

Pathways Towards Sustainable Livelihood Among Banana Farmers: A Multi-Case Study

Je Anne Rose P. Canones^{1*}, Kate Lorainne Y. Lawag^{1,2}, Mary Rose M. Antolijao^{1,3}, Rhealyn M. Retialo^{1,4}

¹Arriesgado College Foundation, Inc., Tagum City, Davao del Norte, Philippines

^{*}jeanner.canones@gmail.com, ²lawagkatelorrainne15@gmail.com, ³maryrose143antolijao@gmail.com,

⁴hirhealyn@gmail.com

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ABSTRACT

The Philippine banana industry remains an important livelihood source, yet growers face recurring climate, disease, labor, cost, and market pressures that threaten long-term income stability. This qualitative multiple-case study examined the pathways through which three experienced banana farmers in Tagum City sustained their livelihoods despite these pressures. Purposive maximum-variation sampling was used to select one grower each from La Filipina, Cuambogan, and Mankilam whose banana farming was the primary livelihood, whose farms had operated for at least 10 years, and who had continued farming despite adversity. Data were generated through in-depth interviews, direct observation, field notes, and documentation, then analyzed using Braun and Clarke's six-phase thematic analysis and cross-case comparison. Three themes described farm-management pathways: kinship-

driven entry into farming, competence through guided practice and partnership, and workflow improvement and leadership transformation. Four themes captured livelihood challenges: recurring crop disease and production vulnerability, price fluctuations, labor-management and human-capital deficits, and systemic and environmental vulnerabilities. Farmers responded through financial discipline and planning, adaptive livelihood strategies, drainage management, and quality-assurance interventions. Cross-case findings showed shared vulnerability but distinct adaptive pathways shaped by farm scale, experience, resource access, contractual support, and financial practices. The findings support the Sustainable Livelihood Framework and Resilience Theory by showing that sustainability emerges through the continuing mobilization of livelihood assets, learning from shocks, resource reorganization, and context-specific adaptation rather than through a single uniform practice.

Keywords: *sustainable livelihood, banana farmers, adaptive strategies, multiple-case study, resilience, Tagum City*

INTRODUCTION

Banana farming remains an economically important livelihood in the Philippines and particularly in Mindanao, but the stability of this livelihood is continually tested by disease, climate variability, high production costs, labor pressures, and unstable markets. Climate-related stress can increase production uncertainty, while diseases such as Fusarium wilt and Banana Bunchy Top can reduce yields and create prolonged recovery problems (Abdoussalami et al., 2023; Chen et al., 2024; Lantican et al., 2023).

Economic pressures interact with these biological risks. Banana growers must absorb changing farmgate prices, quality-based price differences, labor expenses, and input costs while still meeting household needs and reinvesting in production. Philippine studies have documented price instability, asymmetric market transmission, and differences between contract and non-contract arrangements as continuing constraints on growers' income stability (Limpoco & Diga, 2023; Lodovico & Lee, 2024; Mangarin, 2023).

Sustaining banana farming therefore requires more than technical production knowledge. Farmers rely on accumulated experience, mentoring, family and institutional relationships, financial discipline, physical assets, disease-control practices, and environmental management. The Sustainable Livelihood Framework conceptualizes sustainability as the capacity to withstand shocks while maintaining or improving capabilities and assets (Chambers & Conway, 1992; DFID, 1999). Resilience Theory complements this view by treating successful adaptation as a dynamic process of absorbing stress, reorganizing resources, learning, and recovering rather than as a fixed personal trait (Liu et al., 2020; Masten et al., 2021).

Although extensive literature addresses banana production, disease, markets, and adaptation, the source thesis identified a local gap in current, experience-based evidence from Tagum City. Quantitative or sector-wide accounts may describe common constraints but cannot fully explain how individual growers combine assets and strategies differently over decades of farming. A multiple-case approach was therefore appropriate for identifying both shared patterns and case-specific pathways.

This study examined the distinct experiences of three banana growers in managing their farms, the challenges affecting livelihood sustainability, the coping strategies used to continue farming, and the similarities and differences that explained their pathways. The study aimed to generate context-sensitive insights for farmers, agricultural agencies, local government units, financial institutions, and researchers seeking to strengthen long-term livelihood resilience.

Literature Review

Sustainable Livelihood and Resilience as Analytical Lenses

The Sustainable Livelihood Framework views a livelihood as sustainable when it can cope with and recover from stresses and shocks while maintaining or enhancing capabilities and assets without undermining the natural resource base (Chambers & Conway, 1992; DFID, 1999). In agricultural settings, this requires attention to human, financial, physical, social, and natural assets and to the vulnerability context in which farmers make decisions.

Resilience Theory adds a process-oriented explanation of how individuals and systems respond to adversity. Resilience develops through interactions among internal capabilities, external support, learning, and repeated adjustment to change (Liu et al., 2020; Masten et al., 2021). Farchi and Peled-Avram (2025) similarly emphasize resilience as an ongoing process of positive adaptation rather than simple endurance.

Together, these lenses allow sustainable banana livelihood to be understood as the interaction of available assets, repeated shocks, practical adaptation, and recovery. In the source study, the framework was used to interpret how growers mobilized experience, savings, farm infrastructure, kinship, institutional partnerships, land, and environmental management to maintain production over time.

Farm Management, Experiential Learning, and Partnership

Banana-farm competence often develops through experience and social learning rather than formal education alone. Ofolsha et al. (2022) showed that social networks can shape participation in agricultural organizations, while Jorge et al. (2022) described knowledge development among small banana farmers as rooted in the interaction of local practice and external guidance. Wibowo et al. (2024) likewise emphasized mentorship and local knowledge in strengthening farmer capacity.

Institutional and contractual relationships can further support professionalization. Sarmiento et al. (2024) found that cooperative contract farming among Cavendish growers in Davao del Norte could improve technical efficiency through structured support. Over time, repeated practice also contributes to improved decision-making and technical efficiency (Pedroso, 2024; Luzuriaga-Amador et al., 2025).

These studies suggest that farming pathways are developmental. Growers may enter through family influence, economic necessity, or social encouragement and then build competence through mentorship, trial and adjustment, and partnerships. The source cases reflected these different routes while converging on increasing managerial independence and asset accumulation.

Threats to Banana Livelihood Sustainability

Persistent crop diseases are among the most serious threats to long-term banana production. *Fusarium oxysporum* f. sp. *cubense* Tropical Race 4 can persist in soil and create prolonged infection risks (Chen et al., 2024), while Banana Bunchy Top Virus disrupts plant development and yield formation (Lantican et al., 2023). At the livelihood level, prolonged disease pressure can increase costs, reduce output, and weaken income stability (Cobrado & Fernandez, 2025).

Market and labor conditions can intensify biological vulnerability. Banana growers face price fluctuations and quality-based price gaps that affect reinvestment and household income (Limpoco & Digal, 2023; Lodovice & Lee, 2024). Labor availability, employment continuity, and workforce costs likewise shape farm performance (Beja et al., 2025; Bulut et al., 2023).

Environmental and systemic pressures further complicate sustainability. Flooding, rainfall variability, extreme winds, and export standards can reduce production or marketability. Climate variability affects yield stability (Patrick et al., 2025), while tropical cyclones can cause severe plantation damage and income disruption (Kaashoek et al., 2025). These interconnected pressures form the vulnerability context within which farmers must continually adapt.

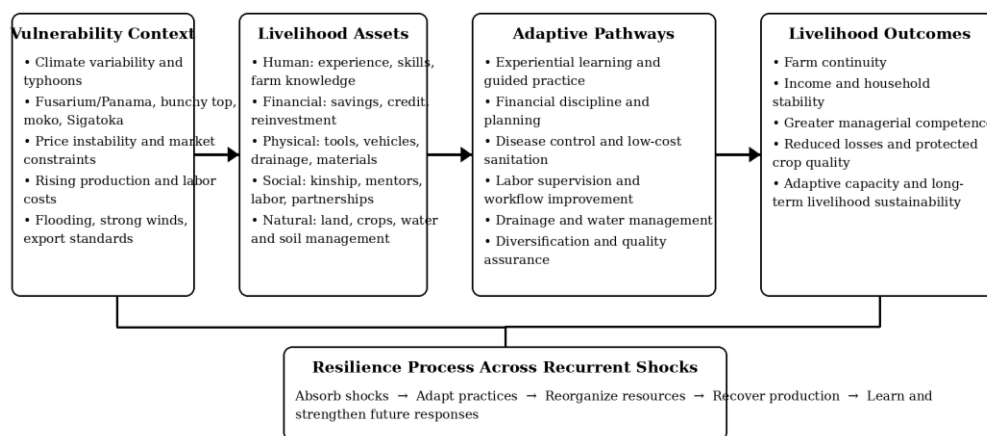
Adaptive Strategies for Farm Continuity

Financial preparedness is a recurring component of agricultural resilience. Access to credit can help Cavendish growers finance high production costs (Loquias et al., 2025), while efficient allocation of fertilizers, pesticides, irrigation, and labor can improve profitability (Shrestha et al., 2025). Emergency savings and short-term financial buffers also help farms continue during disease-related losses (Bersamen et al., 2024).

Farm-level adaptation includes direct supervision, low-cost sanitation, crop diversification, and water management. Agricultural training can improve adoption of advanced practices (Yang et al., 2021), while simple sanitation methods can reduce disease transmission through contaminated tools (Ocimati et al., 2021). Crop diversification can reduce household economic vulnerability (Basantaray et al., 2024), and systematic drainage or irrigation management supports crop stability (Gul et al., 2025; Zubelzu et al., 2022).

Quality protection is also essential because market value depends on the condition of harvested fruit. Protective bunch covers can reduce sunburn and heat-related damage (Chaiwong et al., 2021), while appropriate packaging and careful handling reduce transport damage (Al-Dairi et al., 2025). Together, these practices show how farmers convert available resources into concrete adaptive pathways.

Figure 1. *Integrated Theoretical Lens for Sustainable Banana-Farming Livelihoods*
Integrated Sustainable Livelihood-Resilience Framework



METHODS

Research Design

The study used a qualitative multiple-case study design to examine three banana growers as distinct cases while allowing systematic comparison across cases. The design preserved the depth and context of each farmer's experiences and supported identification of recurring patterns and meaningful differences (Baxter & Jack, 2008; Creswell & Guetterman, 2019).

Research Locale

The study was conducted in Tagum City, Davao del Norte, from 2025 to 2026. The three cases were located in Barangay La Filipina, Barangay Cuambogan, and Barangay Mankilam. The sites represented medium- and small-scale banana operations with different land sizes, farming histories, production arrangements, and resource conditions.

Participants and Sampling Technique

Purposive maximum-variation sampling was used to select three experienced banana growers. Inclusion criteria required banana farming to be the participant's primary livelihood, farm operation for at least 10 years, and continued farming despite significant challenges. The cases were intentionally diverse in farm scale, years of operation, contractual arrangements, and crop strategy so that shared patterns and distinctive pathways could be compared (Campbell et al., 2020).

Table 1. *Profile of the Three Case Units*

Case	Case Label	Barangay	Age	Farm Size	Years Operating
A	The Passionate Grower	La Filipina	58	8 ha	20
B	The Resilient Son-in-Law	Cuambogan	40	6 ha	31
C	Dual-Variety Banana Farmer	Mankilam	69	2 ha	20

Research Instrument and Data Sources

Primary data were generated through in-depth interviews using a pre-validated interview guide. The guiding questions were aligned with the research questions but allowed follow-up probing and clarification. Interviews were audio-recorded with permission and transcribed verbatim. Direct observation, field notes, and documentation were used as supplementary sources to enrich contextual understanding.

Data Gathering Procedure

Before recruitment, the researchers obtained institutional permission and ethics approval from the Arriesgado College Foundation, Inc. Research Ethics Committee. Eligible farmers received an invitation and informed-consent form explaining voluntary participation, privacy protections, and study procedures. Interviews were scheduled only after signed consent, conducted in agreed locations, audio-recorded with explicit permission, and supplemented by systematic observation and field notes.

Data Analysis

Interview transcripts were analyzed using Braun and Clarke's (2006) six-phase thematic-analysis process: familiarization, initial coding, theme development, theme review, theme definition and naming, and report production. Analysis was primarily inductive and remained closely tied to participants' accounts. After within-case analysis, cross-case comparison was used to identify similarities, differences, and broader patterns across the three cases.

Trustworthiness

Trustworthiness was addressed through credibility, confirmability, transferability, and dependability following Lincoln and Guba (1985). Strategies included member checking, audio recording and verbatim

transcription, follow-up clarification, audit-trail documentation, thick description of the cases and setting, organized coding and theme development, and review of the research process by the thesis panel.

Ethical Consideration

The study followed the Philippine Health Research Ethics Board's National Ethical Guidelines for Research Involving Human Participants and underwent review by the ACFI Research Ethics Committee. Participation was voluntary and based on informed consent. Privacy and confidentiality were protected under the Data Privacy Act of 2012; personally, identifying details were withheld, participants could withdraw without penalty, and potentially sensitive financial and farm-management information was handled confidentially.

RESULTS AND DISCUSSION

Case Profiles and Livelihood Contexts

The cases represented distinct farming trajectories. Case A was a 58-year-old medium-scale grower from La Filipina managing eight hectares after approximately 20 years in banana farming and export-oriented production. Case B was a 40-year-old medium-scale grower from Cuambogan managing six hectares for 31 years through a farm passed down by his father-in-law, with both independent and contract-farming experience. Case C was a 69-year-old small-scale grower from Mankilam managing two hectares for 20 years and combining Cavendish with Cardava as a secondary income source.

These differences in scale, age, farm history, and institutional support were important because they shaped how each farmer learned, financed operations, managed labor, and responded to disease and market stress. The cross-case analysis therefore treated livelihood sustainability as context-dependent rather than as a uniform set of best practices.

Pathways in Managing Banana Farms

Three themes explained how farmers entered, learned, and developed their operations: Kinship-Driven Entry into Farming, Competence Through Guided Practice and Partnership, and Workflow Improvement and Leadership Transformation. Entry was socially and economically embedded. Case A was encouraged by people already involved in farming; Case B viewed banana farming as a dependable family enterprise; and Case C shifted from unstable mining income to banana production.

Table 2. *Themes Describing the Farmers' Management Pathways*

Theme	Case A	Case B	Case C
Kinship-Driven Entry into Farming	Social encouragement and mentorship supported entry.	Family livelihood and income potential reinforced continuation.	Shift from unstable employment toward a more dependable farm livelihood.
Competence Through Guided Practice and Partnership	Former manager and late uncle provided informal mentorship.	Father-in-law provided a prolonged apprenticeship and hands-on learning.	Company coaches provided structured technical guidance.
Workflow Improvement and Leadership Transformation	Progressed from bicycle/manual logistics to vehicles, more workers, and expanded farms.	Built competence gradually through repeated practice and management responsibility.	Moved from dependence on coaches toward independent application of learned techniques.

"I had no experience when I first started farming, but I am very grateful that there were people who taught me, like my former manager and my late uncle. It was from them that I learned everything I know." (Case A)

The cases show that competence was built through relationships and accumulated experience rather than formal education alone. This pattern is consistent with Ofolsha et al. (2022), Jorge et al. (2022), and Wibowo et al. (2024), who emphasize social networks, experience, and knowledge sharing. Case C additionally illustrates

the role of structured institutional coaching, paralleling Sarmiento et al.'s (2024) findings on cooperative or contract-based support.

"I learned gradually because at the beginning I really had nothing; I truly didn't know anything. Now, I know a little already." (Case B)

"If not for the company, I really wouldn't know anything. I've already learned the techniques in growing bananas and how to properly make them grow." (Case C)

Challenges Affecting Livelihood Sustainability

Four interrelated themes described the principal threats: Recurring Crop Disease and Production Vulnerability, Price Fluctuations, Labor Management and Human Capital Deficits, and Systemic and Environmental Vulnerabilities. All cases encountered disease and market pressure, but the severity and immediate consequences differed.

Table 3. *Cross-Case Challenges to Sustainable Livelihood*

Challenge Theme	Case A	Case B	Case C
Recurring Crop Disease and Production Vulnerability	Bunchy top and recurring field defects reduced quality and harvest reliability.	Panama disease persisted in soil and was worsened by flooding.	Panama, moko, and bunchy top could produce severe or total crop loss.
Price Fluctuations	Low prices affected wages, operating expenses, and farm continuity.	Extended low-price periods forced some growers to surrender farms.	Large Class A–Class B price gaps weakened household and farm income.
Labor Management and Human Capital Deficits	High labor cost remained burdensome during low-income periods.	Disciplining poor performers could trigger complaints and management difficulty.	Unreliable or slow workers increased operational risk.
Systemic and Environmental Vulnerabilities	Strict export standards and rejected shipments caused financial loss.	Poor drainage and flooding damaged roots and increased disease risk.	Strong winds, weak plant support, and handling problems toppled plants and reduced quality.

Disease-related findings parallel evidence on the persistence of Fusarium TR4 and BBTv and their long-term effects on crop productivity (Chen et al., 2024; Lantican et al., 2023). Price instability and quality classification likewise constrained reinvestment and household income, consistent with Philippine market studies (Limpoco & Digal, 2023; Lodovico & Lee, 2024). The environmental cases further demonstrate how flooding and extreme winds interact with disease and quality loss, echoing Patrick et al. (2025) and Kaashoek et al. (2025).

Coping Strategies Used to Sustain Livelihoods

Four themes captured the farmers' principal coping strategies: Financial Discipline and Planning, Adaptive Livelihood Strategies, Maintaining Proper Drainage to Protect Banana Crops, and Quality Assurance Interventions. Although all farmers attempted to protect continuity, the specific strategies reflected their resources and farm conditions.

Table 4. *Coping Strategies Across the Three Cases*

Coping Theme	Case A	Case B	Case C
Financial Discipline and Planning	Used loans or sold assets for urgent production needs.	Controlled spending and prioritized essential inputs.	Saved during high-price periods to buffer low-price periods.

Coping Theme	Case A	Case B	Case C
Adaptive Livelihood Strategies	Worked alongside laborers and corrected mistakes immediately.	Used low-cost sanitation mixtures and available materials for disease control.	Diversified with Cardava banana for supplementary income.
Maintaining Proper Drainage	Maintained canals to reduce waterlogging and protect treatments.	Conditioned and deepened drainage pathways in flood-prone areas.	Monitored canals and cleared blockages to control water flow.
Quality Assurance Interventions	Used paper canopies and increased spray cycles to protect fruit.	Used paper, foam separators, sacks, and careful handling during transport.	Wrapped bunches with two layers of paper to prevent sunburn.

The coping themes align with evidence on agricultural credit and input prioritization (Loquias et al., 2025; Shrestha et al., 2025), low-cost sanitation (Ocimati et al., 2021), diversification (Basantaray et al., 2024), drainage management (Gul et al., 2025; Zubezu et al., 2022), and physical protection of marketable fruit (Chaiwong et al., 2021; Al-Dairi et al., 2025). The cross-case differences are equally important: Case A relied more on reactive financing and hands-on labor leadership; Case B emphasized cost control, sanitation, and broader post-harvest protection; Case C combined savings with crop diversification and straightforward preventive farm practices.

Cross-Case Pathways Toward Sustainable Livelihood

Cross-case comparison showed that the same broad pressures did not produce identical livelihood responses. Sustainability emerged through a sequence of context-specific decisions influenced by kinship, farm scale, accumulated knowledge, contractual support, assets, and financial position. Case A's pathway emphasized entrepreneurial expansion and labor leadership; Case B's pathway emphasized family-based apprenticeship, cost discipline, and adaptive operational control; and Case C's pathway emphasized institutional learning, savings, and dual-variety diversification.

Table 5. *Distinctive Sustainable-Livelihood Pathway of Each Case*

Case	Entry/Learning Pathway	Dominant Vulnerability	Characteristic Response	Livelihood Direction
A	Social encouragement; informal mentorship; experiential expansion	Disease, labor cost, price pressure, export rejection	Emergency financing, close labor supervision, drainage, fruit protection	Expansion, asset accumulation, increasing autonomy
B	Family succession; father-in-law apprenticeship; contract and independent farming	Panama disease, prolonged low prices, flooding, labor discipline	Cost control, low-cost sanitation, drainage improvement, protective transport	Operational resilience through disciplined resource management
C	Shift from mining; company coaching; later independent farming	Severe disease loss, price-grade gaps, worker reliability, strong winds	Savings, Cardava diversification, drainage maintenance, paper wrapping	Household stability through learned techniques and diversified income

These pathways confirm the logic of the Sustainable Livelihood Framework because farmers continuously mobilized and reconfigured human, financial, physical, social, and natural assets in response to vulnerability. They also support Resilience Theory: repeated exposure to disease, market decline, environmental shocks, and labor problems led farmers to adjust practices, reorganize resources, and restore farm functionality rather than simply endure disruption. Sustainable livelihood was therefore a dynamic, experience-based process of learning and adaptation.

CONCLUSION

Banana farming among the three Tagum City cases functioned as a long-term livelihood built through socially embedded entry, experiential learning, mentorship, and gradual managerial development. Despite differences in farm scale and history, the growers shared a progression from dependence on others toward greater competence, autonomy, and asset management.

Their livelihoods remained vulnerable to recurring disease, price instability, labor difficulties, flooding, strong winds, quality standards, and rising costs. Nevertheless, farmers sustained operations through distinct combinations of financial planning, credit or savings, labor supervision, low-cost disease control, diversification, drainage management, and fruit-protection practices. The findings show that sustainable livelihood is not produced by one universal strategy. It emerges through the continuing alignment of livelihood assets with changing risks, supported by practical learning, adaptive decision-making, and resilience developed over time.

Recommendation

Agricultural agencies and local government units should strengthen structured mentorship and peer-to-peer technical coaching so that experienced growers' practical knowledge can be transferred while smallholders gain access to updated disease-control, record-keeping, and farm-management practices.

Extension services should prioritize communal drainage maintenance, disease quarantine, sanitation protocols, and climate-risk preparation in areas where flooding and pathogen spread cross farm boundaries.

Farm-support programs should include differentiated labor-management assistance, practical worker-performance guidelines, and training on supervision, safety, and efficient use of labor inputs.

Government agencies, cooperatives, buyers, and financial institutions should improve direct-market access and develop context-sensitive microcredit, crop-insurance, and savings mechanisms that protect farmers' capacity to reinvest after disease, price, or climate shocks.

Future studies should expand across Davao del Norte, compare farm scales and contractual arrangements, develop quantitative measures from the identified themes, and use longitudinal designs to examine how training, asset accumulation, disease management, and market access influence farm profitability and livelihood resilience over multiple production cycles.

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