VISAYAS – MINDANAO
MONITORING & EVALUATION NETWORK FORUM
Cagayan de Oro City

Application of Mixed Method Approach to Impact Assessment in Evaluating Agricultural Technology Adoption in the Visayas Region

Moises Neil V. Seriño, PhD
Visayas State University
Region 8

INTRODUCTION

- Impact assessment provides tangible evidences of changes in outcomes and facilitates evidence-based policy planning.
- Impact assessments guide decision-making about the allocation of scarce resources toward activities that enhance desired outcomes for the target beneficiaries
- There is no all-encompassing evaluation methodology that can completely capture the complexity of outcomes of development projects

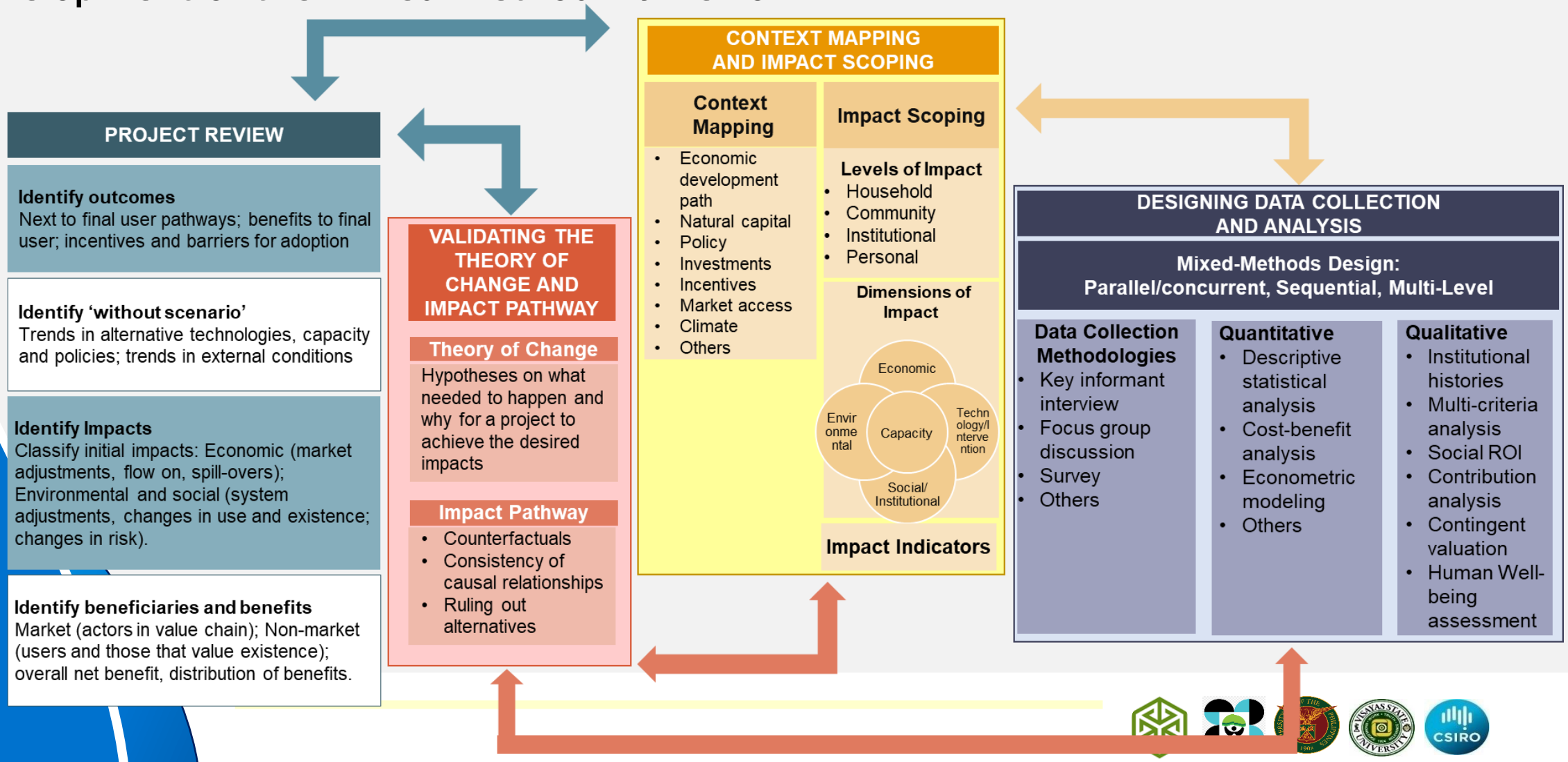
INTRODUCTION

- Recognizing that development projects are becoming more complex and that outcomes occur in dynamic settings, there is a need for a more comprehensive approach in assessing impacts.

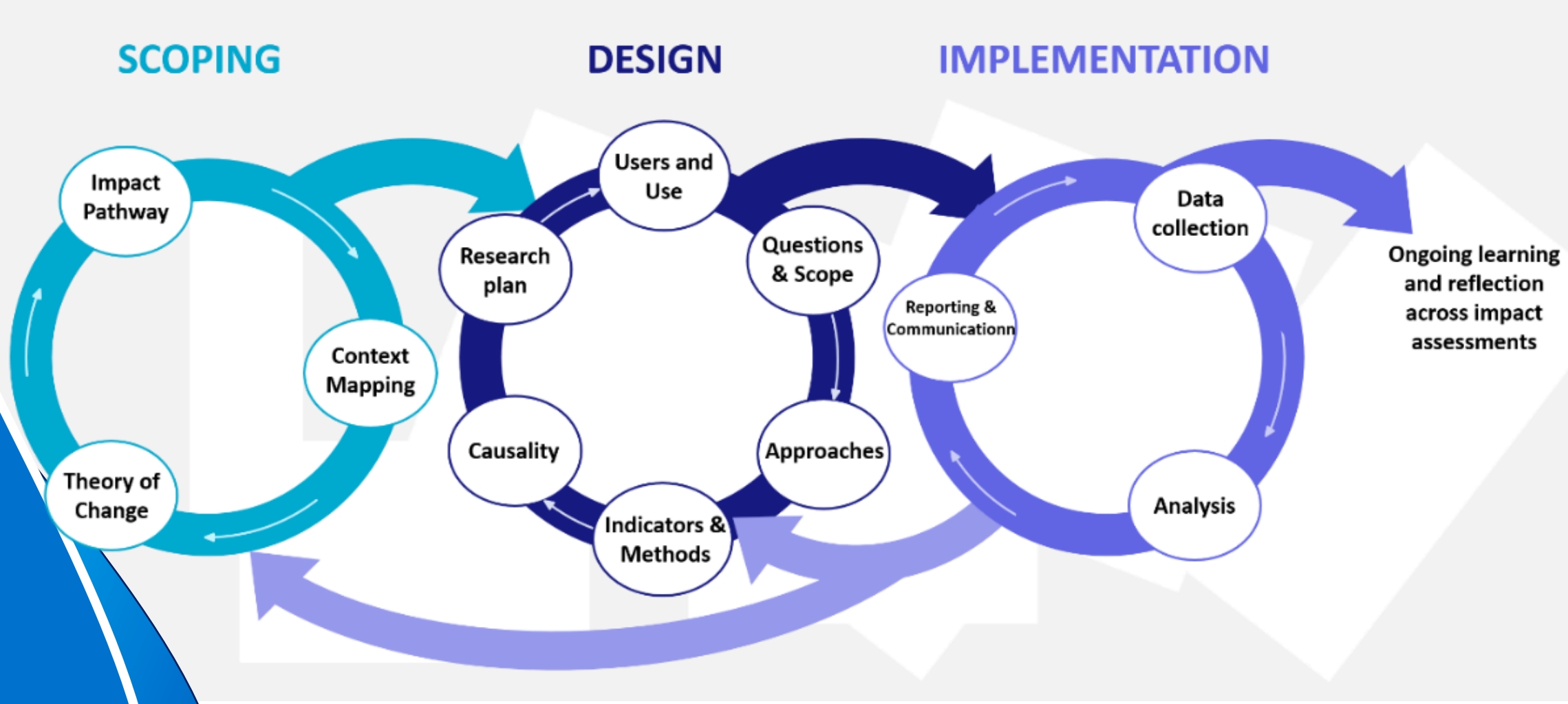
- Using a mixed method approach in impact assessment becomes necessary to effectively capture the effects of different kinds of interventions

Review, identify, adapt/ develop, and mix appropriate methods for mixed method approach in impact assessment of agricultural research and development projects

Development of the mixed method framework



Integrated approach of the framework



Application of the Mixed Method Framework to Selected Research Projects in Visayas Area

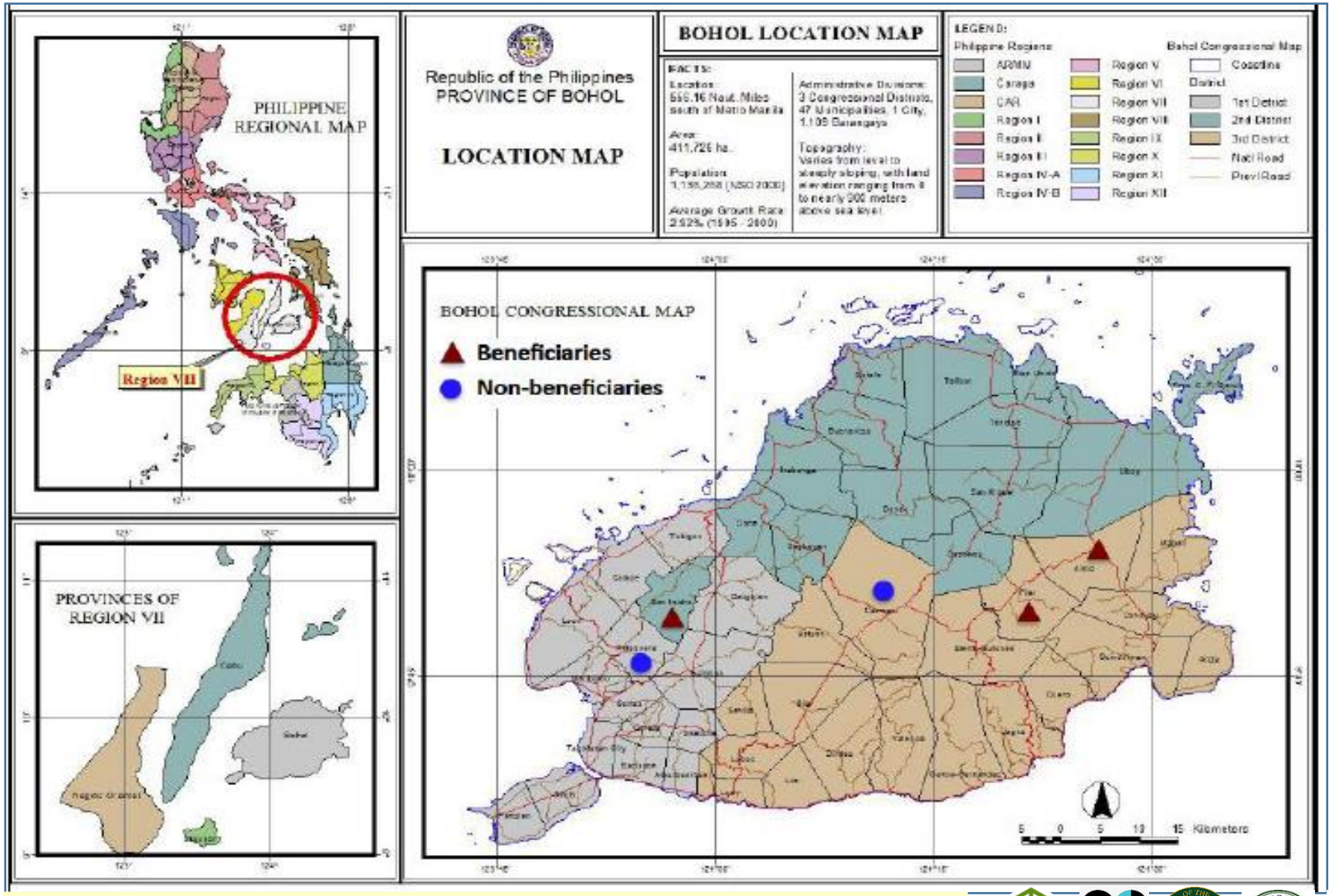
- <u>Sustaining and Growing Landcare Systems (Landcare Project) in Bohol</u>

- Sustainable Upland Farming Through the Establishment of Conservation Farming Villages in Negros Oriental

Application of the Mixed Method Framework to Technology Adoption in Bohol

"Sustaining and Growing Landcare Systems (Landcare) Project in Bohol"

Research Sites



Sustaining and Growing Landcare Systems (Landcare) Project in Bohol

- The project aimed to sustain adoption of conservation farming systems using natural vegetative strips, promote diverse and productive cropping systems, Improved capacity of farmers to make better business decisions
- Established theory of change (TOC) and impact pathway

THEORY OF CHANGE: Landcare Program is a farmer-centered and farmer-led, group-based approach to agricultural extension, aimed at improving upland livelihoods through sustainable soil conservation farming.

Application of the MMAIA Framework to Selected Research Projects in Central Philippines

Activities Conducted

01

Project Review

02

Validation of the TOC and establishment of the impact pathway

03

Context mapping and impact scoping

04

Methodological approach

Sustaining and Growing Landcare Systems (Landcare) Project in Bohol

Data Analysis

Qualitative

- Thematic analysis
- Analysis of most significant change (MSC) stories

Quantitative

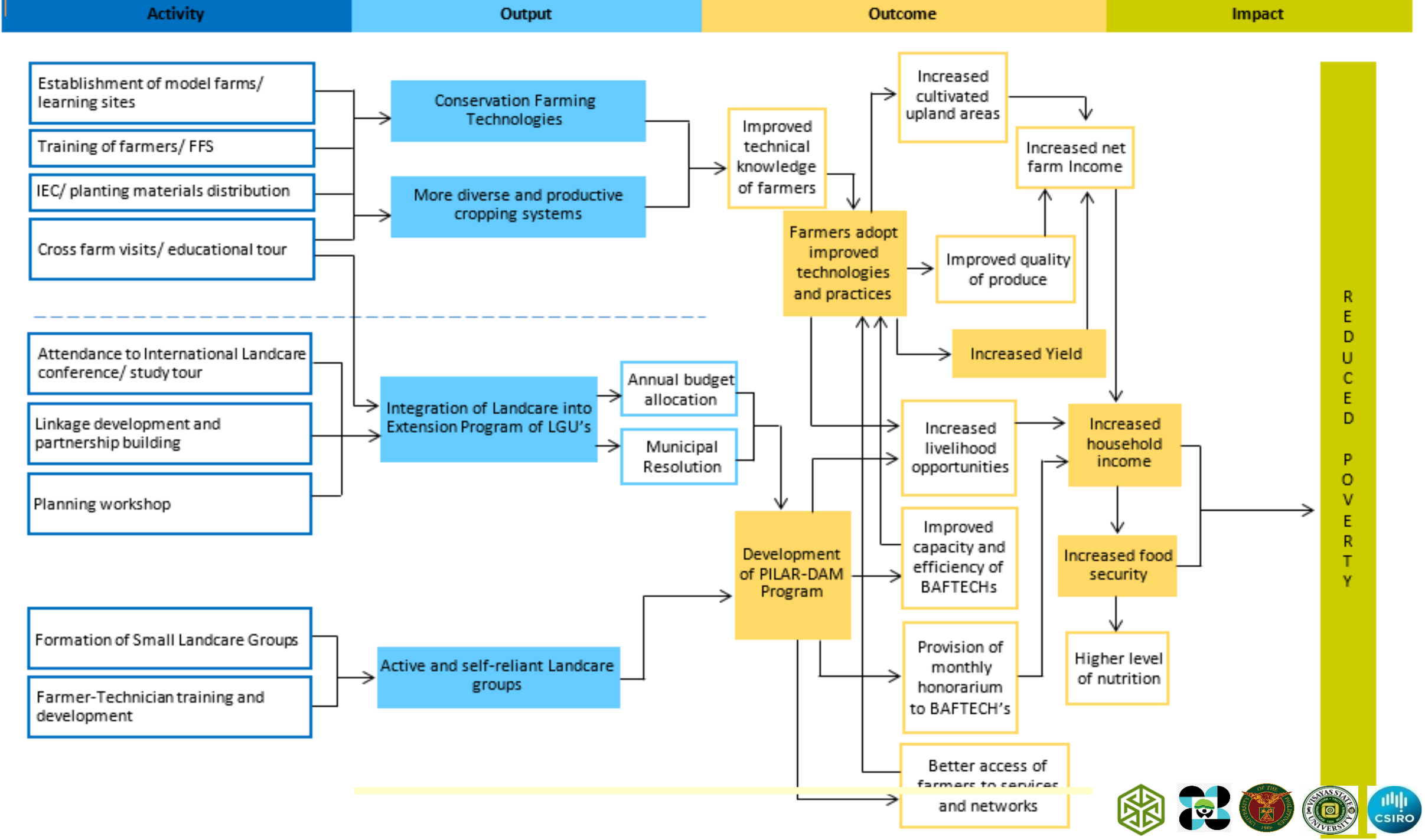
- Descriptive statistics
- Propensity score matching (PSM)
- Adoption analysis using regression

Sustaining and Growing Landcare Systems (Landcare) Project in Bohol

Designing the methodological approach: Exploratory sequential mixed-method approach

- Qualitative data gathering through KIIs and FGDs and analysis of information
- Creating shared understanding on the context of impact assessment and further development of the impact pathway

Development of survey questionnaire (mainly for quantitative analysis)


Activity
Output
Outcome
Impact
Establishment of model farms/ learning sites
Training of farmers/ FFS
IEC/ planting materials distribution
Cross farm visits/ educational tour
Attendance to International Landcare conference/ study tour
Linkage development and partnership building
Planning workshop
Formation of Small Landcare Groups
Farmer-Technician training and development
Conservation Farming Technologies
More diverse and productive cropping systems
Integration of Landcare into Extension Program of LGU's
Annual budget allocation
Municipal Resolution
Active and self-reliant Landcare groups
Improved technical knowledge of farmers
Increased cultivated upland areas
Increased net farm Income
Farmers adopt improved technologies and practices
Improved quality of produce
Increased Yield
Increased livelihood opportunities
Increased household income
Development of PILAR-DAM Program
Improved capacity and efficiency of BAFTECHs
Increased food security
Provision of monthly honorarium to BAFTECH's
Higher level of nutrition
Better access of farmers to services and networks
REDUCED POVERTY
Impact Pathway

Socio-demographic Characteristics

Variable	Adopter	Non-adopter	All Farmers
Main occupation (%)			
Farming	91.5	83.1	87.0
Barangay official/ worker	1.5	1.9	1.8
Others	6.9	14.9	11.3
Estimated annual household income (pesos)	137,190	90,971	112,128
Estimated annual household expenditure (pesos)	87,718	71,811	79,092

Farm Characteristics

Variable	Adopter	Non-adopter	All Farmers
Farming experience (years)	37.8	36.5	37.2
Farm area (mean ha)	1.61	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	28.9
Others	19.2	14.3	16.5

Factors Affecting Adoption

Variable	Marginal Effects	S.E
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 organizations	**0.436*****	**0.032**
Observations	284	

Changes that occurred in the farms of adopters

Variable (%)	Increase	Decrease	No Change
Yield	87.2	0.8	12.0
Soil loss	2.4	96.0	1.6
Soil fertility	87.2	3.2	9.6
Soil moisture	68.8	1.6	29.6
Labor use	25.6	16.8	57.6
Fertilizer use	20.8	46.4	32.8
Weed growth	40.8	18.4	40.8
Food for the household	77.6	22.4	-
Farm cash income	68.0	-	32.0
Number of timber trees	96.4	3.6	-
Frequency of availing credit	15.5	22.4	62.1
Amount of credit	19.0	22.4	58.6
Ability to pay loans	41.4	5.2	53.4

Propensity Score Matching in Estimating Impacts

Handling bias

- A crucial point in any impact assessment is coping with selection bias. This happens when there are systematic differences between households in the treated group and households in the control group.
- For this study, the treated group are composed of households who are beneficiary of the Landcare program in Bohol and the control group are the randomly selected non-beneficiary households.
- However, comparing the adopter and the non-adopter group without regard to its inherent differences might lead to bias.

Methodological approach

Descriptive Statistics

Variables	Adopter (n = 130)	Non-adopter (n = 154)	t-value	p>t
Age household head	59.84	60.88	-0.93	0.356
Male household head	0.97	0.95	0.85	0.397
Education household head	6.06	6.41	-0.96	0.336
Education spouse	5.10	5.58	-1.22	0.222
Household size	4.94	4.21	2.92***	0.004
House ownership	0.79	0.95	-4.53***	0.000
Access to electricity	0.83	0.97	-4.21***	0.000
Farm area	1.61	1.27	1.91*	0.057
Rolling topography	0.53	0.44	1.59	0.112
Land ownership	0.47	0.51	-0.68	0.497
Years in farming	37.82	36.54	0.71	0.479
Membership in organization	0.64	0.47	3.00***	0.003
Farm market distance	2058.20	2644.10	-1.01	0.314
Asset index	2.83	2.77	0.41	0.679
*** p<0.01, ** p<0.05, * p<0.1				

Estimating propensity score

- To reduce the differences on observable characteristics observed, propensity score matching technique will be use to compare the beneficiary group to the non-beneficiary group by matching households with similar characteristics.

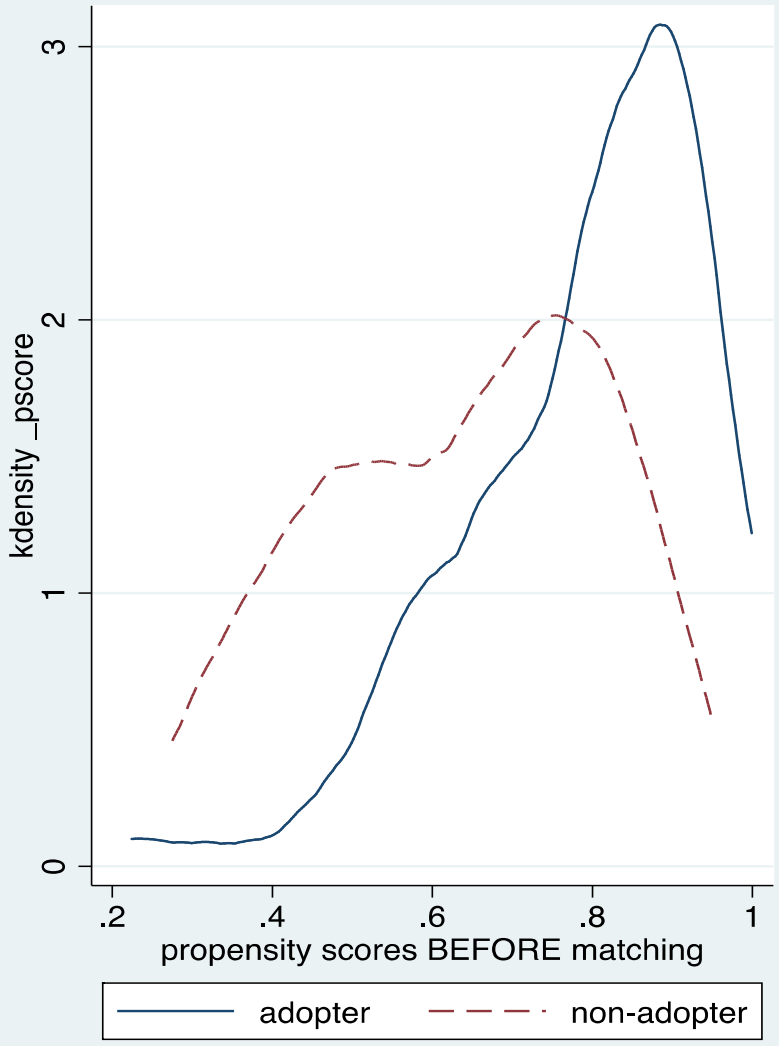
- For estimating propensity score, logit model of the following form was used:

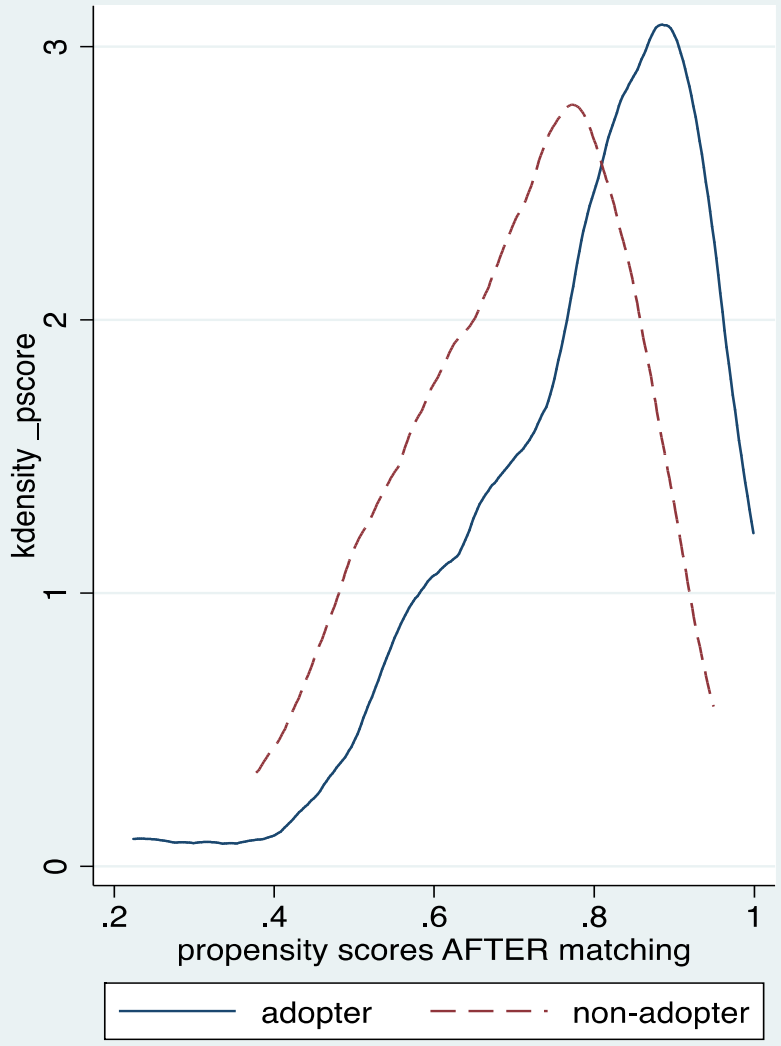
$$P_i = E(Y_i = 1 \mid X) = 1 / (1 + e^{-z}) = \beta_0 + \beta_1 age + \beta_2 gender + \beta_3 educhh + \beta_4 educsp + \beta_5 hhsize .... + \beta_{14} asset + u_i$$

Balancing of covariates

Variables	Adopter (n = 97)	Non-adopter (n = 89)	t-value	p>t
Age household head	60.34	58.81	1.18	0.240
Male household head	0.98	0.98	-0.17	0.861
Education household head	5.96	5.87	0.23	0.818
Education spouse	5.45	5.67	-0.49	0.628
Household size	4.87	4.79	0.27	0.786
House ownership	0.90	0.94	-1.24	0.216
Access to electricity	0.94	0.94	-0.10	0.920
Farm area	1.55	1.48	0.36	0.720
Rolling topography	0.61	0.53	1.06	0.290
Land ownership	0.58	0.57	0.10	0.923
Years in farming	38.94	37.86	0.60	0.552
Membership in organization	0.76	0.75	0.22	0.825
Farm market distance	1907.30	1354.3	1.29	0.197
Asset index	3.12	3.12	0.00	0.999

Balancing of covariates





Impact estimates (ATT)

Impact = Outcomes (adopters) – Outcomes (non-adopters)

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

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 treated group

Y_0 = outcome variable (farm income) for the comparison group

Contour farming adoption

Impact estimates (ATT) – all farms

Farm income	Nearest neighbour	Radius matching	Kernel marching
ATT (Farm income)	38,752.88*	38,913.0*	40,195.39**
Bootstrap SE§	20,553.70	20,402.34	20568.11
z	1.89	1.91	1.95
P>|z|	0.059	0.056	0.05

Note: § Standard error was bootstrapped and replicated 100 times
*** p<0.01, ** p<0.05, * p<0.1

Contour farming adoption

Impact estimates (ATT) – small farms

Farm income	Nearest neighbour	Radius matching	Kernel marching
ATT (Farm income)	10,050.17	14,385.57*	7,270.08
Bootstrap SE§	8970.87	8,417.59	8,009.96
z	1.12	1.71	0.91
P>|z|	0.263	0.087	0.36
Adopters (n)	25	25	28
Non-adopters (n)	29	29	25

Note: § Standard error was bootstrapped and replicated 100 times
*** p<0.01, ** p<0.05, * p<0.1

Contour farming adoption

Impact estimates (ATT) – big farms

Farm income	Nearest neighbour	Radius matching	Kernel marching
ATT (Farm income)	3,760.32	2,108.38	6,583.80
Bootstrap SE§	15,316.29	13,939.18	20,012.07
z	0.25	0.15	0.33
P>|z|	0.806	0.88	0.74
Adopters (n)	25	25	25
Non-adopters (n)	19	19	19

Note: § Standard error was bootstrapped and replicated 100 times
*** p<0.01, ** p<0.05, * p<0.1

Impact estimates (ATT) – below poverty line

Farm income	Nearest neighbor	Radius matching	Kernel matching
ATT (Farm income)	9,675.25**	10,022.01***	9,049.61**
Bootstrap SE§	4,013.04	3,135.96	4,156.74
z	2.41	3.20	2.18
P>|z|	0.016	0.001	0.029
Adopters (n)	61	61	64
Non-adopters (n)	64	64	60

Note: § Standard error was bootstrapped and replicated 100 times
*** p<0.01, ** p<0.05, * p<0.1

Impact estimates (ATT) – above poverty line

Farm income	Nearest neighbour	Radius matching	Kernel matching
ATT (Farm income)	28,091.74	6,432.00	32,213.28
Bootstrap SE§	82,519.99	84,343.56	107,700.80
z	0.34	0.08	0.30
P>|z|	0.734	0.939	0.765
Adopters (n)	19	19	19
Non-adopters (n)	24	24	24

Note: § Standard error was bootstrapped and replicated 100 times
*** p<0.01, ** p<0.05, * p<0.1

Environmental Impacts

- ✓ Improved landscape
- ✓ Increased biodiversity
- ✓ Reduced soil erosion

Most Significant Change Stories

An example of a story shared by a adopter from Cantagdaan, Pilar, Bohol

"When I contoured my farm, I was able to plant more crops. My choices on crops to plant increased. I also observed that the soil in my farm remained fertile because the soil is not anymore eroded and washed downward when there is rain…. For me, the change is good because I now have better harvest from my farm and it has helped in the schooling of my child."

Most Significant Change Stories

Farmer from San Isidro, Bohol also shared:

"The seminar was also able to help me because in the past, I was a shy person but after the seminar, we always met and I noticed that I was able to slowly overcome my shyness and I learned how to interact with other people"

Most Significant Change Stories

Distribution of significant change stories about impacts of the Landcare Project per municipality and domain of change

Domain of Change	Municipality			Total	%
	Alicia	Pilar	San Isidro		
1. Change in knowledge	0	1	1	2	4
2. Change in practices	0	0	1	1	2
3. Environmental changes	14	9	6	29	63
4. Economic changes	1	2	6	9	20
5. Social changes	0	1	1	2	4
6. Other changes	2	0	1	3	7
Total	17	13	16	46	100

Conclusion and Recommendation

Conclusions

- Results of the assessment where the framework was applied, provided significant impact on income of beneficiaries in the area
- The impact is more pronounced among farmers below poverty line and with smaller farms
- In addition, project beneficiaries identified significant impacts in their capacity and social capital

Recommendations

- Capacity building is one of the effective approaches in increasing productivity in the Philippines however a new design is needed to target increasing productivity of those who have relatively larger farms.
- Results have implications in designing capacity building programs aiming to upgrade farmers knowledge and skills and influencing productivity targeting specific groups
- Policy makers can leverage peer effects through building networks and social initiatives to boost participation in government programs

Recommendations

- For future projects to be evaluated, it is important to have a clear theory of change that can guide the evaluation of project impacts.
- An iterative approach was useful in guiding the assessment of complex projects and documenting diversified benefit streams
- The mixed method approach will require more time, resources, and expertise

Book Publication

An integrated approach to ex-post impact assessment

Liana Williams, Larelle McMillan, Monica van Wensveen and James Butler
CSIRO

Jose DV Camacho Jr, Aileen Lapitan, Rodmyr Datoon, Jeanarah Gapas and Emmanuel Pinca
University of the Philippines, Los Baños

Fe M. Gabunada, Moises Neil V Seriño, Lilian B. Nuñez, Ana Liza Recto, Jessica H. Ruales, Wendy C. Enerlan and Editha G. Cagasan
Visayas State University

Princess Alma B Ani and Mia Barbara Aranas
Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development

ACIAR Impact Assessment Series Report No. 102

https://www.aciar.gov.au/publication/technical-publications/integrated-approach-ex-post-impact-assessment

VISAYAS – MINDANAO
MONITORING & EVALUATION NETWORK FORUM
Cagayan de Oro City

Application of Mixed Method Approach to Impact Assessment in Evaluating Agricultural Technology Adoption in the Visayas Region

Thank you very much for your attention!

Email: moisesneil.serino@vsu.edu.ph

Adoption of Soil Conservation Practices

Variable	
Type of contour farming adopted (%)	
Natural vegetative strip (NVS)	30.9
Enriched NVS	66.7
Rock wall	3.0
Crops used as hedgerow for enriched NVS* (%)	
Coconut	54.8
Banana	51.9
Fruit trees	23.1
Timber trees	18.3
Napier grass	17.3