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STRENGTHS, OPPORTUNITIES AND CHALLENGES OF WEST APAYAO ABULUG IRIGATION SYSTEM-IRRIGATORS ASSOCIATIONS

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Abstract

This study assessed the strengths, opportunities, and challenges of the West Apayao-Abulug Irrigation System–Irrigators Association in relation to irrigation management, organizational performance, and agricultural sustainability. The study employed a descriptive qualitative research design utilizing interviews and documentary analysis among selected association members and key stakeholders. The findings revealed that the association possesses several institutional strengths, including active member participation, strong collaboration among stakeholders, and effective irrigation management practices that contribute to organizational stability and agricultural productivity. The study likewise identified significant opportunities for development, particularly through access to government assistance programs and technical support from the National Irrigation Administration and the Department of Agriculture, the adoption of modern irrigation technologies, and the implementation of capacity-building and training initiatives. Despite these positive attributes, the association continues to encounter several operational and institutional challenges, including limited financial resources, climate-related disruptions affecting water availability, inadequate technical support and equipment, and recurring conflicts in water allocation and distribution among beneficiaries. These issues significantly affect the efficiency, sustainability, and long-term resilience of the irrigation system. The study concludes that sustained government assistance, strengthened institutional partnerships, and the adoption of improved irrigation management strategies are essential to enhance the operational effectiveness, organizational capacity, and long-term sustainability of the Irrigators Association. Furthermore, the study emphasizes the importance of collaborative governance, continuous capacity development, and adaptive management approaches in addressing the emerging challenges confronting irrigation systems and agricultural communities. Irrigation Management, Irrigators Association, Agricultural Sustainability, Organizational Performance, Water Resource Management, Capacity Building, Government Assistance, Climate-Related Challenges, Stakeholder Collaboration, Adaptive Management.

Keywords: *Irrigation Management, Irrigators Association, Agricultural Sustainability, Organizational Performance, Water Resource Management, Capacity Building, Government Assistance, Climate-Related Challenges, Stakeholder Collaboration, Adaptive Management.*

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Introduction

Globally, irrigation remains fundamental to food security and agricultural sustainability, contributing approximately 40% of the world's food production from only 20% of cultivated land (American Society of Agricultural and Biological Engineers [ASABE], 2018; Shiklomanov, 1999). Nevertheless, the long-term sustainability of irrigated agriculture is increasingly threatened by rapid population growth, urbanization, climate variability, and intensified competition for limited freshwater resources (United Nations Department of Economic and Social Affairs [UNDESA], 2020). In response to these emerging concerns, numerous developing countries, particularly within Southeast Asia, have implemented institutional reforms such as Irrigation Management Transfer (IMT) and Participatory Irrigation Management (PIM), which emphasize the active involvement of Water Users Associations (WUAs), commonly referred to in the Philippines as Irrigators Associations (IAs), in irrigation governance and management (Food and Agriculture Organization [FAO], 2001). These reforms aim to decentralize irrigation management by transferring greater responsibility for system operation, maintenance, and water distribution to local farmer organizations (FAO, 2001; National Irrigation Administration [NIA], 2019).

Despite the recognized advantages of decentralized irrigation governance, the performance of IAs continues to vary significantly across irrigation systems and geographical regions. Existing studies consistently identify several persistent institutional and operational challenges confronting these associations. Among these are deteriorating irrigation infrastructure, wherein aging and poorly maintained facilities reduce water delivery efficiency and overall system performance (Asian Development Bank [ADB], 2017). Institutional weaknesses, including low irrigation service fee collection efficiency, weak internal governance structures, limited technical capabilities, and insufficient political and institutional support, further constrain the effectiveness of IAs in managing irrigation systems sustainably (FAO, 2001; NIA, 2019). Additionally, increasing climate and environmental pressures, particularly hydrological variability caused by droughts and floods, require IAs to adopt more adaptive, flexible, and resilient management approaches (UNDESA, 2020).

Not with standing these constraints, successful Irrigators Associations exhibit considerable strengths that contribute to effective irrigation management and agricultural productivity. These strengths include the utilization of local knowledge in water management, collective action in infrastructure maintenance, and improved equity in water allocation among users (Ostrom, 1990). Furthermore, significant opportunities exist for strengthening IAs through the adoption of modern irrigation technologies, enhanced monitoring systems, stronger collaboration with government agencies and local government units, and the implementation of sustainable financial and institutional development strategies (ADB, 2017).

In the Philippine context, the National Irrigation Administration has served as a key institution in the development and modernization of irrigation systems, particularly through policies promoting the devolution of operation and maintenance responsibilities to Irrigators Associations (NIA, 2019). The achievement of the country's agricultural productivity and food

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security objectives is closely linked to the effectiveness and sustainability of these local organizations. However, similar to global trends, many Filipino IAs continue to operate under conditions characterized by aging infrastructure, financial limitations, and complex socio-political dynamics that adversely affect their institutional and operational capacities (ADB, 2017).

The West Apayao-Abulug Irrigation System is one of the major national irrigation systems supporting agricultural production within the Cordillera Administrative Region and Cagayan Valley. Owing to its extensive geographic coverage and diverse terrain, ranging from mountainous uplands to lowland agricultural communities, the Irrigators Associations operating within the WAAIS encounter unique operational, environmental, and institutional challenges that may significantly differ from those experienced in other irrigation systems throughout the country.

Although existing literature provides comprehensive discussions regarding the general conditions and issues affecting Irrigators Associations at the global and national levels, a substantial research gap remains in the localized and integrated assessment of specific large-scale irrigation systems. Most previous studies have concentrated primarily on broad national analyses or isolated performance indicators such as agricultural productivity or irrigation fee collection efficiency. Consequently, there is limited contemporary research that holistically examines the challenges, strengths, and opportunities of the Irrigators Associations operating within the complex bio-physical and socio-institutional environment of the West Apayao-Abulug Irrigation System.

A comprehensive understanding of the institutional mechanisms, collective practices, and site-specific opportunities for organizational development within WAAIS is essential for the formulation of targeted, evidence-based, and sustainable policy interventions. Without localized and context-specific information, regional and national initiatives aimed at modernizing irrigation governance and strengthening organizational resilience may prove ineffective or unsustainable in the long term. Hence, this study seeks to identify and document the prevailing challenges confronting the Irrigators Associations under the West Apayao-Abulug Irrigation System, particularly those related to water allocation conflicts, infrastructure maintenance, and financial sustainability. Moreover, the study aims to evaluate the internal and external strengths that may be leveraged by the associations, including leadership capacity, social capital, and traditional water-sharing practices, and to propose evidence-based and actionable recommendations for the National Irrigation Administration, local government units, and the Irrigators Associations themselves to enhance water service delivery, strengthen organizational capacity, and ensure the long-term sustainability and resilience of the irrigation system.

Statement of the Problem

This research seeks to investigate the strength, opportunities and challenges of West Apayao Abulug Irrigation System- Irrigators Associations (WAAIS-IA).

Specifically, this study aims to answer the following questions:

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1. What are the strengths and opportunities of the Irrigators Associations?
2. What are the challenges experienced by the Irrigators Associations?
3. What strategies can be crafted to address the challenges experienced by the Irrigators Associations?

RESEARCH METHODOLOGY

This presents the research methods and procedures utilized in the study. It includes the research design, locale of the study, respondents of the study, research instrument, data gathering procedure, and statistical treatment of data.

Research Design

This study will employ a Qualitative Descriptive-Evaluative design. It is the most suitable for this research as it seeks to explore the complex social dynamics, institutional mechanisms, and human interactions inherent in the management of irrigation systems.

The descriptive component of the design will be used to provide a detailed account of the current challenges, strengths, and operational realities of the Irrigators Associations (IAs) within the West Apayao Abulug Irrigation System (WAAIS). The evaluative component will assess these findings against established institutional benchmarks—specifically Ostrom's Design Principles for common-pool resource management—to determine the effectiveness of the associations' current governance and maintenance strategies.

Finally, as the WAAIS represents a specific, large-scale national irrigation system with unique bio-physical and socio-institutional characteristics, this approach allows for an in-depth investigation of these contemporary phenomena within their real-life context.

Irrigation management is fundamentally a social process involving trust, cooperation, and conflict resolution among water users. A qualitative design allows the researcher to capture the "how" and "why" behind member participation or non-participation that numerical data cannot explain.

The WAAIS traverses diverse landscapes from mountains to lowlands. Qualitative methods ensure that the unique geographic and cultural nuances of the Apayao region are integrated into the analysis of institutional challenges.

By using semi-structured interviews and focus groups, the study adopts an inductive approach, allowing site-specific strengths and opportunities to emerge directly from the lived experiences of the farmers and IA officers.

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The design facilitates the triangulation of data from interviews, focus group discussions, and documentary analysis (such as NIA reports and IA bylaws), ensuring a robust and well-validated evaluation of the system's sustainability.

Locale of the Study

The research was conducted within the West Apayao Abulug Irrigation System (WAAIS), which serves as a major irrigation facility in the province of Apayao and some areas in Cagayan. This system supports several farming communities and is managed, in part, by organized Irrigators Associations (IAs).

These associations play a critical role in the operation, maintenance, and sustainability of the irrigation services in the area.

The WAAIS covers various agricultural zones in West Apayao, and the Northwestern part of Cagayan wherein vital to the livelihood of local farmers, particularly those cultivating rice and other staple crops. The locale of the study provides an appropriate setting to assess the challenges, strengths, and opportunities faced by the IAs in managing irrigation resources and improving agricultural productivity.

Respondents of the Study

The study utilized purposive sampling to select respondents who possess in-depth knowledge and direct experience with the West Apayao Abulug Irrigation System (WAAIS). The primary respondents will consist of the Officers of the Irrigators Associations (IAs), including the Presidents and Treasurers, who are responsible for the daily governance and financial management of the system.

To ensure a comprehensive understanding of the strengths and challenges member-farmers will also be included as participants. The researcher will select farmers from both the head-end and tail-end sections of the irrigation canals to capture varying perspectives on water distribution equity. Additionally, Institutional Development Officers (IDOs) from the National Irrigation Administration (NIA) will serve as key informants to provide technical and administrative context regarding the associations' performance and opportunities for future growth.

Data Gathering Procedure

The data collection process was conducted systematically to ensure the capture of "on-the-ground reality" within the West Apayao-Abulug Irrigation System (WAAIS). The primary method for gathering qualitative insights from Irrigators Association (IA) members and officers was the Focus Group Discussion (FGD).

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Before the actual data collection, the researcher secured the necessary clearances and entry protocols. Formal letters of request were sent to the National Irrigation Administration (NIA) and the respective local government units (LGUs) within the WAAIS coverage area.

The researcher coordinated with the Presidents of Irrigators Associations (e.g., Samahang Nayon ng Apayao FIA, Emilia IA, etc.) to schedule the sessions and identify participants.

Following the purposive sampling method defined in the study, the participants were organized into specific groups to ensure diverse perspectives consisting of IA Presidents and Treasurers to discuss institutional governance and financial constraints and member-farmers from both the head-end and tail-end sections of the irrigation canals to capture data on water distribution equity and maintenance and separate sessions or interviews with Irrigation Development Officers (IDOs) from NIA to provide administrative context.

The FGDs facilitated using an inductive approach, utilizing meta-cards to categorize qualitative data visually. The researcher explained the study's purpose, ensure confidentiality, and obtain informed consent from all respondents.

Participants were asked to write specific difficulties (e.g., aging infrastructure or climate variability) on colored meta-cards. These were posted and clustered on a board to identify common themes.

Using different colored cards, the group will identify internal assets (leadership, social capital) and external growth areas (government partnerships, modernization).

The session concluded with a collaborative discussion on evidence-based strategies to address the identified challenges, serving as the basis for the proposed Action Plan.

To ensure a "robust and well-validated evaluation," the following performed. With permission, sessions will be recorded to capture the "how" and "why" behind member participation. Verbal accounts and the text on meta-cards was transcribed for thematic analysis. Data gathered from the FGDs had compared against NIA reports and IA by laws to ensure accuracy.

Statistical Treatment of Data

The collected data had subject to descriptive analyses to address the research questions. To address the research questions regarding the strengths, opportunities and challenges of the West Apayao Abulug Irrigation System (WAAIS), the following analytical procedures were used:

The data collected through meta-cards and FGDs had analyzed using a thematic approach to identify recurring patterns. All recorded discussions and text from meta-cards will be transcribed into a master text document. The researcher had assigned "codes" to specific statements (e.g., Aging

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Irrigation Infrastructure will be coded as Deteriorated Infrastructure). Codes were grouped into the three primary categories of the study: Strengths, Opportunities and Challenges.

As specified in the research design, the internal governance of the IAs were evaluated against Ostrom's Eight Design Principles for Common-Pool Resources.

A comparison will be made between the "on-the-ground reality" of the WAAIS-IAs and the ideal benchmarks of long-enduring institutions.

Using the Institutional Analysis and Development (IAD) Framework, the analysis showed how physical conditions and community attributes (Inputs) lead to current O&M outcomes.

To ensure the validity of the qualitative findings, a triangulation technique had applied. Results from the FGDs with farmers had cross-referenced with the interviews of NIA IDOs and documentary analysis of NIA reports. A comparative descriptive analysis conducted to determine if the challenges faced by head-end farmers differ significantly from those of tail-end farmers.

The final stage of analysis involves translating the thematic results into the Proposed Strategies/Action Plan. The identified Strengths and Opportunities were mapped against the Challenges to create "evidence-based strategies" for organizational resilience. Qualitative insights will be prioritized based on the urgency and frequency of the challenges identified by the respondents.

RESULTS AND DISCUSSIONS

This presents results from the data gathered. Discussion and thorough analysis of the results are also reflected.

Table 1. Strengths and opportunities of the IAs

Strengths	Opportunities
1. The Irrigators Associations had bylaws as guidelines	1. Interventions from NGA's and NGOs
2. The association demonstrates effective and transparent leadership (e.g. financial aspect)	2. Capacity-building and training programs can enhance members' irrigation management skills.

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3. Members actively participate in canal maintenance and communal activities.	3. Stronger partnership with government agencies and development institutions would benefit the association.
4. Irrigation infrastructures (canals, gates, structures) are properly maintained by members	4. Adoption of modern irrigation technologies is feasible within the association.
5.Adoption of Modern Technology	5. Access to Government Programs and Funding from the National Irrigation Administration and other Agencies like Department of Agriculture
6. Recognition and Achievements	
7. Support from Government Agencies	

Table 1 presents the strengths identified by the WAAIS-IAs highlight the success of Participatory Irrigation Management (PIM) and Irrigation Management Transfer (IMT) in the region. The findings reveal that the West Apayao Abulug Irrigation System-Irrigators Association (WAAIS-IA) possesses several organizational strengths that contribute to its effective operation and sustainability. The presence of established by-laws and guidelines provides a clear framework for governance, decision-making, and member responsibilities within the association. Furthermore, the association demonstrates effective and transparent leadership, particularly in financial management, which helps strengthen trust, accountability, and confidence among its members. Active participation of members in canal maintenance and communal activities also reflects a strong sense of cooperation, unity, and shared responsibility in sustaining irrigation services.

Moreover, the proper maintenance of irrigation infrastructures such as canals, gates, and other structures indicates the commitment of members toward preserving the functionality and efficiency of the irrigation system. The adoption of modern technology further enhances irrigation management and agricultural productivity by promoting efficient farming practices and water utilization. In addition, the association's recognition and achievements serve as evidence of its strong organizational performance and dedication to community development. Lastly, continuous support from government agencies provides technical assistance, training, and resources that

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further strengthen the capacity and sustainability of the association. Overall, these strengths contribute significantly to the operational effectiveness and long-term development of WAAIS-IA.

While the opportunities, Interventions from National Government Agencies (NGAs) and Non-Government Organizations (NGOs) play a significant role in strengthening irrigation associations and improving agricultural productivity. Government agencies such as the National Irrigation Administration and the Department of Agriculture provide technical assistance, infrastructure support, financial aid, and policy guidance to irrigation associations. These interventions help ensure the proper operation and maintenance of irrigation systems, resulting in a more reliable water supply for agricultural activities. Likewise, NGOs contribute through community development programs, farmer education, and resource mobilization, which empower farmers and promote sustainable irrigation practices. The collaboration between NGAs, NGOs, and irrigation associations enhances organizational efficiency, strengthens farmer participation, and supports long-term agricultural development.

Capacity-Building and Training Programs Can Enhance Members' Irrigation Management Skills-Capacity, building and training programs are essential in improving the knowledge, skills, and competencies of irrigation association members in managing irrigation systems effectively. Through seminars, workshops, and technical training conducted by agricultural experts and government institutions, members gain a better understanding of water distribution, system maintenance, financial management, and sustainable farming practices. These programs also promote leadership development, teamwork, and decision-making among association members. As a result, trained members become more capable of addressing irrigation-related issues, minimizing water wastage, and ensuring efficient utilization of available resources. Continuous learning opportunities contribute to the overall improvement of irrigation management and organizational performance.

Stronger Partnership with Government Agencies and Development Institutions Would Benefit the Association, establishing stronger partnerships with government agencies and development institutions can provide significant benefits to irrigation associations. These partnerships create opportunities for technical support, funding assistance, training programs, and access to agricultural innovations. Government agencies and development institutions can also assist in policy implementation, infrastructure improvement, and project monitoring to ensure the sustainability of irrigation systems. Furthermore, collaborative relationships encourage the sharing of expertise and resources that can improve the operational efficiency of the association. Strong partnerships also increase the association's credibility and capacity to implement development projects that directly benefit farmers and the agricultural community.

Adoption of Modern Irrigation Technologies Is Feasible Within the Association,

The adoption of modern irrigation technologies is feasible within irrigation associations, particularly when adequate technical and financial support is available. Modern technologies such as drip irrigation systems, automated water control mechanisms, solar-powered pumps, and water-

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efficient irrigation methods can improve water management and agricultural productivity. These innovations help reduce water losses, lower operational costs, and increase crop yields. With proper training and support from government agencies and development organizations, association members can successfully adapt to these technologies. The feasibility of adopting modern irrigation systems also reflects the willingness of farmers to embrace innovation in order to improve farming efficiency and sustainability.

Access to Government Programs and Funding from the National Irrigation Administration and Other Agencies Like the Department of Agriculture, Access to government programs and funding from agencies such as the National Irrigation Administration and the Department of Agriculture provides valuable support for irrigation associations. These agencies offer financial assistance, subsidy programs, farm inputs, irrigation rehabilitation projects, and agricultural extension services that contribute to the improvement of irrigation facilities and farming operations. Access to these programs enables associations to strengthen their infrastructure, improve water management systems, and enhance agricultural productivity. Additionally, government funding can support training activities, equipment acquisition, and the implementation of modern technologies that benefit both the association and its members. Such support contributes to the sustainability and long-term development of irrigation associations and the farming communities they serve.

Table 2. Challenges encountered by Irrigators Associations

The responses below were derived from the FGD

Responses
1. There is insufficient water supply during dry seasons.
2. Conflicts among members arise regarding water allocation and usage.
2. Low participation of some Members
4. Conflict between the Land Owners and the Tenant
5. Aging Irrigation Infrastructure

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Table 2 revealed the data which outlines the critical hurdles faced by the West Apayao-Abulug Irrigation System-Irrigators Associations (WAAIS-IA). The findings reveal that the West Apayao Abulug Irrigation System-Irrigators Association (WAAIS-IA) encounters several challenges that affect its operations and overall effectiveness. One of the major concerns identified is the insufficient water supply during dry seasons, which limits irrigation capacity and negatively affects agricultural productivity. The scarcity of water creates difficulties in providing adequate irrigation to all farmlands, particularly during periods of prolonged drought and extreme weather conditions.

Another challenge experienced by the association is the occurrence of conflicts among members regarding water allocation and usage. Competition for limited water resources often leads to misunderstandings and disagreements among farmers, especially during times when irrigation supply is inadequate. In addition, low participation of some members in communal activities, meetings, and maintenance works weakens collective cooperation and affects the efficient management of the irrigation system.

The association also faces conflicts between landowners and tenants, particularly concerning farming arrangements, responsibilities, and sharing of resources. Such disagreements may affect harmonious relationships within the farming community and disrupt agricultural operations. Furthermore, aging irrigation infrastructures, including canals, gates, and other irrigation facilities, pose significant challenges to the association. The deterioration of these structures may result in water leakage, inefficient distribution, and increased maintenance costs. Overall, these challenges hinder the operational efficiency and sustainability of WAAIS-IA and highlight the need for strengthened cooperation, improved resource management, and continuous infrastructure development.

Summary of Findings

The findings of the study revealed that the West Apayao-Abulug Irrigation System–Irrigators Association (WAAIS-IA) encounters several operational and institutional challenges that adversely affect the effective management and long-term sustainability of the irrigation system. Among the major concerns identified was the inadequate water supply during dry seasons, which significantly limits the availability of irrigation water and consequently affects agricultural productivity and crop performance within the service area.

The study further disclosed the existence of recurring conflicts among association members regarding water allocation and utilization. These disputes primarily stem from limited water resources and the unequal distribution of irrigation supply across farming communities. Such issues contribute to tensions among beneficiaries and hinder the equitable management of irrigation services.

Moreover, the findings indicated that low participation among certain members in communal activities, maintenance operations, and organizational programs weakens collective

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cooperation and diminishes the overall efficiency of irrigation management practices. The study also identified conflicts between landowners and tenant-farmers, particularly concerning irrigation responsibilities, farming arrangements, and the sharing of resources and obligations within the association.

In addition, the deteriorating condition of irrigation infrastructure, including canals, control gates, and other irrigation facilities, was found to contribute significantly to inefficient water distribution, water losses, and increased maintenance requirements. These infrastructural deficiencies further constrain the operational capacity of the association and negatively affect service delivery to farmers.

Overall, the study concludes that these interconnected environmental, institutional, and infrastructural challenges substantially influence the operational effectiveness, organizational performance, and long-term sustainability of the WAAIS-IA.

Please transform in longer statement, The findings of the study revealed that the West Apayao-Abulug Irrigation System–Irrigators Association (WAAIS-IA) encounters several operational and institutional challenges that adversely affect the effective management and long-term sustainability of the irrigation system. Among the major concerns identified was the inadequate water supply during dry seasons, which significantly limits the availability of irrigation water and consequently affects agricultural productivity and crop performance within the service area. The study further disclosed the existence of recurring conflicts among association members regarding water allocation and utilization. These disputes primarily stem from limited water resources and the unequal distribution of irrigation supply across farming communities. Such issues contribute to tensions among beneficiaries and hinder the equitable management of irrigation services. Moreover, the findings indicated that low participation among certain members in communal activities, maintenance operations, and organizational programs weakens collective cooperation and diminishes the overall efficiency of irrigation management practices. The study also identified conflicts between landowners and tenant-farmers, particularly concerning irrigation responsibilities, farming arrangements, and the sharing of resources and obligations within the association. In addition, the deteriorating condition of irrigation infrastructure, including canals, control gates, and other irrigation facilities, was found to contribute significantly to inefficient water distribution, water losses, and increased maintenance requirements. These infrastructural deficiencies further constrain the operational capacity of the association and negatively affect service delivery to farmers. Overall, the study concludes that these interconnected environmental, institutional, and infrastructural challenges substantially influence the operational effectiveness, organizational performance, and long-term sustainability of the WAAIS-IA.

The findings of the study revealed that the West Apayao-Abulug Irrigation System–Irrigators Association (WAAIS-IA) is confronted with numerous operational, institutional, environmental, and infrastructural challenges that collectively affect the effective management, organizational stability, and long-term sustainability of the irrigation system. These challenges continue to hinder the

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association's ability to efficiently deliver irrigation services and maintain equitable water distribution among its members, thereby affecting agricultural productivity and the overall welfare of farming communities within the service area.

One of the most significant concerns identified in the study was the inadequacy of water supply, particularly during prolonged dry seasons and periods of reduced rainfall. The limited availability of irrigation water greatly affects the capacity of farmers to sustain crop production, resulting in lower agricultural yields, delayed planting schedules, and reduced farm income. The findings suggest that climate variability and irregular water availability have intensified the vulnerability of farmers who rely heavily on irrigation for their agricultural activities. Consequently, the insufficiency of water supply has become a major constraint to achieving stable and sustainable agricultural productivity within the WAAIS coverage area.

The study likewise disclosed the persistent occurrence of conflicts among association members regarding water allocation, scheduling, and utilization. These disputes primarily arise from the unequal distribution of irrigation water, particularly between farmers located in the head-end and tail-end sections of irrigation canals. Farmers situated in downstream areas often experience limited access to water, resulting in perceptions of inequity and dissatisfaction among beneficiaries. Such conflicts contribute to strained relationships among members, weaken trust and cooperation within the association, and create barriers to the implementation of effective and equitable irrigation management practices. The study further revealed that unresolved disputes over water access may negatively affect collective decision-making processes and the overall harmony of the farming community.

In addition, the findings indicated that low participation among certain members in communal activities, irrigation maintenance operations, and organizational programs poses a significant challenge to the association's collective functionality. The lack of active involvement from some beneficiaries reduces the availability of labor and support necessary for the proper maintenance and rehabilitation of irrigation facilities. This weakens collective responsibility and diminishes the effectiveness of community-based irrigation management initiatives. The study also found that limited participation may be influenced by varying levels of commitment, economic constraints, and differing perceptions regarding the roles and responsibilities of association members. As a result, the reduced participation of members adversely affects organizational cohesion, collaborative governance, and the efficient implementation of irrigation-related activities.

Furthermore, the study identified the existence of conflicts between landowners and tenant-farmers, particularly concerning irrigation obligations, farming arrangements, cost-sharing mechanisms, and access to irrigation resources. These conflicts often create misunderstandings and disagreements regarding the allocation of responsibilities for irrigation maintenance and financial contributions to the association. The study emphasized that such socio-economic tensions further complicate the management of irrigation operations and may contribute to reduced cooperation among stakeholders within the system.

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Another major issue identified in the study was the deteriorating condition of irrigation infrastructure, including canals, diversion structures, control gates, and other irrigation facilities. Many of these structures were found to be aging and inadequately maintained, resulting in inefficient water conveyance, water losses, seepage, and increased maintenance requirements. The poor condition of infrastructure significantly limits the operational efficiency of the irrigation system and constrains the association's ability to provide reliable and sufficient water delivery to farmers. Additionally, the lack of adequate financial and technical resources for infrastructure rehabilitation and maintenance further aggravates these problems and places additional pressure on the operational capacity of the association.

Overall, the study concludes that the interconnected environmental, institutional, socio-economic, and infrastructural challenges confronting the WAAIS-IA substantially affect its operational effectiveness, organizational performance, and long-term sustainability. These issues highlight the urgent need for strengthened institutional support, improved irrigation management strategies, enhanced member participation, infrastructure rehabilitation, and collaborative governance mechanisms to ensure the resilience and sustainability of the irrigation system and the agricultural communities that depend upon it.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the findings of the study, it can be concluded that the West Apayao Abulug Irrigation System-Irrigators Association (WAAIS-IA) continues to play an important role in supporting agricultural productivity and irrigation management within the community. However, the association faces several operational and organizational challenges that affect its efficiency and sustainability. These challenges include insufficient water supply during dry seasons, conflicts among members regarding water allocation and usage, low participation of some members, conflicts between landowners and tenants, and aging irrigation infrastructure.

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The study further concludes that these challenges hinder the effective distribution and management of irrigation resources, weaken cooperation among stakeholders, and affect the overall performance of the association. Despite these difficulties, the identified issues may be addressed through strengthened policies, active member participation, effective conflict resolution, continuous coordination with government agencies, and regular rehabilitation and maintenance of irrigation facilities. Therefore, promoting unity, proper resource management, and sustainable development strategies is essential in improving the operations and long-term stability of WAAIS-IA.

Recommendations

1. Based on the findings of the study, the following recommendations are proposed to improve the operations and sustainability of the West Apayao Abulug Irrigation System-Irrigators Association (WAAIS-IA):
2. The association should strengthen water conservation practices and implement an effective irrigation scheduling system to address insufficient water supply during dry seasons. Coordination with the National Irrigation Administration and other government agencies should also be enhanced to develop additional water sources and irrigation support projects.
3. Clear policies and guidelines regarding water allocation and usage should be strictly implemented to minimize conflicts among members. Regular meetings, consultations, and conflict resolution activities should also be conducted to promote cooperation and understanding among irrigators.
4. The association should encourage greater participation of members in communal activities, meetings, and maintenance programs through awareness campaigns, incentives, and leadership development activities.
5. Dialogue and mediation between landowners and tenants should be strengthened to address disputes and establish clear agreements concerning irrigation responsibilities, farming arrangements, and resource sharing.
6. Regular inspection, maintenance, and rehabilitation of irrigation infrastructure should be prioritized to improve water distribution efficiency and prevent further deterioration of canals, gates, and other facilities.
7. Capacity-building programs, seminars, and training related to irrigation management, leadership, and sustainable agriculture should be continuously provided to association members to strengthen their knowledge and skills.
8. Future researchers may conduct further studies on irrigation management practices, climate adaptation strategies, and organizational development to provide additional information that may help improve the performance and sustainability of WAAIS-IA.

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