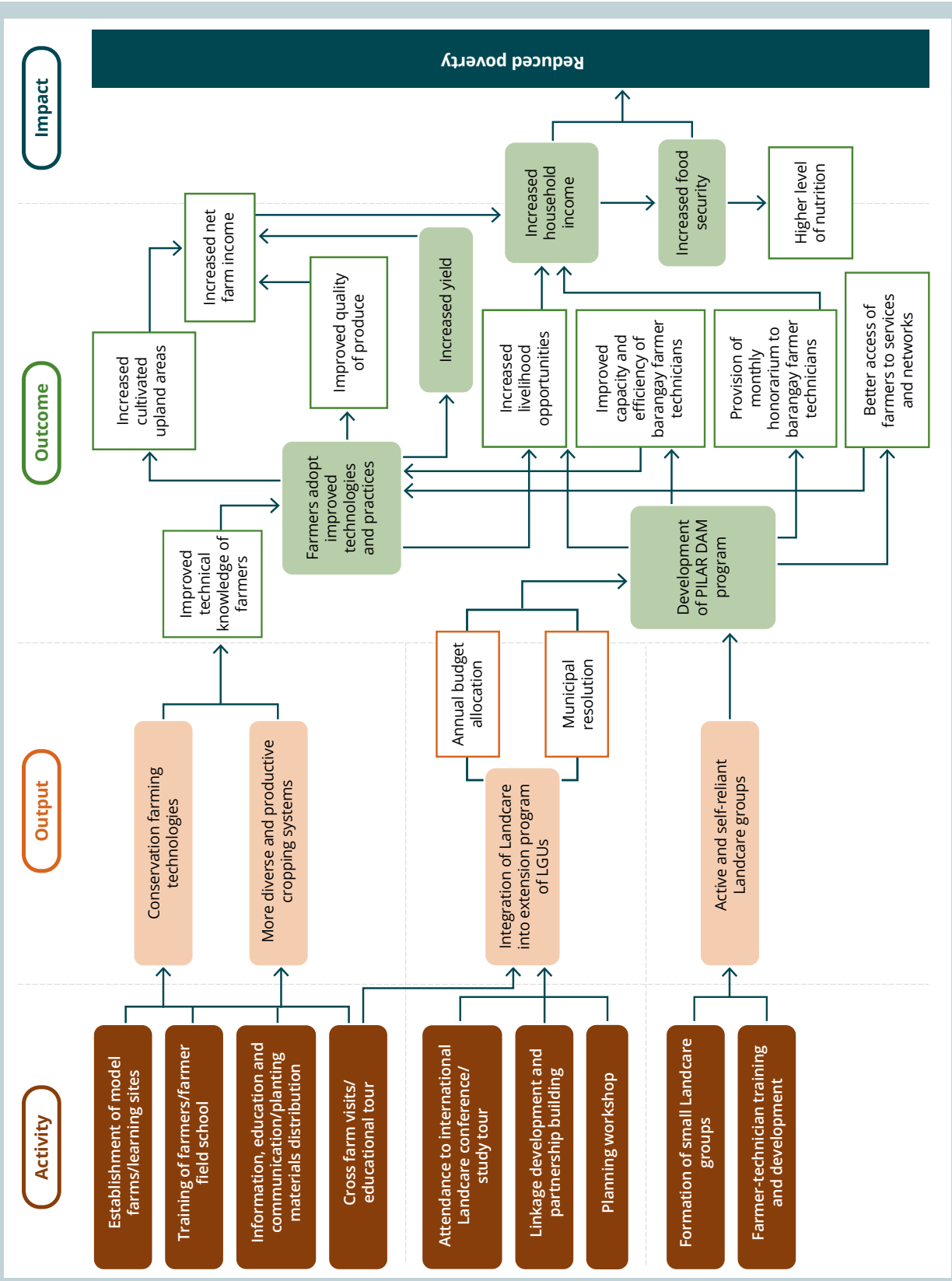

Figure A2 Impact pathway defined for the impact assessment of the Landcare program in Bohol

Appendix 5: Overview of variables used for a logistic regression model, Claveria site

Table A1 Overview of the variables used in the logistic regression model for the impact assessment of the Landcare program in Claveria

Variable	Unit	Code
Dependent variable: adoption of Landcare technologies	1=adopts 0=otherwise	adopt
Independent variable		
Household size	Number of persons in a household	hhsize
Farm size	Hectare	fsize
Participation in farmer organisation	1=participated 0=otherwise	org
Awareness of Landcare	1=aware 0=otherwise	aware
Trust in Landcare groups	1=very little 2=somewhat little 3=undecided 4=somewhat much 5=very much	trust
Type of crop 1	1=high value 0=otherwise	type1
Type of crop 2	1=fruit or timber tree 0=otherwise	type2
Diversity of income	1=has other sources of income 0=otherwise	othincsource
Land ownership	1=owned 0=otherwise	landown

Appendix 6: Overview of variables used for a multiple linear regression model, Claveria site

Table A2 Overview of the variables used in the multiple regression model for the impact assessment of the Landcare program in Claveria

Variable	Unit	Code
Independent variable		
Sex	1=male 0=female	sex
Age	Years	age
Education	1=elementary level 2=elementary graduate 3=high school level 4=high school graduate 5=college level 6=college graduate 7=vocational graduate 8=postgraduate	educ
Household size	Number of persons in a household	hhsize
Farm size	Hectare	fsize
Access to extension services	1=accessed 0=otherwise	Accesstoext
Access to credit	1=accessed 0=otherwise	credit
Participation in farmer organisation	1=participated 0=otherwise	org
Adoption	1=adopted 0=otherwise	adopt
Awareness of Landcare	1=aware 0=otherwise	aware
Trust in Landcare groups	1=very little 2=somewhat little 3=undecided 4=somewhat much 5=very much	trust
Year of first involvement in Landcare	1=1996–2007 0=otherwise	year
Dependent variable: total household income		

No.	Author(s) and year of publication	Title	ACIAR project numbers
1	Centre for International Economics 1998	Control of Newcastle disease in village chickens	AS1/1983/034, AS1/1987/017, AS1/1993/222
2	George P.S. 1998	Increased efficiency of straw utilisation by cattle and buffalo	AS1/1982/003, AS2/1986/001, AS2/1988/017
3	Centre for International Economics 1998	Establishment of a protected area in Vanuatu	ANRE/1990/020
4	Watson A.S. 1998	Raw wool production and marketing in China	ADP/1988/011
5	Collins D.J. and Collins B.A. 1998	Fruit fly in Malaysia and Thailand 1985–1993	CS2/1983/043, CS2/1989/019
6	Ryan J.G. 1998	Pigeonpea improvement	CS1/1982/001, CS1/1985/067
7	Centre for International Economics 1998	Reducing fish losses due to epizootic ulcerative syndrome—an ex ante evaluation	FIS/1991/030
8	McKenney D.W. 1998	Australian tree species selection in China	FST/1984/057, FST/1988/048
9	ACIL Consulting 1998	Sulfur test KCL–40 and growth of the Australian canola industry	PN/1983/028, PN/1988/004
10	AACM International 1998	Conservation tillage and controlled traffic	LWR2/1992/009
11	Chudleigh P. 1998	Postharvest R&D concerning tropical fruits	PHT/1983/056, PHT/1988/044
12	Waterhouse D., Dillon B. and Vincent D. 1999	Biological control of the banana skipper in Papua New Guinea	CS2/1988/002-C
13	Chudleigh P. 1999	Breeding and quality analysis of rapeseed	CS1/1984/069, CS1/1988/039
14	McLeod R., Isvilanonda S. and Wattanutchariya S. 1999	Improved drying of high moisture grains	PHT/1983/008, PHT/1986/008, PHT/1990/008
15	Chudleigh P. 1999	Use and management of grain protectants in China and Australia	PHT/1990/035
16	McLeod R. 2001	Control of footrot in small ruminants of Nepal	AS2/1991/017, AS2/1996/021
17	Tisdell C. and Wilson C. 2001	Breeding and feeding pigs in Australia and Vietnam	AS2/1994/023
18	Vincent D. and Quirke D. 2002	Controlling *Phalaris minor* in the Indian rice-wheat belt	CS1/1996/013
19	Pearce D. 2002	Measuring the poverty impact of ACIAR projects—a broad framework	
20	Warner R. and Bauer M. 2002	*Mama Lus Frut* scheme: an assessment of poverty reduction	ASEM/1999/084
21	McLeod R. 2003	Improved methods in diagnosis, epidemiology, and information management of foot-and-mouth disease in South-East Asia	AS1/1983/067, AS1/1988/035, AS1/1992/004, AS1/1994/038

No.	Author(s) and year of publication	Title	ACIAR project numbers
22	Bauer M., Pearce D. and Vincent D. 2003	Saving a staple crop: impact of biological control of the banana skipper on poverty reduction in Papua New Guinea	CS2/1988/002-C
23	McLeod R. 2003	Improved methods for the diagnosis and control of bluetongue in small ruminants in Asia and the epidemiology and control of bovine ephemeral fever in China	AS1/1984/055, AS2/1990/011, AS2/1993/001
24	Palis F.G., Sumalde Z.M. and Hossain M. 2004	Assessment of the rodent control projects in Vietnam funded by ACIAR and AusAID: adoption and impact	AS1/1998/036
25	Brennan J.P. and Quade K.J. 2004	Genetics of and breeding for rust resistance in wheat in India and Pakistan	CS1/1983/037, CS1/1988/014
26	Mullen J.D. 2004	Impact assessment of ACIAR-funded projects on grain-market reform in China	ADP/1997/021, ANRE1/1992/028
27	van Bueren M. 2004	Acacia hybrids in Vietnam	FST/1986/030
28	Harris D. 2004	Water and nitrogen management in wheat-maize production on the North China Plain	LWR1/1996/164
29	Lindner R. 2004	Impact assessment of research on the biology and management of coconut crabs on Vanuatu	FIS/1983/081
30	van Bueren M. 2004	Eucalypt tree improvement in China	FST/1984/057, FST/1987/036, FST/1988/048, FST/1990/044, FST/1994/025, FST/1996/125, FST/1997/077
31	Pearce D. 2005	Review of ACIAR's research on agricultural policy	
32	Tingsong Jiang and Pearce D. 2005	Shelf-life extension of leafy vegetables—evaluating the impacts	PHT/1994/016
33	Vere D. 2005	Research into conservation tillage for dryland cropping in Australia and China	LWR2/1992/009, LWR2/1996/143
34	Pearce D. 2005	Identifying the sex pheromone of the sugarcane borer moth	CS2/1991/680
35	Raitzer D.A. and Lindner R. 2005	Review of the returns to ACIAR's bilateral R&D investments	
36	Lindner R. 2005	Impacts of mud crab hatchery technology in Vietnam	FIS/1992/017, FIS/1999/076
37	McLeod R. 2005	Management of fruit flies in the Pacific	CS2/1989/020, CS2/1994/003, CS2/1994/115, CS2/1996/225
38	ACIAR 2006	Future directions for ACIAR's animal health research	

No.	Author(s) and year of publication	Title	ACIAR project numbers
39	Pearce D., Monck M., Chadwick K. and Corbishley J. 2006	Benefits to Australia from ACIAR-funded research	AS2/1990/028, AS2/1994/017, AS2/1994/018, AS2/1999/060, CS1/1990/012, CS1/1994/968, FST/1993/016, PHT/1990/051
40	Corbishley J. and Pearce D. 2006.	Zero tillage for weed control in India: the contribution to poverty alleviation	CS1/1996/013
41	ACIAR 2006	ACIAR and public funding of R&D. Submission to Productivity Commission study on public support for science and innovation	
42	Pearce D. and Monck M. 2006	Benefits to Australia of selected CABI products	
43	Harris D.N. 2006	Water management in public irrigation schemes in Vietnam	LWR1/1998/034, LWR2/1994/004
44	Gordon J. and Chadwick K. 2007	Impact assessment of capacity building and training: assessment framework and two case studies	CS1/1982/001, CS1/1985/067, LWR2/1994/004, LWR2/1998/034
45	Turnbull J.W. 2007	Development of sustainable forestry plantations in China: a review	
46	Monck M. and Pearce D. 2007	Mite pests of honey bees in the Asia–Pacific region	AS2/1990/028, AS2/1994/017, AS2/1994/018, AS2/1999/060
47	Fisher H. and Gordon J. 2007	Improved Australian tree species for Vietnam	FST/1993/118, FST/1998/096
48	Longmore C., Gordon J. and Bantilan M.C. 2007	Assessment of capacity building: overcoming production constraints to sorghum in rainfed environments in India and Australia	CS1/1994/968
49	Fisher H. and Gordon J. 2007	Minimising impacts of fungal disease of eucalypts in South-East Asia	FST/1994/041
50	Monck M. and Pearce D. 2007	Improved trade in mangoes from the Philippines, Thailand and Australia	CS1/1990/012, PHT/1990/051
51	Corbishley J. and Pearce D. 2007	Growing trees on salt-affected land	FST/1993/016
52	Fisher H. and Gordon J. 2008	Breeding and feeding pigs in Vietnam: assessment of capacity building and an update on impacts	AS2/1994/023
53	Monck M. and Pearce D. 2008	The impact of increasing efficiency and productivity of ruminants in India by the use of protected nutrient technology	AH/1997/115
54	Monck M. and Pearce D. 2008	Impact of improved management of white grubs in peanut-cropping systems in India	CS2/1994/050

No.	Author(s) and year of publication	Title	ACIAR project numbers
55	Martin G. 2008	ACIAR fisheries projects in Indonesia: review and impact assessment	FIS/1997/022, FIS/1997/125, FIS/2000/061, FIS/2001/079, FIS/2002/074, FIS/2002/076, FIS/2005/169, FIS/2006/144
56	Lindner B. and McLeod P. 2008	A review and impact assessment of ACIAR's fruitfly research partnerships—1984–2007	CP/1997/079, CP/2001/027, CP/2002/086, CP/2007/002, CP/2007/187, CS2/1983/043, CS2/1989/019, CS2/1989/020, CS2/1994/003, CS2/1994/115, CS2/1996/225, CS2/1997/101, CS2/1998/005, CS2/2003/036, PHT/1990/051, PHT/1993/87, PHT/1994/133
57	Montes N.D., Zapata Jr N.R., Alo A.M.P. and Mullen J.D. 2008	Management of internal parasites in goats in the Philippines	AS1/1997/133
58	Davis J., Gordon J., Pearce D. and Templeton D. 2008	Guidelines for assessing the impacts of ACIAR's research activities	
59	Chupungco A., Dumayas E. and Mullen J. 2008	Two-stage grain drying in the Philippines	PHT/1983/008, PHT/1986/008, PHT/1990/008
60	Centre for International Economics 2009	ACIAR Database for Impact Assessments (ADIA): an outline of the database structure and a guide to its operation	
61	Fisher H. and Pearce D. 2009	Salinity reduction in tannery effluents in India and Australia	AS1/2001/005
62	Francisco S.R., Mangabat M.C., Mataia A.B., Acda M.A., Kagaoan C.V., Laguna J.P., Ramos M., Garabiag K.A., Paguia F.L. and Mullen J.D. 2009	Integrated management of insect pests of stored grain in the Philippines	PHT/1983/009, PHT/1983/011, PHT/1986/009, PHT/1990/009
63	Harding M., Tingsong Jiang and Pearce D. 2009	Analysis of ACIAR's returns on investment: appropriateness, efficiency and effectiveness	
64	Mullen J.D. 2010	Reform of domestic grain markets in China: a reassessment of the contribution of ACIAR-funded economic policy research	ADP/1997/021, ANRE1/1992/028
65	Martin G. 2010	ACIAR investment in research on forages in Indonesia	AS2/2000/103, AS2/2000/124, AS2/2001/125, LPS/2004/005, SMAR/2006/061, SMAR/2006/096
66	Harris D.N. 2010	Extending low-cost fish farming in Thailand: an ACIAR–World Vision collaborative program	PLIA/2000/165
67	Fisher H. 2010	The biology, socioeconomics and management of the barramundi fishery in Papua New Guinea's Western Province	FIS/1998/024

No.	Author(s) and year of publication	Title	ACIAR project numbers
68	McClintock A. and Griffith G. 2010	Benefit–cost meta-analysis of investment in the International Agricultural Research Centres	
69	Pearce D. 2010	Lessons learned from past ACIAR impact assessments, adoption studies and experience	
70	Harris D.N. 2011	Extending low-chill fruit in northern Thailand: an ACIAR–World Vision collaborative project	PLIA/2000/165
71	Lindner R. 2011	The economic impact in Indonesia and Australia from ACIAR's investment in plantation forestry research, 1987–2009	FST/1986/013, FST/1990/043, FST/1993/118, FST/1995/110, FST/1995/124, FST/1996/182, FST/1997/035, FST/1998/096, FST/2000/122, FST/2000/123, FST/2003/048, FST/2004/058
72	Lindner R. 2011	Frameworks for assessing policy research and ACIAR's investment in policy-oriented projects in Indonesia	ADP/1994/049, ADP/2000/100, ADP/2000/126, AGB/2000/072, AGB/2004/028, ANRE1/1990/038, ANRE1/1993/023, ANRE1/1993/705, EFS/1983/062, EFS/1988/022
73	Fisher H. 2011	Forestry in Papua New Guinea: a review of ACIAR's program	FST/1994/033, FST/1995/123, FST/1998/118, FST/2002/010, FST/2004/050, FST/2004/055, FST/2004/061, FST/2006/048, FST/2006/088, FST/2006/120, FST/2007/078, FST/2009/012
74	Brennan J.P. and Malabayabas A. 2011	International Rice Research Institute's contribution to rice varietal yield improvement in South-East Asia	
75	Harris D.N. 2011	Extending rice crop yield improvements in Lao PDR: an ACIAR–World Vision collaborative project	CIM/1999/048, CS1/1995/100, PLIA/2000/165
76	Grewal B., Grunfeld H. and Sheehan P. 2011	The contribution of agricultural growth to poverty reduction	
77	Saunders C., Davis L. and Pearce D. 2012	Rice–wheat cropping systems in India and Australia, and development of the 'Happy Seeder'	LWR/2000/089, LWR/2006/132, CSE/2006/124
78	Carpenter D. and McGillivray M. 2012	A methodology for assessing the poverty-reducing impacts of Australia's international agricultural research	
79	Dugdale A., Sadleir C., Tennant-Wood R. and Turner M. 2012	Developing and testing a tool for measuring capacity building	
80	Fisher H., Sar L. and Winzenried C. 2012	Oil palm pathways: an analysis of ACIAR's oil palm projects in Papua New Guinea	ASEM/1999/084, ASEM/2002/014, ASEM/2006/127, CP/1996/091, CP/2007/098, PC/2004/064, PC/2006/063

No.	Author(s) and year of publication	Title	ACIAR project numbers
81	Pearce D. and White L. 2012	Including natural resource management and environmental impacts within impact assessment studies: methodological issues	
82	Fisher H. and Hohnen L. 2012	ACIAR's activities in Africa: a review	AS1/1983/003, AS1/1995/040, AS1/1995/111, AS1/1996/096, AS1/1998/010, AS2/1990/047, AS2/1991/018, AS2/1993/724, AS2/1996/014, AS2/1999/063, AS2/1996/090, AS2/1996/149, AS2/1996/203, AS2/1997/098, CP/1994/126, CS2/1990/007, EFS/1983/026, FST/1983/020, FST/1983/031, FST/1983/057, FST/1988/008, FST/1988/009, FST/1991/026, FST/1995/107, FST/1996/124, FST/1996/206, FST/2003/002, IAP/1996/181, LPS/1999/036, LPS/2002/081, LPS/2004/022, LPS/2008/013, LWR/2011/015, LWR1/1994/046, LWR2/1987/035, LWR2/1996/049, LWR2/1996/163, LWRS/1996/215, LWR2/1997/038, SMCN/1999/003, SMCN/1999/004, SMCN/2000/173, SMCN/2001/028
83	Palis F.G., Sumalde Z.M., Torres C.S., Contreras A.P. and Datar F.A. 2013	Impact pathway analysis of ACIAR's investment in rodent control in Vietnam, Lao PDR and Cambodia	ADP/2000/007, ADP/2003/060, ADP/2004/016, AS1/1994/020, AS1/1996/079, AS1/1998/036, CARD 2000/024, PLIA/2000/165
84	Mayne J. and Stern E. 2013	Impact evaluation of natural resource management research programs: a broader view	
85	Jilani A., Pearce D. and Bailo F. 2013	ACIAR wheat and maize projects in Afghanistan	SMCN/2002/028, CIM/2004/002, CIM/2007/065
86	Lindner B., McLeod P. and Mullen J. 2013	Returns to ACIAR's investment in bilateral agricultural research	
87	Fisher H. 2014	Newcastle disease control in Africa	AS1/1995/040, AS1/1996/096
88	Clarke M. 2015	ACIAR-funded crop–livestock projects, Tibet Autonomous Region, People's Republic of China	LPS/2002/104, CIM/2002/093, LPS/2005/018, LPS/2005/129, LPS/2006/119, LPS/2008/048, LPS/2010/028, C2012/228, C2013/017
89	Pearce D. 2016	Sustaining cocoa production: impact evaluation of cocoa projects in Indonesia and Papua New Guinea	SMAR/2005/074, HORT/2010/011, ASEM/2003/015, ASEM/2006/127, PC/2006/114
90	Pearce D. 2016	Impact of private sector involvement in ACIAR projects: a framework and cocoa case studies	PC/2006/114, ASEM/2006/127, SMAR/2005/074, HORT/2010/011

No.	Author(s) and year of publication	Title	ACIAR project numbers
91	Brown P. R., Nidumolu U. B., Kuehne G., Llewellyn R., Mungai O., Brown B. and Ouzman J. 2016	Development of the public release version of Smallholder ADOPT for developing countries	
92	Davila F., Sloan T. and van Kerkhoff L. 2016	Knowledge systems and RAPID framework for impact assessments	CP/1997/017
93	Mullen, J.D., de Meyer, J., Gray, D. and Morris, G. 2016	Recognising the contribution of capacity building in ACIAR bilateral projects: Case studies from three IAS reports.	FST/1986/030, FST/1993/118, FST/1998/096, FIS/2005/114
94	Davila F., Sloan T., Milne M., and van Kerkhoff L., 2017	Impact assessment of giant clam research in the Indo-Pacific region	FIS/1982/032, FIS/1987/033, EFS/1988/023, FIS/1995/042
95	Ackerman J.L. and Sayaka B. 2018	Impact assessment of ACIAR's Aceh aquaculture rehabilitation projects	FIS/2005/009, FIS/2006/002
96	Clarke, M. and Mikhailovich, K. 2018	Impact assessment of investment in aquaculture-based livelihoods in the Pacific islands region and tropical Australia	FIS/2001/075, FIS/2006/138
97	Mullen J.D., Malcolm B. and Farquharson R.J. 2019	Impact assessment of ACIAR-supported research in lowland rice systems in Lao PDR	CSI/1995/100, CIM/1999/048, CSE/2006/041
98	Clarke M. 2019	Impact assessment of ACIAR investment in citrus rootstock, scion and production improvement in China, Vietnam, Bhutan and Australia	CSI/1987/002, CS1/1996/076, HORT/2005/142, HORT/2010/089
99	Abell J., Chudleigh P. and Hardaker T., 2012	An impact assessment of conservation tillage research in China and Australia	LWR2/1992/009, LWR2/1996/143
100	Yet to be published		
101	Davila, F., Vanzetti, D. and Sloan, T., 2021	Mixed-methods impact assessment of sandalwood research in Vanuatu	FST/2002/097, FST/2008/010
102	Williams L.J., McMillan L., Van Wensveen M., Butler J.R.A., Camacho Jr J.D.V., Lapitan A., Datoon R., Gapas J., Pinca E., Macavinta-Gabunada F., Serino M.N.V., Nunez. L., Recto A.L., Ruales J.H., Enerlan W.C., Ani P.A.B and Aranas M.B. 2021	An integrated approach to ex-post impact assessment	ASEM/1998/052, ASEM/2002/051, ASEM/2009/044

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