Prioritization of Indigenous Crops and Fish Species among Pulangi Residents in Mindanao, Philippines

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Abstract
This paper analyzes the prioritization of indigenous crops and fish species among residents along the Pulangi River in Mindanao, Philippines. Utilizing quantitative multi-criteria assessment data, we examine how farming and fishing communities value specific local species based on economic, market, social, and environmental indicators. The data reveals that while potential income enhancement remains the primary driver for agricultural and fisheries prioritization, distinct variances exist between crop types (e.g., Kamoting Kahoy, Kayos, Mangga Wani) and fish species (Kasili, Buted or beya, Baanak). However, findings emphasized that kamoting kahoy (Manihot esculenta) for indigenous crops and kasili (Anguilla marmorata) found to be the priority species to be cultured for added value products. This findings offer empirical insights for designing localized food security frameworks and targeted biodiversity conservation policies in the Mindanao region specifically along Pulangi River.

Keywords: Indigenous, crops, fish, Pulangi, Mindanao

Introduction

The Pulangi River basin in Mindanao is a critical ecological and economic lifeline supporting diverse agricultural and fishing communities. Indigenous crops and native fish species are vital components of local food systems, public health, and cultural heritage. However, agricultural modernization, climate fluctuations, and changing market dynamics present ongoing challenges to traditional agrobiodiversity. Agricultural land degradation in the steeply sloping upland areas of the Philippines has been recognized as a major environmental problem for decades. With significant on–site and off-site impacts (Cramb, 1998), conservation farming systems have been developed, such as contour hedgerows of shrub legumes (Cramb, 2000 and Cramb, et al., 2000). Through these farming systems, smallholder farmers in the country can expand their areas, thus, the attainment for the increased food production and income is possible to achieve.

Farmers have their farming practices and practical knowledge and activities such as land preparation, planting, fertilizing, spraying, weeding, harvesting, transporting, cooking and eating. These activities through which are made side by side signify ideology-making. It is a distinctive human process (Bhandari, 1993).

The specific water parameters, deep pools, and variable currents of the Pulangi River support a diverse range of inland fish species. Indigenous species like the Freshwater Eel (Anguilla marmorata), locally known as Kasili or Igat, and the Banak (Cestraeus plicatilis) anchor the river's native food chain (Corpuz et.al., 2025). These migratory and resident species depend on the river's hydrological connections to complete their life cycles. They also provide vital nutrition and income for riverside communities (Morillo 2025).

To support targeted rural development, it is necessary to identify which indigenous resources residents prioritize and understand the underlying reasons for these preferences. This study analyzes structured evaluation data to understand the socio-economic and ecological drivers influencing the prioritization of local crops and fish species among Pulangi residents.

Methodology

Data was gathered through a multi-criteria evaluation matrix completed by residents and stakeholders within the Pulangi River basin. Respondents assessed three native crop varieties and three indigenous fish species against fourteen distinct development indicators.

Research Design

This study utilized a descriptive-quantitative multi-criteria evaluation approach to capture local knowledge regarding priority native crop and fish species for cultivation, management and designing of added value products. Field data collection was executed across multi-stakeholder cohorts, including smallholder farmers, local fishers (mangingisda), and barangay environmental officers. Respondents evaluated the six focal target species using a structured multi-

criteria decision-making matrix. They assigned proportional weight percentages across fourteen developmental indicators to measure socioeconomic and environmental viability.

Respondents of the Study
The researchers decided to choose 50 farmer/fisherfolk respondents per barangay with a total of 250 respondents in the three municipalities (Pres. Roxas with 2 barangays, Matalam with 1 barangay, and Carmen with 2 barangays).

Location of the Study
The study was conducted in the three distinct sites in Cotabato Province (Fig. 1): the upper stream in the Municipality of President Roxas [Sito Kaminuangan, (7°22'52.97" N, 125°0'9.09" E) Brgy. Kisupaan], the midstream in the Municipality of Matalam [Brgy. Arakan (7°21'29.81" N, 124°55'52.39" E)], Municipality of President Roxas [Sitio Lebpas (7°21'9.63" N, 124°55'18.58" E), Brgy. Tuael] and in Barangay Manili (7°8'33.44" N, 7° 8'33.44" E), of Carmen Cotabato; and the lower stream located at Sitio Lumayong, Brgy. Ugalingan (7°17'26.49" N, 124°51'15.11" E), Carmen Cotabato.

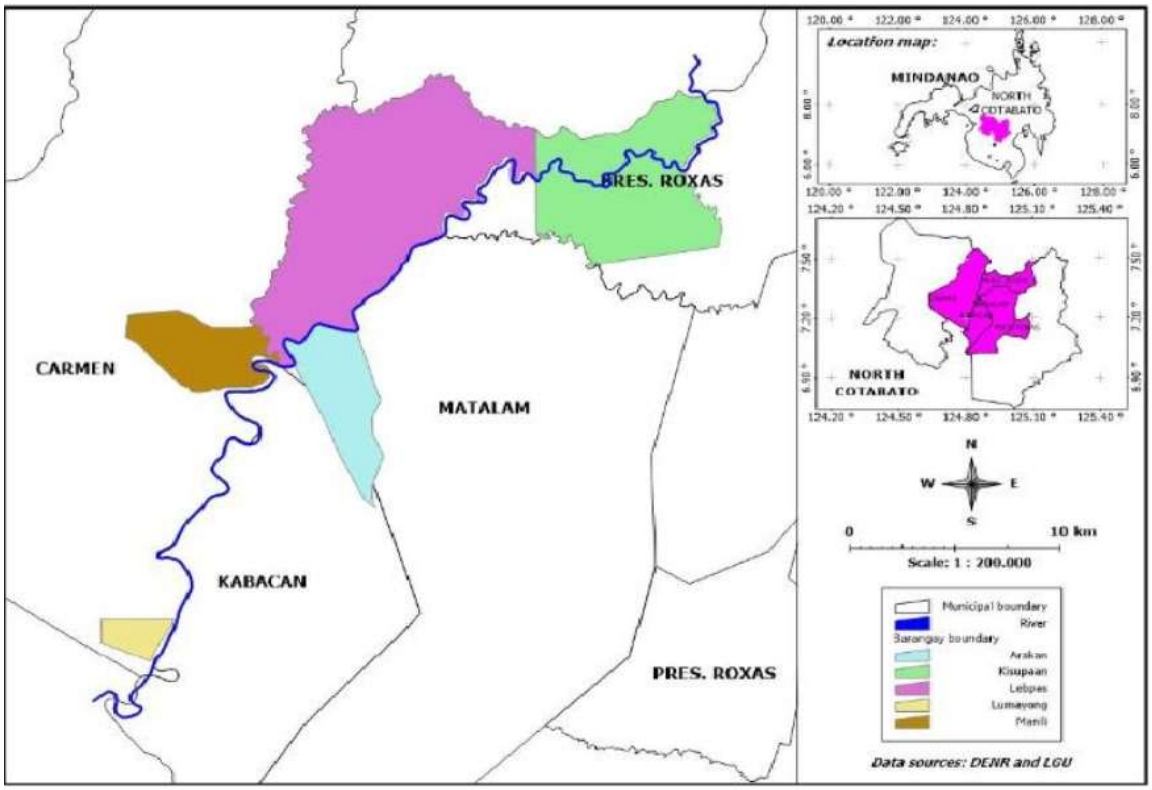

Fig. 1. Map showing the study site

Evaluated Species
Indigenous Crops: Kayos (Wild Yam), Kamoting Kahoy (Cassava variety), and Mangga Wani (Local Mangifera/Mango relative).
Indigenous Fish Species: Kasili (Freshwater Eel), Buted or beya/ (Glossogobius giuris), and Baanak (Mullet variety).

Core Assessment Metrics
The evaluation utilized fourteen standardized metrics grouped into five primary thematic areas:
1. **Economic & Market Impact (A1–A3):** Potential to increase income, potential for increasing market share, and potential for increasing production.
2. **Governance & Collective Action (B1–B4):** Collective action capabilities, private sector engagement, government priority/engagement, and infrastructure availability.
3. **Social Inclusion & Value Chains (C1–C4):** Smallholder involvement, youth and women engagement, value chain collaboration potential, and scaling potential.
4. **Environmental Sustainability (D1):** Low negative impact on the environment.
5. **Research & Development (E1):** Researchability and technical feasibility.

Results and Discussion

Prioritization Analysis of Indigenous Crops
The agricultural dataset shows a clear preference for specific crops depending on the developmental metric applied. It shows in Fig. 1, the Selected Crop Data Highlights:

1. **Economic Dominance of Kamoting Kahoy:** Kamoting Kahoy holds a dominant position in economic potential, scoring **70.98%** for income increase potential (A1). This indicates a highly functional local market and consistent consumer demand. It also leads in market expansion potential (**29.20%**) and production scalability (**26.67%**).
2. **Ecological Resilience of Local Varieties:** While Kayos and Manna Wani show lower immediate commercial returns, they perform strongly in environmental sustainability. Kamoting Kahoy leads environmental safety scores at **41.42%**, closely followed by Kayos at **31%** and Manna Wani at **22.86%**. This underscores the low ecological footprint associated with cultivating traditional wild yams and perennial tree crops.
3. **Social & Institutional Bottlenecks:** All three crops show lower scores (under 10%) for institutional indicators like collective action (B1), government priority (B3), and infrastructure (B4). This points to a lack of formal policy frameworks and dedicated agricultural extensions for indigenous crops along the Pulangi basin.

The agricultural landscape along the Pulangi River basin is shaped by diverse soil profiles, including Adtuyon clay and mountain loam. These soils historically supported thick dipterocarp forests and traditional swidden systems. For Indigenous Cultural Communities, such as the Higaonon and Bukidnon-Pulangiyen tribes, the floodplains and surrounding slopes provide ideal conditions for cultivating resilient indigenous crops (Morillo 2025).

Traditional crops like Kayos (Wild Yam) and native root crops like Kamoting Kahoy (Cassava varieties) have long served as reliable food sources during droughts or seasonal crop failures. Perennial tree species, such as Mangga Wani (a native forest mango relative), offer stable root networks that help secure fragile riverbanks. These traditional crop varieties have a low environmental impact and adapt well to the region's climate. Because they require minimal chemical inputs, they play a crucial role in maintaining soil health and preventing erosion along the basin (Morillo 2025).

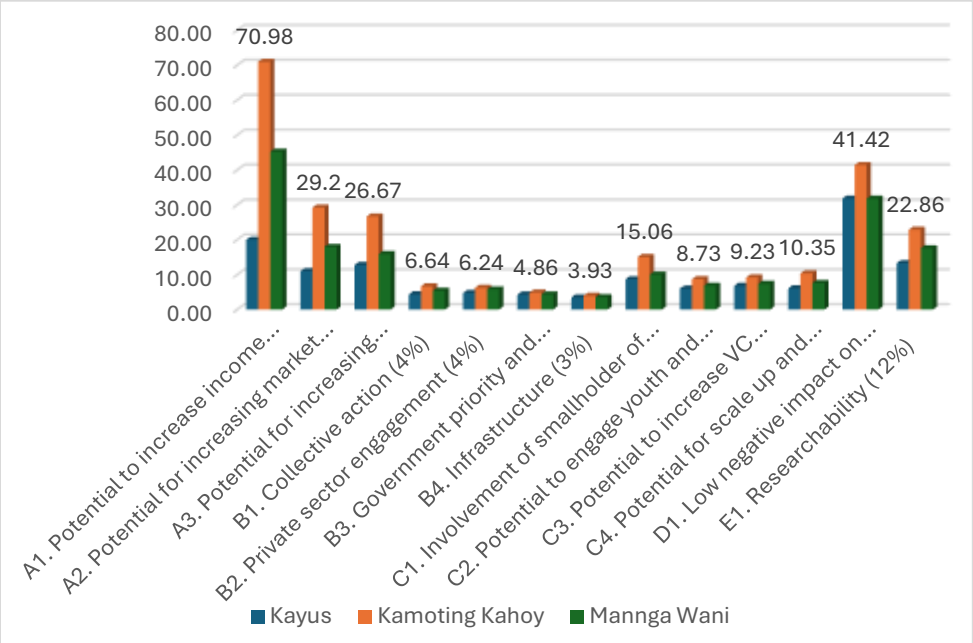

Fig. 1. Prioritization graph of indigenous crops

Prioritization Analysis of Indigenous Fish Speciess

The fisheries sector displays different prioritization dynamics, characterized by a high demand for specific high-value fish species among residents (Fig. 2).

Selected Fish Data Highlights:

1. **High Value of Kasili (Freshwater Eel):** Kasili emerges as the top-priority aquatic resource, scoring **55.76%** in income-generating potential. This reflects its high market value and steady demand in local and regional trade networks. It also holds the highest perceived potential for production increases (**17.99%**).
2. **Stable Footprint of Secondary Fisheries:** Buted and Baanak display moderate, balanced profiles. Buted shows reliable income potential (**26.00%**) and solid environmental compatibility (**27.00%**). Baanak presents lower scores across production metrics (**5.78%**) but retains local value due to its adaptability.
3. **Value Chain and Scaling Opportunities:** The fish varieties show higher capacity scores for value chain integration (C3) and scalability (C4) than the crop varieties. Kasili leads environmental sustainability at **32.99%**, indicating that residents view managed wild-capture or localized aquaculture of eel as ecologically sustainable.

The study of Corpuz, et.al. reported a noticeable decline in overall fish diversity. While native varieties remain ecologically significant, sampling catches are increasingly dominated by introduced food fish, such as the Indian Rohucarp (Labeo rohita) and Common Carp (Cyprinus carpio). This shift highlights a changing aquatic structure along the river.

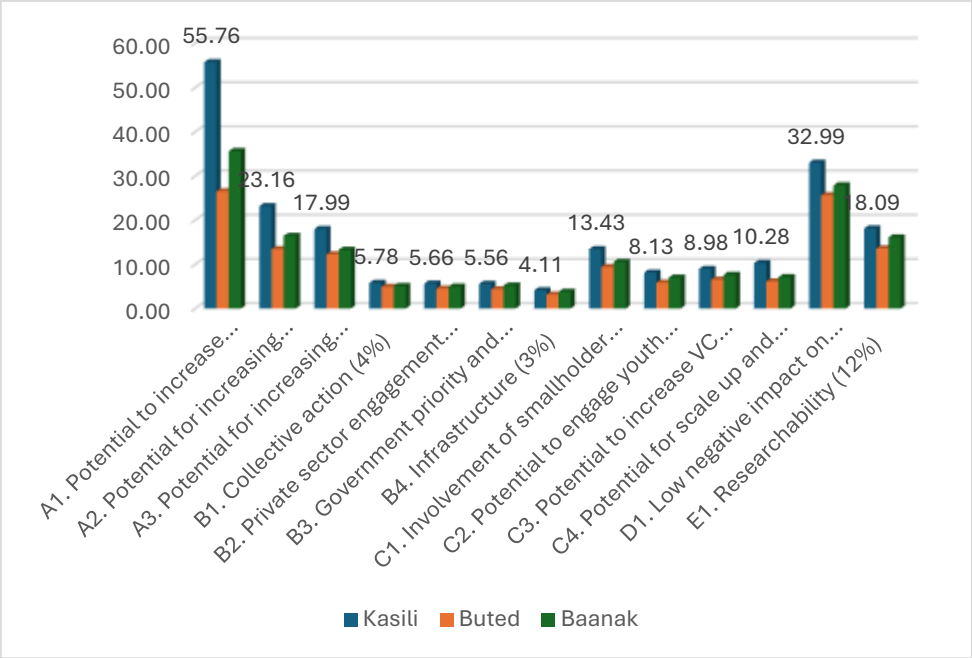

Fig. 2. Prioritization graph of indigenous fish species

Conclusion and Policy Recommendations

The multi-criteria analysis demonstrates that Pulangi residents prioritize indigenous species primarily based on their economic viability and potential to improve household income. Kamoting Kahoy dominates the agricultural sector, while Kasili serves as the primary anchor for local fisheries. However, the systemic low scores in governance, infrastructure, and institutional support highlight a clear gap between local reliance on these resources and formal state backing.

Based on these findings, the following actions are recommended:

1. **Targeted Infrastructure Investment:** Develop localized processing facilities and cold-storage networks along the Pulangi River to reduce post-harvest losses for high-value items like Kasili and Kamoting Kahoy.
2. **Formal Integration into Extension Services:** Municipal and provincial agriculture offices should create explicit conservation and marketing programs for underrepresented crops like Kayos and Manna Wani to preserve regional agro-biodiversity.
3. **Support for Community-Led Resource Management:** Establish community-managed freshwater sanctuaries and sustainable fishing quotas along the Pulangi River to protect high-priority species from overexploitation while securing long-term local incomes.

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