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**CENTRALITY OF ONLINE ADVOCATES IN THE STRUCTURE OF CRITICAL  
COMMUNICATION MOVEMENT: CASE OF STOP A DAM  
NETWORK IN THE PHILIPPINES**

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## **Biographical Sketch**

Ma. Monica Lourdes L. Ollet is a faculty member at the Institute of Arts and Sciences, Communication Department of Far Eastern University Manila. She has nearly a decade of teaching experience in communication and general education courses across various institutions in Lucena City. Beyond the academe, she is actively engaged in the development sector, particularly in Gender and Development and Climate Advocacy.

She earned her Master of Development Communication degree from the University of the Philippines Open University (UPOU) and her Bachelor of Science in Mass Communication from Manuel S. Enverga University Foundation (MSEUF). Currently, she is a full-time CHED-SIKAP Grantee pursuing her Doctor of Communication degree at UPOU.

Alongside her academic and advocacy work, she is also a freelance communication and media practitioner. With extensive experience in stage and digital media productions, she has taken on multiple roles in the creative process, including story researcher, scriptwriter, stage manager, host, and talent, covering all aspects from pre-production to post-production.

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## **Dedication**

To Him,  
for the unending blessings You pour into my life,  
for giving far more than I could ever dream of,  
and for surrounding me with hearts that truly care.

In every battle, You are my greatest shield,  
my constant strength, my quiet refuge.

I offer and dedicate all of this to You.

For Joel and Lindsay,  
my anchors, my light, and my joy.

And to our loved ones in heaven,  
Papa, Mama, Kuya Joseph, and little Logan,  
may this work be a humble tribute to the love you left behind.

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## Abstract

This study investigates how centrality in social networks, specifically of Facebook accounts advocating for the Stop Kaliwa Dam campaign, shape communication structures and communication flows. Guided by the Cybernetics Tradition of Communication theories, particularly General Systems Theory and Network Theory, the research examined how the format, categories, and engagement patterns of the uploaded posts as well as the ensuing centrality shaped advocacy effectiveness. Data were collected from purposely sampled Facebook accounts active between February 1 to May 1, 2023, covering the event of “Alay-Lakad Laban sa Kaliwa Dam”, held on February 15-23, 2023. The centrality measures of the network based on likes and comments were degree, betweenness, and closeness.

Visual content, particularly images, infographics, and videos, and advocacy-themed posts generated the highest levels of engagement, underscoring the role of visual storytelling in mobilization. Likes primarily signaled visibility and affective approval, aligning with degree centrality, while comments facilitated dialogue and bridging functions, corresponding to betweenness and closeness centrality. Frequent posting or more follower counts did not consistently translate to higher centrality; rather, strategic positioning across clusters proved more decisive. Based on the findings, a framework is proposed to enhance centrality: optimizing inputs through visual and narrative formats, balancing throughputs by cultivating both likes and comments; and monitoring outputs through centrality measures. This study contributes to Development Communication by demonstrating how network positioning (like centrality), beyond message sharing (uploading), empowers marginalized advocacy groups to amplify their voices and sustain influence in digital environments.

*Keywords: Network Centrality; Facebook Advocacy; Environmental Communication; General Systems Theory; Development Communication; Social Media Engagement*

## **Chapter I**

### **INTRODUCTION**

#### **Background and Rationale of the Study**

The digital era has created unprecedented opportunities for networking and mobilization for pressing issues such as environmental problems and the climate crisis. And social media has become the most widely used mode of communication worldwide for such networking and mobilization. In fact, the use of various social media platforms has surged, and as of July 2024, there are now 5.17 billion social media users globally, representing 63.7 percent of the world's population (Data Reportal, n.d.).

In social media, each user can create a public profile, produce content, establish connections, and build networks (Wayward, n.d.), hence making networking and mobilization possible. Many social media users encounter a diverse range of information, including content, reactions, debates, and social input related to climate issues (Leon et al., 2022). And these online content can grow and influence an audience with a simple click of the "like" button, by commenting on posts, or by sharing them to their news feed (Rouse, n.d.).

And of course, the interactivity of social media is its connecting power. Social media has become essential for facilitating interactions among people and communities. They connect individuals to share interests, communicate, and exchange information for various purposes; they promote learning and content sharing; they leverage for business and promotional activities; they enhance connectivity among different

stakeholders; and they influence political movements and drive social change worldwide (Kaur & Chahal, 2018).

In other words, social media can establish both personal and organizational relationships in an interactive online environment. The goal is to connect individuals with similar viewpoints, fostering relationships and mutual understanding. Social networking allows users to build connections based on shared interests through various websites such as Facebook, Twitter, and TikTok (Ghermandi et al., 2023).

Social networks play a pivotal role in shaping the management of natural resources, the dissemination of environmental knowledge, and the mobilization of collective action for environmental advocacy. A growing body of literature has examined how the structure and dynamics of these networks influence environmental communication and public engagement.

The central role of social networks focuses on the influence of collaboration, information exchange, and decision-making processes in environmental management contexts (Rockenbauch, 2017). Similarly, the flow of information and individuals' positions within these networks significantly shape the transmission of local ecological knowledge and environmental practices (Salpeteur et al., 2017).

Castells (2013) argued that modern social movements, including environmental campaigns, thrive within networked structures that converge diverse frustrations and aspirations, facilitating collective expressions of dissent against systemic inequalities and environmental injustices.

Hence, climate-related concerns are increasingly being shared, and organizations are forming partnerships on social media to raise awareness and address inequalities related to climate change (Anderson, 2017). Environmental organizations are becoming more aware of their content's impact and are investing more in creating purpose-driven content within the social media landscape (Metag, 2016). They are also strategizing to raise these connections to social networks for mobilization and change.

Among these social media that can potentially enhance the networking of like-minded advocates, 'many individuals and organizations are leveraging Facebook to advance their climate change advocacy' (Anderson, 2017). Facebook stands out for its dominance and extensive reach (Chaffey, 2019). It can serve as a powerful platform for mobilization and has the potential to amplify environmental awareness provided with meaningful engagement (Meng, Chung, & Zhang, 2023).

Audience engagement on Facebook shows greater focus on environmental and climate-related contents. Engagement is both interactive and context-dependent and can be understood through an examination of its various aspects, known as service experiences (see Brodie et al., 2011; Calder et al., 2009; Gummerus et al., 2012).

In the Philippines, there were 4.388 billion Internet users worldwide in 2019, with 3.484 billion of them being social media users. Facebook remains the most visited social media site, with 92.1 percent of users regularly engaging with the platform as of July 2024 (Meltwater, n.d.). In February 2023, Facebook reported a substantial number of monthly active users in the Philippines (Statista, 2023).

One development issue high on the list of Facebook recently is the Stop Kaliwa Dam Movement on the environmental agenda. The Kaliwa Dam Project in the Philippines is a government-led infrastructure initiative designed to address the increasing water demands of Metro Manila. Spearheaded under the former President Rodrigo Duterte's administration, the project is financed through a bilateral loan from China.

However, it has raised significant environmental and social concerns, particularly regarding its potential impact on indigenous peoples (IPs) and the rich biodiversity of the Sierra Madre mountain range. Despite the existence of laws intended to safeguard these communities and ecosystems, the project has advanced amid persistent issues of poor governance, a lack of transparency, and minimal stakeholder consultation (Navarro, 2023; De Santos, 2019). As Maningo (2023) notes, addressing such complex environmental and social challenges requires more than technocratic solutions; it calls for active engagement with the people most affected.

In response to these risks, the Stop Kaliwa Dam Campaign was established by various non-government organizations (NGOs), civil society groups, religious organizations, and concerned citizens. The campaign appeals to the government to reconsider the controversial project, with one of its primary initiatives being a nationwide petition drive aiming to gather 10 million signatures from citizens and affected communities to demand the cancellation of the dam's construction (Lagarde, 2019).

One of the campaign's key online advocacy tools is the Stop Kaliwa Dam Facebook page, created on July 3, 2019, and managed by multiple administrators from

different sectors and communities opposing the Kaliwa Dam Project. This page serves as a broad network of local and international organizations, institutions, and advocacy groups actively campaigning against the controversial New Centennial Water Source–Kaliwa Dam Project (Stop Kaliwa Dam, 2019).

As part of the movement, a major event was led by the Indigenous Dumagat-Remontado communities from Infanta and General Nakar, Quezon. They organized a 9-day Alay Lakad Laban sa Kaliwa Dam march to Malacañang Palace, calling on the President to cancel and halt the Kaliwa Dam Project. Joining them were environmental advocates and civil society groups, who marched in solidarity to support the Dumagat-Remontado communities' demand to stop the dam's construction and protect the Sierra Madre mountain range (Greenpeace Philippines, 2023).

### **Statement of the Problem**

The literature on social media's role in environmental sustainability and activism is extensive, offering insights into various facets of social networking sites in fostering community dynamics, and information-sharing behaviors (Pi, Chou, & Liao, 2013; Verma & Kumar, 2025) and the environmental message strategies on Facebook influence user engagement (Wut, Lau, & Chan, 2022; Ghermandi & Sinclair, 2019; Hafferty et al., 2024; Dwivedi et al., 2022).

However, a gap exists in understanding how individuals and organizations feature or advocate for the Stop Kaliwa Dam Campaign in their Facebook pages and how they network with each other to 'multiply' and expand their efforts. While individual-level studies provide valuable insights into users' knowledge sharing and

behavioral intentions on platforms like Facebook, little is known about the inter-organizational communication dynamics including networking and mobilizing.

Hence, this exploratory study on how these Facebook accounts (of organizations or individuals) engage in and connect (network) with each other to amplify each other's messages, and shape collective public discourse on the Kaliwa Dam. Who are the top participants in the Facebook networks? What messages do they advocate and share with each other? How are they networked with each other? As Sadiku et al. (2019) pointed out: Facebook users tailor information sharing based on their networks, suggesting the importance of understanding both content type and audience dynamics in digital advocacy.

The study therefore explored the use of Facebook as a platform of sharing content on the Stop Kaliwa Dam campaign and how this creates networks, thus amplifying the digital advocacy. It can identify key actors, patterns of interaction, and network centrality in digital advocacy spaces.

## **Research Objectives**

The major objective of the study is to determine the use of Facebook as a digital platform of sharing content and networking on the Stop Kaliwa Dam movement.

Specifically, the study aims to do the following:

1. Determine the online content of the Facebook accounts related to the Stop Kaliwa Dam movement in terms of number and type of information;

2. Describe the categories of posts shared in the Facebook accounts about the Stop the Kaliwa Dam movement;
3. Discuss the engagements generated by the Facebook accounts' posts on the Stop the Kaliwa dam movement through likes, comments, and shares;
4. Analyze the key actors or organizations or those with high centrality in the Facebook network of the Stop Kaliwa dam movement; and
5. Recommend ways of enhancing the role of centrality in the Facebook network for advocacy groups.

### **Significance of the Study**

The research hopes to contribute to the existing body of knowledge on social media for advocacy on critical or controversial issues, an emerging role of social media in the digital landscape. This can enhance the growing use of social media in fostering public engagement, emotional resonance, participatory advocacy, and networking particularly in environmental communication.

The insights could provide inputs into crafting effective communication strategies and network dynamics that would resonate with diverse audiences, strengthening their efforts to achieve environmental justice and sustainability. These would be individuals and organizations involved in climate change and environmental campaigns, including those opposing and supporting the Kaliwa Dam project.

The inclusion of network analysis of organizations engaged in the Kaliwa Dam issue can elucidate the growing influence of social networks in the virtual world. By identifying the importance of the network influence and the actors in the network, more

strategic positioning in the social network and designing of more targeted and impactful messages can be done by organizations and policymakers.

## **Limitations**

The focus is on a single environmental and development issue, that is the Kaliwa Dam, and not on other development issues or environmental concerns.

Additionally, the research is limited to examining content from a single social networking platform, Facebook, thereby excluding insights from other digital platforms such as Twitter, Instagram, or YouTube where related discussions may also take place.

## **CHAPTER 2**

### **REVIEW OF RELATED LITERATURE**

This chapter presents a review of studies that provide the foundation for this research and is aligned with the research objectives. First, it discusses the role of social media in presenting environmental issues, including the Kaliwa Dam. Second, it expounds on how social media like Facebook promotes engagement of the public. Third, it presents some studies using Facebook for network analysis and some network analysis done on environmental issues including the Kaliwa Dam.

#### **Social Media and Environmental Issues**

Social media platforms have become essential spaces for public discourse, advocacy, and civic participation, with user engagement playing a critical role in amplifying issues and mobilizing communities.

The growing accessibility of the Internet and the proliferation of social media platforms have transformed how environmental issues are communicated and perceived globally. Hence, various advocacy groups, institutions, and individual actors are increasingly relying on digital platforms to disseminate information, raise awareness, and mobilize public support for environmental causes.

However, while the role of social media in environmental communication is expanding, certain aspects remain underexplored, particularly regarding content engagement and perceived efficacy in influencing climate-related attitudes and behaviors. The impact of content communities, such as YouTube, and social networks

like Facebook, Facebook Messenger, and Instagram on perceived climate change efficacy remains underexplored (Lutzke et al., 2019).

## **Twitter**

The use of Twitter as a platform for mobilizing and documenting climate activism highlights the significance of digital platforms in empowering younger generations to engage in global political discourse, facilitate information exchange, and sustain advocacy networks (Boulianne et al., 2020).

Susanto (2021) analyzed how Indonesian environmental non-governmental organizations (NGOs) utilize Twitter to raise public awareness. Social media utilization was analyzed and issues linked to infrastructure development and ecological degradation were determined. Results showed that NGOs leverage Internet platforms to strengthen their activism and mobilizing capacities, where smaller and more informal groups proved effective in connecting marginalized and isolated communities to global information flows, thereby democratizing environmental discourse (Kurniawan and Rye, 2014).

León et al. (2021) studied social engagement with climate change content through visual communication using content analysis of climate-related images on Twitter. Their study revealed that images play a significant role in fostering interaction and in increasing public engagement, thereby enhancing the visibility of environmental issues in the digital space.

Complementing this perspective, Chen et al. (2022) analyzed media narratives surrounding climate change on Twitter and found distinct differences in how various actors frame the issue. While mainstream news outlets predominantly emphasized the actions and inactions of political figures, the consequences of climate change, and corporate responses, climate advocates on Twitter prioritized grassroots mobilization, policy reforms, and the intersectional dimensions of climate justice. This contrast demonstrates how social media enables alternative voices and frames to gain visibility within the broader climate discourse.

### **Engagement Using Social Media**

Several scholars have examined the dynamics of social media engagement, identifying the factors that influence audience interaction and participation in both commercial and advocacy contexts.

A study on Facebook posts by political actors explored factors influencing user engagement, including comments, likes, and shares (Heiss et al., 2018). Profiles with a higher number of followers, official fan pages, and stronger electoral performances were less likely to respond to user comments, underscoring patterns of selective engagement in digital political communication.

Shahbaznezhad et al. (2021) found that social media content can shape user engagement behavior on Facebook and Instagram fan pages. Their findings revealed

that the increase in audience interaction of social media content is highly contingent upon its context and its emotional appeal.

In line with these findings, content capable of triggering high-arousal emotions, such as awe, anger, or anxiety, tends to generate greater audience interaction (Hart, 2024) and is more widely disseminated than content eliciting low-arousal emotions, like sadness (Berger & Milkman, 2013). This presents the importance of emotional resonance in digital content strategy, particularly for campaigns seeking to maximize reach and public participation.

The strategic use of social media for environmental advocacy has also been the focus of contemporary research. Katz-Kimchi and Manosevitch (2015) explored how environmental organizations harness Facebook for online mobilization, shifting from traditional protest strategies to digital advocacy tactics. Their study illustrated how advocacy groups adapted to the affordances of social media platforms, utilizing them to engage audiences, disseminate information, and organize campaigns effectively.

Further, a study on the website's content on conservation, biodiversity, and environmental awareness found that it lagged behind social media, online news outlets, and television in its capacity to engage audiences and foster public interaction, reinforcing the comparative strength of social media in mobilizing environmental discourse (Dwiyanto & Gasa, 2023).

## **Social Network of Facebooks and the Environment**

### **Studies on Facebook in Social Network**

Facebook has evolved from a university-based social platform into a global space for communication, advocacy, and information exchange. With its structure of users, pages, and relationships organized through the Graph API, Facebook allows for large-scale data analysis. This makes it a valuable platform for Social Network Analysis (SNA), especially in tracking how advocacy campaigns, such as those for environmental protection, gain traction and engage audiences (Packt, 2017).

Social Network Analysis provides a framework for understanding the relationships and influence within a network. Rooted in sociology, SNA identifies individuals or organizations as nodes and their interactions as ties. Measures like degree, betweenness, and closeness centrality help reveal who holds influence, who bridges different groups, and how information flows within the network (Akhtar et al., 2013; Sharmaroshan, n.d.).

Several studies have applied SNA to Facebook data to identify influential users and community structures. Using tools like GraphFrames, NetworkX, and Gephi, researchers have mapped user interactions and identified tightly-knit clusters and influential accounts. These methods have shown how certain users or organizations serve as central figures in spreading content, an insight valuable for environmental movements seeking reach and resonance (Scaibu, 2024; NetworkX Notebooks, n.d.).

In advocacy and activism, SNA helps uncover patterns of communication and influence. Nouh and Nurse (2015) showed how SNA identifies key players within activist Facebook groups, while Senekal (2014) demonstrated its use in analyzing extremist networks. These studies confirm the effectiveness of SNA in identifying central actors and assessing how advocacy efforts are structured and maintained online.

The spread of misinformation is another area where SNA proves useful. Kitikamdhorn and Ramasoota (2023) found that misinformation and corrective content often circulate in separate networks, forming echo chambers. This insight is relevant to environmental advocacy, where false narratives may hinder mobilization and awareness efforts on platforms like Facebook.

Few have examined environmental campaigns in the Philippines using SNA, particularly in connection with content engagement and centrality. Moreover, as Facebook's data policies continue to evolve, updated approaches to data access and analysis are needed. Lastly, localized studies that explore how specific environmental issues are communicated and contested in online networks are to be further explored.

### **Facebook Accounts on Environment in the Social Network**

The increase of online social networks has transformed the landscape of communication research, offering extensive opportunities to analyze digital interactions and influence. Can and Alatas (2019) underscore the analytical potential of platforms such as Facebook by systematically reviewing prevalent research problems and

methodologies within online social network studies. Their work positions Facebook as a fertile ground for examining how digital content circulates, how actors connect, and how influence propagates in advocacy settings.

Social Network Analysis (SNA) has emerged as a critical methodological approach for exploring the structure and dynamics of relationships within social systems. As Derr (2023) notes, SNA facilitates the identification of influential actors and network patterns through key measures such as degree, closeness, and betweenness centrality. These metrics enable researchers to map the relational positioning of actors and determine pathways for information flow, particularly relevant in environmental advocacy where reach and connectivity influence public discourse.

In the context of development work, Anand and Carneiro (2024) present SNA as a strategic tool for evaluating collaboration, influence, and resilience within networks. Their manual offers a framework for embedding SNA into monitoring and evaluation processes, emphasizing the importance of mapping both formal and informal linkages. This is particularly instructive for environmental campaigns that require coordinated action and cross-sectoral communication, which can be exemplified in grassroots movements like the Stop Kaliwa Dam campaign.

Carneiro et al. (2022) provided further evidence of SNA's relevance in climate advocacy by assessing the online influence of the Future Climate for Africa (FCFA) program. Using social media analytics, the study extracted metadata (account names, hashtags, mentions, retweets, and favorites) and applied text mining to assess how FCFA and its partners advanced climate adaptation discourse. By mapping mentions as

relational ties, accounts became nodes whose connections revealed the structure of communication. Peaks in engagement coincided with high-profile advocacy events, such as the UN Climate Summit (2014) and Climate Week NYC (2019), highlighting how strategic moments catalyze online visibility. In-degree centrality highlights the institutional actors most referenced in the Twitter conversations of CCAFS project partners. Betweenness centrality was a key metric, identifying profiles that acted as “social mediators” or “information brokers” bridging otherwise disconnected groups (Hansen et al., 2011; cited by Carneiro et al., 2022).

The above results showed how FCFA amplified climate adaptation discourse by connecting diverse stakeholders and extending its influence across fragmented audiences. Importantly, the study stressed that online interactions often complement offline advocacy, making digital platforms integral to multi-scalar climate communication (Rogers, 2013; cited by Carneiro et al., 2022). Overall, this revealed how digital platforms serve as amplifiers of climate science and policy-oriented discourse by mobilizing attention, fostering horizontal engagement, and strengthening ties across institutions, policymakers, and the public. Their findings underscore the value of integrating digital metrics with network analysis to capture how central actors shape information flows, insights crucial for understanding how advocacy networks, such as those opposing the Kaliwa Dam, rely on centrality to sustain visibility and influence.

In a regional study, Corlew et al. (2015) applied social network analysis (SNA) to examine communication among climate professionals in the Pacific Islands. Using surveys and Gephi-based centrality measures, the study mapped a large and fluid network to assess connectedness and develop tools for future collaboration. Results

showed a strongly connected network across regions and professions but hampered by inefficiencies caused by frequent personnel turnover, multiple role assignments, and the absence of systematic mechanisms for sharing updates on membership changes. While the network was diffuse yet cohesive, two disconnected clusters emerged from new members who had not yet integrated, reflecting the network's dynamic nature. The core network revealed sub-regional clusters that remained well linked to others, with central actors typically being those whose professions emphasized networking. The findings underscore the need for sustained monitoring of communication networks to address gaps and strengthen collaboration, insights that are highly relevant for movements like Stop Kaliwa Dam, where diverse actors and constant membership shifts shape the flow of advocacy communication.

Yang, Keller, and Zheng (2017) emphasize the theoretical foundations of SNA as a multidisciplinary lens that bridges individual behaviors and collective outcomes. By foregrounding relational ties over individual attributes, SNA provides a nuanced understanding of how environmental messages circulate and gain traction. Their work supports the use of SNA in analyzing digital advocacy as a form of networked collective action.

Tannous (2018) analyzed 50 Facebook posts from the "Secret Jaffa" group and surveyed 250 users, applying egocentric network analysis to examine engagement patterns. Findings revealed that both strong and weak ties influenced interaction, with weak ties particularly effective for diffusing information across clusters. Advertisement posts generated the highest engagement, with likes signaling quick support and comments reflecting deeper involvement.

Similarly, Alvarez, Borsi, and Rodriguez (2016) explored Facebook's role in virtual placemaking through four case studies, combining SNA with consultations, surveys, and mapping. Results showed that while high online activity did not always translate to face-to-face participation, active members and bridging agents played key roles in shaping community priorities and outcomes.

Meanwhile, Kitikamdhorn and Ramasoota (2023) investigated the COVID-19 infodemic in Thailand using CrowdTangle, content and sentiment analysis, and SNA with Gephi. Their study revealed a fragmented network where few influential nodes spread misinformation, while counternarratives were less prominent. Alternative medicine and political content dominated, attracting the most engagement, highlighting how Facebook's communicative environment reinforces influential actors and limits counter-discourses.

Lastly, networks often hold greater value than hierarchies in disseminating knowledge and coordinating social action. Social Network Analysis (SNA) provides a framework for mapping influence, identifying central actors, and uncovering communication gaps that shape collaboration. By representing development initiatives or advocacy movements as networks, SNA highlights who influences whom, while capturing the relationship dynamics. This perspective is critical in analyzing Facebook accounts as nodes of influence, where centrality determines information flow, engagement, and ultimately the outcomes of communication discourse (Serrat, 2017).

In the Philippine context, several studies have applied social network analysis with a focus on centrality measures. A study applied SNA to the online research

community of faculty members in Northern Mindanao, using Gephi, to analyze modularity and centrality patterns (Tantoy et al., 2024). The study revealed distinct clusters, like research leaders, multi-disciplinary teams, discipline experts, and less connected faculty. Centrality results showed that highly cited researchers and institutional leaders were the most influential actors, serving as hubs for collaboration and knowledge exchange. This highlights how centrality determines the flow of academic influence in research networks where they are highly connected, as many hold positions in the Office of the Vice President for Research, Extension, and Innovations. Similarly, it was found that the most prominent researchers not only shape research themes but also serve as bridging actors, strengthening relationships among faculty researchers (Elisabeth et al. 2019, cited by Tantoy et al., 2024).

Additionally, the use of SNA to map support mechanisms in the Philippine seaweed farming industry was explored, focusing on 115 farmers across Zamboanga, Bohol, and Tawi-Tawi (Suyo et al., 2020). Findings showed strong reliance on internal ties such as family, while centrality patterns revealed gender-based differences in access to external support and information. The study demonstrated SNA's capacity to uncover relational inequalities and guide policy interventions to improve resource flow and inclusivity within production networks.

Moreover, a combined bibliometric and SNA approaches to examine Human Movement Sciences (HMS) research in the Philippines from 2010 to 2021 (Fernandez et al., 2023). With 274 publications analyzed, the University of the Philippines emerged as the most productive institution, while co-authorship patterns showed that 75% of authors engaged in collaborative research. Centrality analysis identified key scholars as

the most influential actors in knowledge diffusion and collaboration, reflecting how central positions sustain research productivity and disciplinary development.

Across these Philippine studies, SNA showed effectiveness in mapping structural dynamics, identifying central actors, and revealing gaps in communication and resource access. Centrality measures were particularly valuable in explaining how influence is concentrated in key individuals or institutions, shaping the flow of knowledge, collaboration, and support. These insights establish the methodological basis for applying SNA to online advocacy movements, where central nodes similarly dictate information dissemination, engagement, and network influence.

The reviewed literature establishes SNA as an essential methodology for analyzing digital advocacy. Across various contexts, centrality measures have been instrumental in identifying key actors, visualizing engagement pathways, and uncovering gaps in communication. The integration of content engagement with network metrics enhances the understanding of how influence is structured and mobilized in social media ecosystems. From these readings, there is a recurring theme that information flow in social media networks is heavily shaped by the positioning of central actors and the relational structure of ties. Some demonstrated that weak ties function as bridges that facilitate diffusion beyond immediate clusters (Tannous, 2018), while bridging agents not only connect fragmented communities but also help translate online activity into offline influence (Alvarez et al., 2016). Further, it was revealed that in fragmented networks, a handful of central nodes can disproportionately shape discourse, either perpetuating misinformation or constraining counternarratives (Kitikamdhorn & Ramasoota, 2023). Similarly, Carneiro et al. (2022) showed how

“information brokers” with high betweenness centrality amplify climate discourse during advocacy peaks, reinforcing how central actors govern visibility and reach. It is also highlighted that the fluidity of climate networks turnover and weak information-sharing systems create inefficiencies despite overall connectivity, and dominate digital communication, with SNA enabling the identification of gaps, leverage points, and collaborative strategies (Corlew et al., 2015, Serrat, 2017).

Together, these findings underscore the importance of centrality in determining whose voices are amplified, how information circulates, and where gaps in communication emerge. This perspective directly informs the present study’s information flow approach by highlighting that online advocates’ influence in critical communication movements depends not merely on activity volume but on their structural position within the network, which ultimately governs the spread, reach, and resonance of advocacy messages.

These insights offer a strong foundation for analyzing the role of Facebook accounts in shaping environmental narratives and fostering collective action in the context of the Stop Kaliwa Dam campaign.

Despite the numerous existing literature, several gaps remain. First, there are a number of studies focusing on Facebook-based environmental advocacy within the Philippine context, however there is a limited one particularly concerning the Stop Kaliwa Dam movement on digital activism. Second, few studies examine audience engagement on Facebook related to this specific environmental issue. Lastly, while social network centrality metrics are often applied, their integration with content

engagement indicators is infrequent, limiting insights into how visibility translates to influence. Although degree centrality is commonly used, the application of closeness and betweenness centrality to assess strategic actor positioning and information flow remains relatively limitedly explored in the local context.

## **Theoretical Framework of the Study**

This study is grounded in the Cybernetics Tradition of Communication Theory (Craig, 1999), which views communication as a means to understand complex systems and their interrelated components working towards specific goals. Within this framework, communication is conceptualized as a process of information exchange that elucidates the operation and occasional dysfunctions of both living and non-living systems, regardless of their scale.

Cybernetics, which is defined as information processing, identifies issues such as noise, information overload, or mismatches between structure and function as disruptions in the flow of information. This perspective emphasizes the importance of considering system alignment in relation to the study's focus on social interaction, relationships, and their influence on environmental agenda perception.

At the core of this tradition is Cybernetic Systems Theory, introduced by Norbert Wiener (1948, 1954), which focuses on how systems achieve self-regulation through continuous communication, feedback, and adaptive mechanisms. Wiener identified three essential components in any functioning system: (1) the system goal, representing the desired outcome; (2) regulatory mechanisms, or processes that guide system operations toward this goal; and (3) feedback loops (Swanson & Miller, 2009), which provide critical information about system performance, enabling adjustments and maintaining system equilibrium.

Originally applied to mechanical and organizational systems, this theory has since been extended to analyze complex social systems, including digital advocacy and social media networks. In social systems such as online advocacy movements, feedback is essential for ensuring coordination, refining communication strategies, and sustaining momentum toward collective objectives, which is manifested through audience engagement, public discourse, and content virality.

Related theories are the General Systems Theory and the Network Theory. General Systems Theory, proposed by Ludwig von Bertalanffy (1968), posits that all systems exhibit similar structural characteristics and behaviors, including interdependence, feedback regulation, and goal-directedness. This theory supports the study's view of social media advocacy networks as open systems that continuously interact with their environments and adapt to feedback (as cited in Walonick, 1993). These principles emphasize that the behavior and function of each part within a system influences the system's overall performance and ability to achieve its goals. GST offers a comprehensive framework for examining how interconnected elements work collectively, highlighting the significance of relationships, functions, and coordinated operations among system components.

Swanson & Miller (2009) further elaborates that systems operate based on key principles such as holism, hierarchy, and feedback, all of which are evident in social media advocacy networks. Holism emphasizes that the system must be understood as a whole rather than merely as the sum of its parts; hierarchy acknowledges the existence of layered structures within the system, from grassroots participants to influential public figures; and feedback mechanisms involve the continuous exchange of

information through user engagement and discourse, which help regulate and refine advocacy strategies. Moreover, GST adopts a holistic approach by focusing on systemic interrelations rather than isolated elements (Issitt, 2024). Its principles are particularly relevant in contemporary analyses of digital communication networks, where the coordinated flow of information, engagement patterns, and system-wide feedback loops shape both social and environmental movements. Social media platforms, advocacy groups, government agencies, activists, and the public function as components within an interdependent advocacy system. Each participant contributes to the broader system through specific roles and actions, whether by generating content, sharing information, or reacting to posts, that collectively shape the dynamics of environmental discourse and advocacy outcomes. As Walonick (1993) underscores, systems are composed of organized concepts in which the contributions of each member are essential to maintaining functionality and achieving objectives.

Complementing GST, Network Theory offers a specialized framework for analyzing systems of interconnected relationships, whether among individuals, groups, or organizations. Network Theory provides a conceptual foundation for examining the structure, patterns, and influence of relationships within social systems. It also facilitates the analysis of how information spreads, influence is distributed, and relationships among advocates, organizations, and the public shape campaign outcomes which reflects the influence of specific actors within an advocacy network. By understanding the positions and interactions of various stakeholders engaged in the Kaliwa Dam issue, this study explores how central actors influence the network agenda, direct information flows, and affect collective perceptions of environmental issues.

Initially conceptualized by Harary and Cartwright (1965), Network Theory applies concepts from graph theory to visualize and interpret the patterns and structures of social systems through network diagrams. Though early applications of Network Theory encountered skepticism due to challenges in modeling human behavior mathematically, it gained wider acceptance for its ability to map, quantify, and explain the complexity of social interactions. The relevance of Network Theory has since extended beyond sociology and biology to help illustrate how environmental changes and habitat loss affect species interactions (Kalso & Reed, 2022). This ecological application parallels the dynamics of digital advocacy networks, where certain actors function as central, highly influential nodes while others maintain peripheral, though still significant, positions within the system.

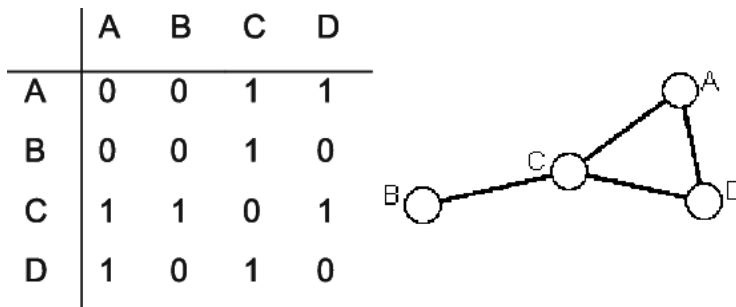
Network Theory offers a conceptual and analytical framework for examining patterns of relationships among actors within a system, whether they are individuals, groups, or organizations. In the context of social media advocacy, this theory provides valuable tools for visualizing and interpreting how interconnected relationships influence the spread of information, the formation of communities, and the mobilization of collective action.

At its core, a network is defined as a set of nodes (actors) connected by ties (relationships). These ties can represent various forms of connection, such as friendship, communication, collaboration, or information exchange, and are organized through paths that directly or indirectly link actors within the network (Figure 1). Network structures are typically characterized by the configuration of these ties and the relative

positions of nodes within the network, often conceptualized through measures of centrality and cohesion (Borgatti & Halgin, 2011).

**Figure 1.**

*Sample matrix showing nodes and ties and the network output*



*Note.* Adapted from *Findings from an organizational network analysis to support local public health management*, by J. Merrill, M. Caldwell, M. L. Rockoff, K. Gebbie, K. M. Carley, and S. Bakken, 2008, *Journal of Urban Health*, 85(4), pp. 572–584 (<https://doi.org/10.1007/s11524-008-9277-8>).

By examining network relationships, SNA helps illustrate the position of nodes in terms of their proximity to the center of the network (Hanneman & Riddle, 2005). Network centrality measures which elements are central to the network and most actively involved in interactions (Wasserman & Faust, 1994).

Freeman (2004) argued that centrality can be applied to human communication in small groups to test the relationship between structural centrality and influence processes. Additionally, Pitts (1965, as cited in Freeman, 2004) explained that testing centrality in communication paths has implications for organizational design. Centrality is also an important index for determining the critical position of key actors in the network, reflecting their influence and power. Key elements for measuring network

centrality include degree, betweenness, and closeness (Freeman, 1979, as cited in Wang, Yu, & Lin, 2020).

Betweenness centrality evaluates how frequently a node lies on the shortest path between other nodes in the network. Nodes with high betweenness centrality function as crucial bridges, facilitating connections between different parts of the network. These nodes have a gatekeeping role; if they withhold or obstruct the flow of information, it can significantly impede the dissemination of ideas throughout the network. Thus, betweenness centrality helps quantify an individual's role in connecting various network segments and highlights critical relationships, rather than focusing solely on individual actors (Freeman, 1979).

Closeness centrality measures the average distance between a node and all other nodes in the network. Nodes with high closeness centrality can reach other nodes more quickly, requiring fewer steps to disseminate information across the network. This metric reflects how effectively an individual can spread information and interact with others. High closeness centrality indicates an individual's overall connectedness and their ability to swiftly access and influence different parts of the network (Freeman, 1979).

Degree centrality quantifies the number of direct connections an individual has within a network. Those with high degree centrality are often seen as opinion leaders due to their extensive social ties, which provide ample opportunities for receiving and

disseminating information. In social networks, degree centrality is further categorized into in-degree and out-degree centrality.<sup>1</sup>

Together, these theoretical perspectives offer a comprehensive framework for understanding how environmental advocacy movements operate within digital ecosystems. They emphasize the significance of information exchange, feedback processes, and relational structures in shaping public engagement and the visibility of environmental issues within networked communication environments.

### **Conceptual Framework of the Study**

This study applies the previously discussed foundational theories to examine how information about the Kaliwa Dam advocacy spreads across Facebook accounts. By analyzing communication ties among accounts, identifying key actors, and evaluating their positions using centrality measures, the study assesses the influence of both central and peripheral nodes.

Drawing from Freeman's (1979) seminal work, three principal measures of centrality are used to analyze the influence and connectivity of nodes within the advocacy network, such as degree, closeness, and betweenness.

In the context of this study, the nodes are the selected Facebook profiles and pages involved in advocacy related to the Kaliwa Dam issue, while the communication ties consist of interactions such as reactions, comments, and shares. The ties between

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these accounts form a network whose structure and dynamics are examined through network analysis.

This study focuses on the network of organizations (or in this case, a system) with Facebook accounts featuring the Kaliwa Dam (Figure 2). There were 25 Facebook accounts, with 15 profiles and 10 pages of organizations that make up the system in the study.

A Facebook Profile is intended for personal, non-commercial use and is limited to a maximum of 5,000 friends, while a Facebook Page is designed for public figures, brands, organizations, and businesses, allowing unlimited followers and providing access to engagement analytics and audience management tools (Edgar, 2024).

The end goal (output) of the organizations/individuals in the network is to enhance their centrality among the organizations carrying Facebook content on the Stop Kaliwa dam movement. Centrality can be measured by degree, closeness, and betweenness.

This study is grounded in the cybernetics theory of Norbert Wiener, which emphasizes the role of communication, control, and feedback within human-machine systems, or networks. Facebook, as both a digital infrastructure (machine) and a participatory space shaped by human actors (Facebook profile and pages), provides an ideal platform to analyze how environmental advocacy campaigns operate as goal-oriented, self-regulating systems. The study applies the Input–Throughput–Output model to organize the flow of information and interactions aligned with the study's objectives.

The Input phase reflects the Facebook content related to the Stop Kaliwa Dam movement. In this study, there were 310 content or uploaded material used to examine the format/type and categories of the content generated from 25 Facebook pages or profiles. These inputs serve as stimuli that initiate communication flows, in line with the first two research objectives: identifying and categorizing content shared by various actors within the movement.

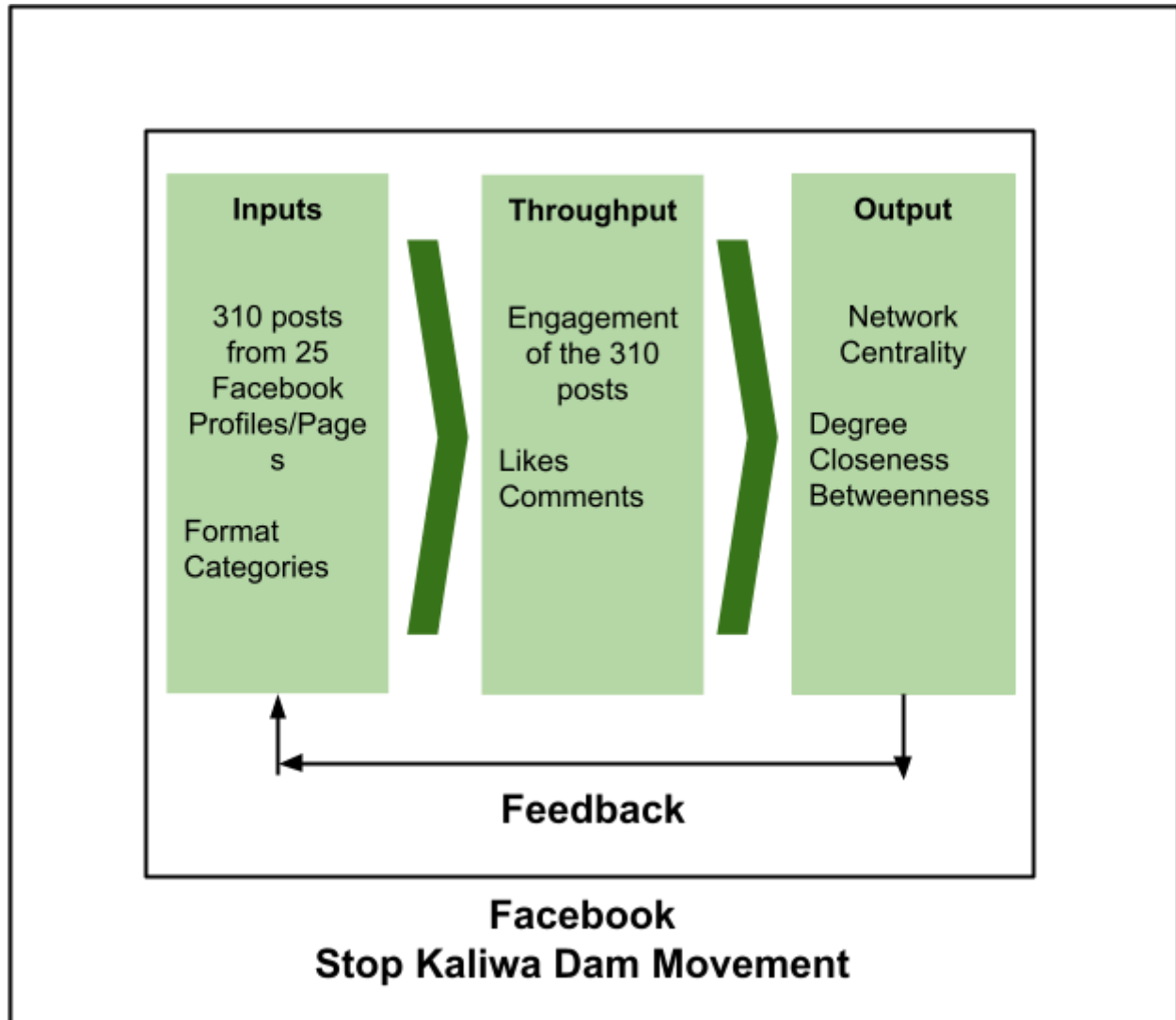
The throughput contains the responses or engagement of the readers with the content of the Facebook accounts in terms of likes, comments, or share, which represent both communication flow and feedback loops. These interactions allow content to circulate importance within the network. This aligns with the analyzing engagement metrics as forms of feedback that shape content strategies and interaction patterns.

The Output phase reflects the emergence of key actors or organizations with high centrality scores (degree, betweenness, and closeness). The centrality position was presumed to come from the Facebook profiles and the engagements they elicited, including 'likes, comments, and shares'. These central figures function as control points in the cybernetic system, influencing the visibility, direction, and overall impact of the movement. It is derived from the 25 Facebook pages and profiles from the 310 uploaded content. Identifying these actors fulfills the final objective of analyzing network centrality, revealing how influence is distributed and exercised within the advocacy campaign.

The framework conceptualizes Facebook, particularly the Stop Kaliwa Dam Movement, as a responsive system where communication (content and engagement), control (centrality of actors), and feedback (likes, shares, comments) dynamically interact to sustain and adapt the environmental advocacy network. This approach enables a systematic assessment of how digital content is shared, how audiences respond, and how influence emerges in networked activism, specifically in the context of the Stop Kaliwa Dam movement. On the other hand, the external conditions or actors interacting with the Stop Kaliwa Dam Movement, such as offline protests and government policies, which constitute the Environment in Cybernetics, were not examined in this study. This represents a limitation of the research.

**Figure 2.**

*Conceptual framework of the study*



## Operational Definition of Terms

**Facebook accounts** – Refers to the 25 selected Facebook accounts, composed of 15 personal Facebook profiles and 10 Facebook pages, generated using Facebook APIfy from the period of February 1, 2023, to April 30, 2023.

**Facebook page** – A type of Facebook account designed for public figures, brands, organizations, and businesses, allowing unlimited followers. In this study, Facebook accounts that posted content related to the Kaliwa Dam issue were included for content analysis and considered as nodes in the centrality analysis.

**Facebook profile** – Refers to personal, non-commercial Facebook accounts that also posted content concerning the Kaliwa Dam issue. These were included in the content analysis and likewise considered as nodes in the Social Network Analysis (SNA).

**Inputs** – Refers to the number of posts, the format used, and the categories of the Facebook posts, as measured through content analysis and recorded as frequency counts and percentages. All content formats were counted based on the 310 posts scraped using Facebook APIfy.

**Content formats/ type** – refers to the kind of uploaded material on the Kaliwa Dam on the Facebook accounts, whether these be text, image, video, reels, external link or art card. These are used interchangeably with type.

*Type or format of the Facebook posts on Kaliwa Dam*

Format of content	Description
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Text	A post containing only written text, typically status updates, statements, or announcements without any accompanying images, videos, or external media.
Image	A post featuring one or more images or photos, often used to visually emphasize advocacy messages, events, or on-ground activities.
Video	A post containing a long-form video, typically exceeding one minute and up to 60 minutes, often documenting events, interviews, or campaign calls.
Reels	A post containing a short-form vertical video, ranging from 15 seconds to 90 seconds, designed for quick consumption and optimized for mobile viewing.
External Link	A post sharing a clickable link that redirects to an external website, news article, petition page, or another Facebook post/profile.
Art Card	A post featuring edited graphics, infographics, or advocacy art cards, designed to convey information through visually appealing, shareable visuals.

**Categories** – refers to classification of the posts in the Facebook accounts, namely: 1) people, 2) solutions, 3) impacts, 4) identifiable people, 5) activism advocacy, 6) causes (of environmental problems), 7) information, events and news events, 8) general media, and 9) nature. The number of posts under each category was counted to determine which were most frequently represented in the Facebook posts.

*Categories of the FB uploads on Kaliwa Dam*

Categories	Description
1. People	Features general discussions about individuals involved in the issue
2. Solution	Proposed ways to address environmental or climate issues
3. Impacts	Highlights the harmful effects of the project on the environment and communities
4. Identifiable People	Mentions and/or shows well-known personalities
5. Activism Advocacy	Related to protests, notably the Alay Lakad from Quezon to Malacañang
6. Causes	Addresses the underlying causes of environmental problems and related phenomena
7. Informative Content	Provides information on policies, scientific data, and facts

8. General Media	Refers to materials that are not intended for a specific niche or targeted topic but are designed to appeal to a broad, general audience.
9. Nature	Showcases the beauty of nature, particularly in areas affected by the project.

**Comments** – Comments refer to responses made to a Facebook post or to another comment. They function as interactive elements that reflect engagement and discussion within the network.

**Posts** – Posts refer to content generated by a Facebook user, such as status updates, that appear on the user’s timeline and in the news feeds of their friends. In this study, posts are considered the primary material of content shared within the network.

**Throughputs** – These refer to the audience engagement metrics measured through the number of likes (react emojis) and comments on each Facebook post. For this study, a total of 310 Facebook posts were examined, with the number of reactions (likes and other react emojis) and comments for each post recorded and organized. These interaction counts by frequency and percentages were used to measure the level of engagement generated by the content related to the Kaliwa Dam issue.

**Outputs** – These refer to the centrality measures derived from the social network analysis (SNA). Centrality represents the importance or influence of a node (in this

case, a Facebook profile or page) within the network based on its position and connections.

**Centrality** – Centrality identifies key positions within a network, indicating the importance of specific nodes, in this case, Facebook accounts, based on their structural roles (Freeman, 1978). Centrality is known for understanding influence, visibility, and the flow of information, which can enhance strategic communication efforts (Tan & Lim, 2022). This study examines three primary centrality measures: **degree**, **closeness**, and **betweenness**, using engagement data, specifically likes and comments, from 310 sampled posts across 25 Facebook profiles/pages related to the Stop Kaliwa Dam movement.

- **Degree centrality** refers to a Facebook account that is highly connected to other accounts in the network. It indicates the volume of information received and shared. Degree centrality can be further classified into: In-degree centrality which measures the popularity of a Facebook account based on the number of reactions or engagements it receives. Out-degree centrality measures the influence or control of a Facebook account based on the number of ties it creates toward others, showing its ability to initiate interactions and influence the network. These were measured using SNA.
  - o In the context of social networks, in-degree centrality measures the number of inbound connections a user receives, such as replies, comments, or mentions. This metric reflects the level of engagement with an individual's

posts and indicates their influence and interaction within the network. High in-degree centrality suggests that the user attracts significant engagement from other users (Rossler, Hoffner, & Zoonen, 2017; Liu, Sidhu, Beacom, & Valente, 2017).

- o Conversely, out-degree centrality quantifies the number of outbound connections a user initiates, such as posts, comments, or shares, particularly on topics like the Kaliwa Dam project. This metric reflects the user's influence within the network; users with high out-degree centrality are more visible and active in spreading information. In contrast, users with low out-degree centrality contribute fewer messages and have a lesser impact on the flow of information (Rossler, Hoffner, & Zoonen, 2017; Liu, Sidhu, Beacom, & Valente, 2017).

- **Closeness centrality** refers to a Facebook account that can reach other accounts in the network faster. It reflects how close a node is to all others in the network. The fewer steps it takes to reach others, the more central the account is. This was measured using SNA.

- **Betweenness centrality** refers to a Facebook account that acts as a bridge between different subgroups within the network. It plays the role of a gatekeeper, connecting clusters of nodes and lying on the shortest path between two other nodes.

## **Chapter III**

### **METHODOLOGY**

This chapter details the methodology employed for a quantitative research study analyzing the content and network centrality of the Facebook accounts of the organizations related to the Kaliwa Dam issue.

#### **Research Design**

This study utilizes a quantitative research approach grounded in the Cybernetics Tradition from the seven traditions of communication theories of Craig (1999). By applying a quantitative approach, the study seeks to understand phenomena by emphasizing cause-and-effect relationships. Positivism holds that meaningful knowledge is derived from empirical observations and measurable data, which help refine and strengthen theoretical frameworks (Bergman, 2016). It values knowledge generated through the observation and measurement of observable events, supported by objective and verifiable data.

This study is composed of two parts. The first part is the content analysis of the posts from Facebook accounts, which include the posts about the Kaliwa Dam, the likes, comments, and shares. The second part covers the social network analysis of the Facebook accounts in the online network of the Stop Kaliwa Dam movement.

Content analysis was used to identify and quantify the types of content formats, categories of issues, and levels of engagement in Facebook posts related to the Kaliwa Dam issue. Berelson (1952) defined content analysis as the objective, systematic, and quantitative description of the manifest content of communication, while Kerlinger (1973) positioned it as a method of analyzing communication in a systematic, objective, and quantitative manner to measure variables such as the frequency and emphasis of particular phenomena (Riffe et al., 2005).

Social Network Analysis (SNA), on the other hand, examines the relational structures and communication patterns among interdependent actors within the Facebook network. SNA is a methodological tool that allows researchers to analyze relational data and understand how connections among individuals or groups influence the flow of information (Viscek et al., 2016). In the context of environmental communication, SNA facilitates the exploration of how environment-related content spreads and how local ecological knowledge is shared within social networks (Salpeteur, Diaz-Reviriego, & Reyes-García, 2017). As networks are formed through ongoing communication, they represent social structures where links are established through interactions (Littlejohn & Foss, 2008). Communication networks, therefore, are defined by recurring patterns of message exchange over time and across digital spaces, providing a framework to analyze the influence and reach of key actors in the network.

### **Period and Locale**

This study focused on analyzing Facebook content related to the Stop Kaliwa Dam Project from February 1 to May 1, 2023. During this time, the march or “Alay

Lakad para sa Stop Kaliwa Dam Project” occurred from February 15 to 23, 2023. Hence, the coverage covered two key periods: before the march and after the march. This was useful also in the analysis of the surges, if any, of any engagements.

## **Procedure**

The procedure is summarized in Figure 3.

First, data was collected and extracted from APify. Then the data were cleaned up using Google spreadsheets. Content analysis was then done after this stage. Quantitative content analysis involves systematically counting the frequency of specific keywords, ideas, or themes within a body of text to generate statistical insights. This method offers measurable answers to questions such as how much, how many, or how often particular elements appear in communication content (Delve et al., 2024). Through numerical quantification, researchers can identify recurring patterns, trends, and sentiments, making it especially valuable in examining large volumes of social media data. In this study, quantified the content based on the format, categories, and engagement levels from the posts related to the Kaliwa Dam issue, to determine the prominence of communication content in the Facebook network.

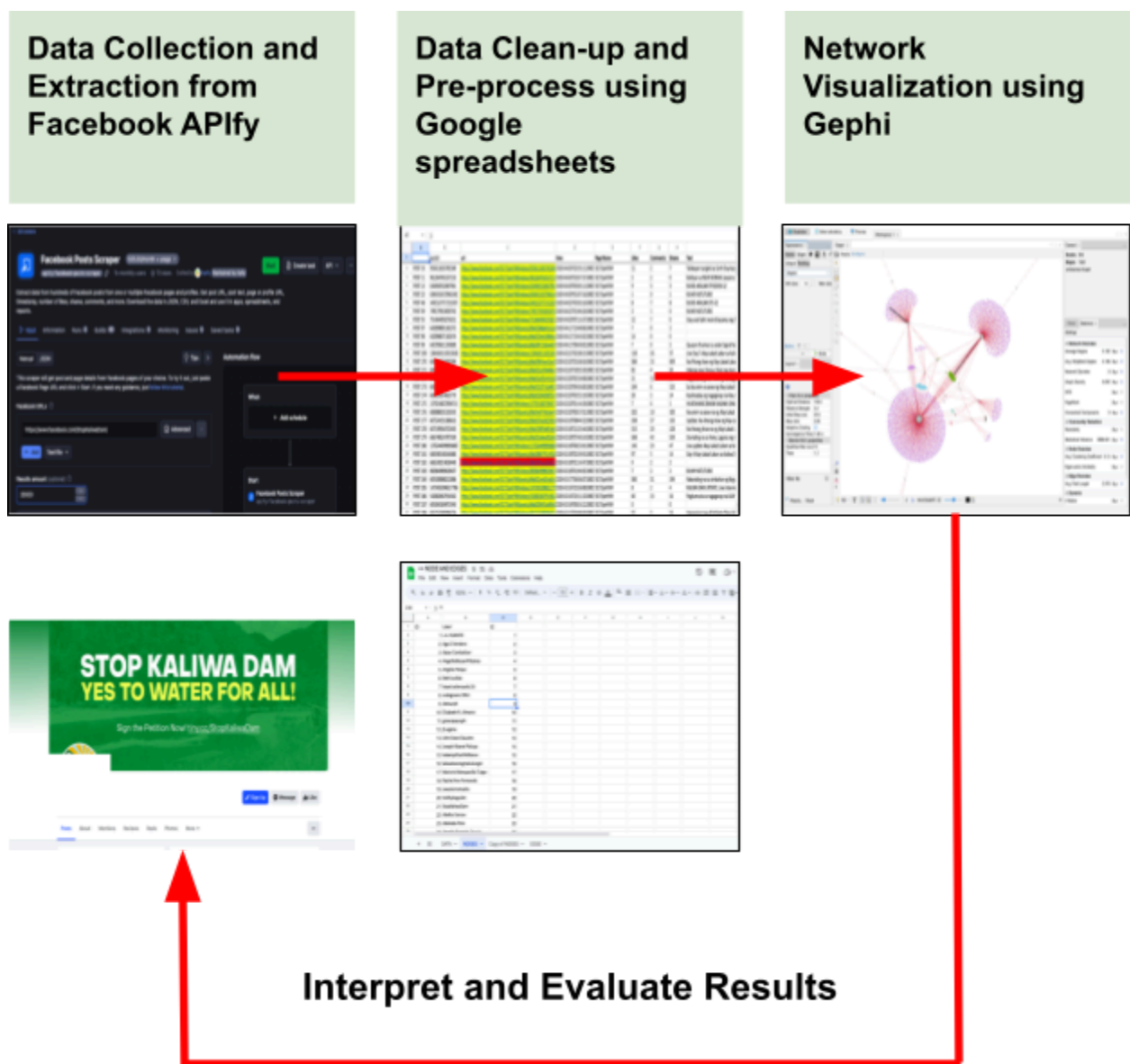
Third, the processed data were subjected to second, Social Network Analysis (SNA) to assess the centrality of organizations and individuals whose Facebook accounts actively discussed the Kaliwa Dam issue. This analysis aimed to identify the most influential actors within the digital network by examining their structural positions. Centrality was measured using engagement metrics, specifically likes and comments, from a total of 310 posts across 25 Facebook accounts. The analysis highlighted key

accounts that occupied central roles in the dissemination and amplification of content related to the movement not only numerically but also visually.

Each step is explained in detail in the following sections.

**Figure 3.**

*Overall procedures used in the study*



## Sample and Sampling

### **Choosing the Facebook accounts.**

The sampling procedure in this study was anchored on purposive selection, guided by relevance to the research focus on the Stop Kaliwa Dam campaign and its representation on Facebook.

A total of 25 Facebook accounts, comprising both individual and organizational profiles, were purposely selected based on their consistent engagement in the digital discourse surrounding the Kaliwa Dam issue. These accounts emerged from the dataset as the most active and visible contributors to the online conversation, as determined by the frequency and relevance of their posts containing the keywords **#StopKaliwaDam** and **#NoToKaliwaDam**. Each of these accounts served as a node in the network analysis.

### **Collection of the posts.**

The data collection process for this study follows methodologies adapted from Wang, Yu, and Lin (2020), Cheung and Lee (2010), Akhtar, Javed, and Sengar (2013), and Almodiel (2022). Instead of focusing on general social media data, the study specifically targets public posts related to the Kaliwa Dam project. Using Facebook Search with the keyword "Stop Kaliwa Dam," the researcher identified over 19,000 relevant posts. Data extraction was carried out using Facebook APIfy, an Application Programming Interface (API) tool designed for mining data from social networking sites.

This tool enabled the researcher to capture detailed information from the Facebook posts

An initial pool of 1,635 Facebook posts was extracted through Facebook's search function using the identified keywords. The time frame was set to capture posts before and after the "Alay Lakad para sa Stop Kaliwa Dam Project" held from February 15 to 23, 2023. Specifically, the data collection covered February 1–14, 2023 (pre-event) and February 24–May 1, 2023 (post-event).

The extracted data were organized and cleaned using Google Sheets and Microsoft Excel. During the cleaning process, all posts that fell outside the defined time period were removed. Likewise, posts not directly related to environmental concerns, such as those lacking explicit references to environmental protection, the climate crisis, or the Stop Kaliwa Dam advocacy, were excluded.

This process reduced the dataset to 640 relevant posts. This timeframe was chosen to focus on campaign activities related to the Stop Kaliwa Dam Project. Further cleaning ensured that each post was directly related to the campaign and addressed environmental or climate change issues.

The analysis encompassed a variety of content types accessible to the general public, including photos, images, videos, reels, and infographics.

The final sample consisted of 310 posts from the 25 selected Facebook accounts. These posts formed the basis of the content analysis and served as the core dataset for the subsequent social network analysis, wherein engagement metrics, such

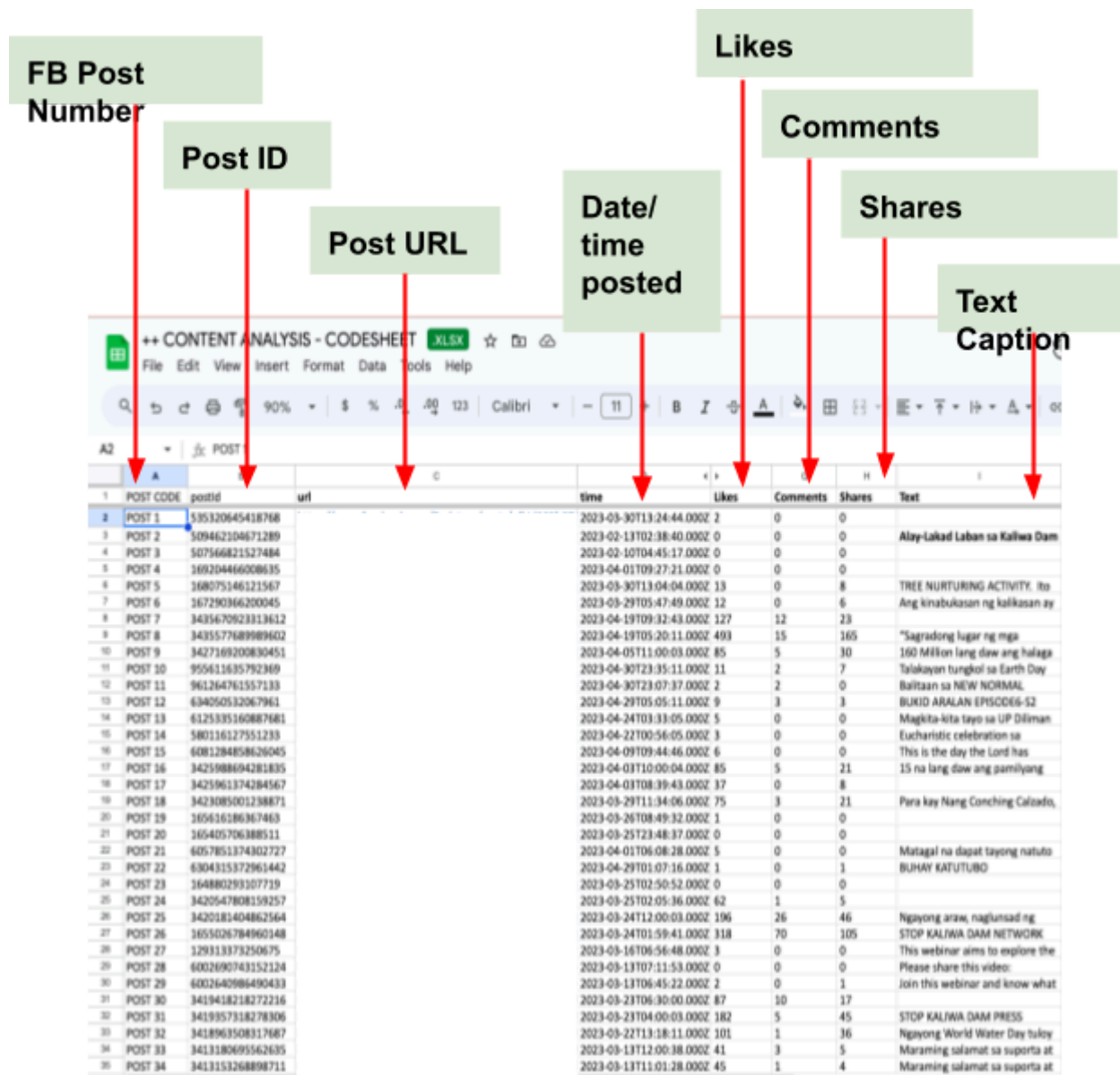
as likes and comments, were treated as relational ties between nodes. All data were anonymized and removed names of Facebook accounts of the samples. The study only looked and observed at the content, used a separate account (not the personal), and did not participate with any of the posts through comments, likes, and shares.

The researcher adapted a codebook and applied deductive coding based on established themes and categories from prior studies. Coding was manually conducted using NVivo software in June 2024, with a subsequent validation using Atlas.ti in June 2025 to ensure reliability and consistency.

The process for coding and cleaning are summarized in Figures 4 and 5.

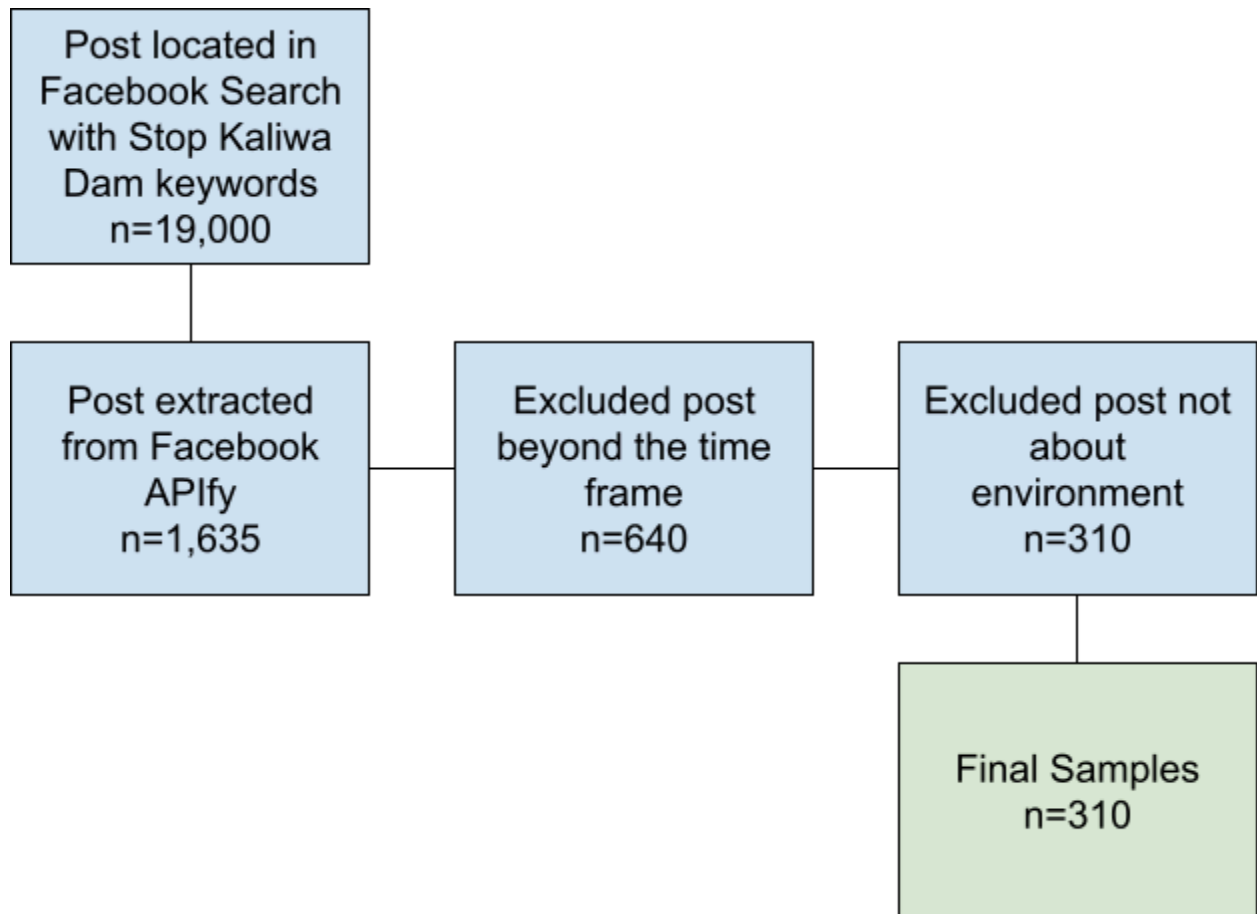
Figure 4.

Screenshot of the Facebook post code sheet in Google Sheets



**Figure 5.**

*Data Extraction and Filter Process from Facebook APIfy to Google Spreadsheets*



## Data Analysis

### **Content analysis**

Content analysis in this study followed the framework proposed by Krippendorff (2004), which involves the objective, systematic, and quantitative description of communication content. This method facilitates the collection and analysis of media content related to specific issues by measuring variables such as post frequency, media type, categories of issues, and audience engagement (Neuendorf, 2002).

This method involved objective and systematic counting and recording procedures to produce a quantitative description of symbolic content in texts (Neuman, 1997). In this study, the number of articles and words referring to the Kaliwa Dam were counted for frequency.

***Type of content.*** Content type refers to the structural presentation and media format used in each post, which can significantly influence user engagement, message interpretation, and the diffusion of information on social media platforms (Saxton & Waters, 2014; Lovejoy & Saxton, 2012).

A codebook was developed as a coding manual to systematically categorize the type of online content. The following categories were adapted and operationalized for this study: (a) text posts, (b) images, (c) videos, (d) reels, (e) external links, and (f) art cards (infographics). This classification scheme aligns with content type categories commonly used in prior studies on social media advocacy and nonprofit communication strategies (Saxton & Waters, 2014; Vraga et al., 2018).

**Categories of issues.** An existing codebook was also adapted, using established themes on social media engagement with environmental content (León et al., 2022; Metag, 2016).

The issues, on the other hand, included nine coded categories derived from environmental-related contents. These were 1) people, 2) solutions, 3) impacts, 4) identifiable people, 5) activism advocacy, 6) causes (of environmental problems), 7) information, events and news events, 8) general media, and 9) nature.

Deductive coding was employed, using manual coding based on the caption, images, and videos of the Facebook content to ensure consistency and accuracy. The contents' type or format and categories of issues were encoded through NVivo in 2024 and Atlas.ti in 2025 for validation. The results were extracted from the quotation manager and transferred to Google Sheets for organization and analysis. Afterwards, the coding scheme was finalized, frequency counts were applied to interpret the results (Krippendorff, 2013; Neuendorf, 2002; Metag, 2016; and Rose et al., 2015).

Additionally, the types of content were evaluated for reliability analysis. This analysis measures the scale's reliability and the relationship of each item within the scale. The reliability measure used is Cronbach's alpha coefficient through SPSS, where a coefficient higher than 0.70 is considered to indicate good internal validity and reliability. The results show that Cronbach's alpha is 0.850, with a Cronbach's alpha based on standardized items of .931 for Type of Content and 0.937 for Type of Post (Table 1). The Cronbach's alpha for the type of posts is 0.884, also indicating strong internal consistency among the items. This reliability improves further to 0.937 when the

items are standardized. With both values above 0.80, the six items used to measure different types of posts demonstrate high reliability, ensuring that the measurement of this variable is both consistent and dependable.

**Table 1**

*Reliability statistics of type of post and format in the Facebook accounts*

<b>Reliability Statistics Type of Content</b>		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.850	0.931	310
<b>Reliability Statistics Type of Format</b>		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.884	0.937	310

**Audience engagement.** Audience engagement was measured by the number of viewer responses such as likes, comments, and shares. Engagement data were also organized alongside the content themes to examine which types of posts generated the most interaction, following established procedures in social media advocacy research (Lovejoy & Saxton, 2012; Guo & Saxton, 2014). It also highlighted the dates that had the most engagement among the extracted Facebook content.

The data transferred to Google Sheets. Data were organized based on the content with the highest number of engagements, including likes, comments, and shares; dates posted of the content with high engagement; engagement by format; and engagement by themes. The data were organized and frequency counts taken.

## **Part 2 Social Network Analysis**

To analyze the key actors within the network, Social Network Analysis (SNA) was performed using Gephi, an open-source software for network visualization and analysis. The network graph mapped the online interactions of the 25 purposively sampled Facebook profiles from the 310 posts extracted through Facebook APIfy, measuring key centrality metrics such as degree centrality, betweenness centrality, and closeness centrality.

The analysis included both the primary profiles (nodes) and their interacting users through likes and comments (edges). A total of 3,543 Facebook likes and 1,034 Facebook comments were collected from 310 posts within the study's timeframe. These data were organized using Google Sheets, processed in Gephi, and exported in PDF and PNG formats for presentation and documentation. Following the procedures outlined by Borgatti (2002) and Guo (2012), social network diagrams and centrality tables were generated to represent the structure and influence levels within the network.

The dataset was extracted from the same 310 content items used earlier for content analysis, and additional data were scraped using Facebook APIfy to capture all publicly visible Facebook profiles interacting with these posts. The data were cleaned and organized into new CSV files for the node table and edge table. The nodes file included two columns: "ID" for the profile number and "Label" for the names of the nodes extracted from the dataset, resulting in a total of 946 nodes.

Another CSV file was created for the edges table to determine how the nodes are connected. This table included three columns: Source, Target, and Type. The Source

column identified the original uploader of the online content, the Target listed the Facebook profiles that interacted with these posts, and the Type indicated the direction of the relationship. A directed connection indicated that the source uploaded the content and the target interacted with it, while an undirected connection indicated a reciprocal relationship, such as when the source responded to the target’s comment (Gephi, n.d.).

The visualized network diagrams displayed the structure and interaction patterns of the digital advocacy environment surrounding the Kaliwa Dam discourse. Centrality measures provided insights into the most influential profiles within the network, identifying key actors in environmental content on Facebook.

Likewise, a matrix was prepared to show the relationship of the 25 FB profiles collected from the data extracted.

A summary of the methods used for the different research questions of the study is found in Table 2.

**Table 2**

*Summary of the variables studied and measurement*

<b>Variables</b>	<b>Data Collection</b>	<b>Data Analysis</b>
Facebook posts (310)	Extracted from publicly available posts on Facebook using the Facebook APIfy tool; mined data were processed using Google Sheets for organization and cleaning. All data used were anonymized for compliance with the Meta User Policy.	Content analysis; Frequency counts
Type of content - (a) text posts, (b) images, (c) videos,	Based on the Facebook APIfy extracted data and the coded	Content analysis; Frequency counts

(d) reels, (e) external links, and (f) art cards (infographics)	categories of format type and categories of issues from Atlas.ti	
Categories of posts - 1) people, 2) solutions, 3) impacts, 4) identifiable people, 5) activism advocacy, 6) causes (of environmental problems), 7) informative content, 8) general media, and 9) nature.	Based on the Facebook APIfy extracted data and the coded categories of format type and categories of issues from Atlas.ti	Content analysis; Frequency counts
Engagement - likes, comments, and shares	Based on the Facebook APIfy extracted data and the coded categories of format type and categories of issues from Atlas.ti of Facebook content, the results were transferred to Google Sheets. Once arranged, it was subjected to content analysis.	Frequency counts
Centrality - degree, betweenness, closeness	<p>The dataset was extracted from the same 310 content items used earlier for content analysis, and additional data were scraped using Facebook APIfy to capture all publicly visible Facebook profiles interacting with these posts. The data were cleaned and organized into new CSV files for the node table and edge table.</p> <p>The nodes file included two columns: "ID" for the profile number and "Label" for the names of the nodes extracted from the dataset, resulting in a total of 946 nodes.</p> <p>Another CSV file was created for the edges table to determine how the nodes are connected. This table included three columns: Source, Target, and Type.</p>	<p>Measured through social network analysis tools, specifically Gephi by examining likes and comments from 25 Facebook accounts. The data were used to create social network visualizations, providing a graphical representation of the social media agenda networks (Borgatti, 2002; Guo, 2012).</p> <p>A total of 3,543 Facebook likes and 1,034 Facebook comments were collected from 310 posts within the study's timeframe. From the 25 Facebook profiles, the study created a matrix and analyzed it to determine the key actors among the samples.</p>

	These data were organized using Google Sheets, processed in Gephi.	
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## Research Ethics

This study adheres to established ethical standards in communication and digital research. While the data used in the analysis were publicly accessible on Facebook, ethical considerations concerning privacy, and confidentiality were strictly observed throughout the research process.

Only public posts and account information were included in the dataset for this research. No private or restricted posts were accessed, and no personal communications were analyzed. The data collection was limited to content publicly published by Facebook account users within the public domain and retrieved through the Facebook APIfy tool, which facilitates non-intrusive access to public data without violating platform privacy policies.

In the dataset, the names of individual and organizational Facebook profiles were replaced with coded identifiers to maintain anonymity while still allowing for accurate coding and network analysis, particularly in identifying nodes and computing centrality measures. For visual presentation, screenshots were used but with names, faces, and names of commenters intentionally covered to protect user identity. Direct profile URLs, email addresses, and other contact details were also excluded. These measures follow the ethical principle of minimizing harm and preventing the unintended exposure of

individuals who, despite posting public content, may not have explicitly consented to inclusion in academic research.

In addition, no attempt was made to interact with the users or influence the data by commenting, liking, or messaging. The analysis remained purely observational and non-participatory. The findings were reported in aggregate form, focusing on patterns of content format, categories, and engagement within the digital network concerning the Stop Kaliwa Dam campaign. Individual posts were not attributed to specific users unless they were made by public institutions or advocacy pages, which are by nature engaged in public discourse. By upholding these principles, the study sought to balance the need for transparency with the responsibility to protect the rights and dignity of individuals in digital spaces.

## **Chapter IV**

### **RESULTS AND DISCUSSIONS**

This chapter presents the results and discussion of the study. It is divided into two major parts: the content analysis and the social network analysis. The content analysis covers the type of the posts, the categories or issues discussed, and the engagements generated from these posts. The second part discusses the social network analysis conducted to analyze the centrality of the Facebook account owners within the advocacy network for the Stop Kaliwa Dam movement.

#### **PART I**

#### **Content Analysis of the Organizations' Facebooks**

##### **Facebook Accounts Studied**

A total of 25 Facebook accounts were identified as having the most number of followers, indicating that they are actively participating in conversations and content sharing related to the Stop Kaliwa Dam campaign and other environmental issues based on data extracted from Facebook APIfy as of June 2023 (Table 2).

A brief description of each Facebook account is shown in Appendix 1.

Of these, 15 were personal Facebook (FB) profiles and 10 were Facebook Pages. It's important to note that a Facebook Profile is intended for personal, non-commercial use and is limited to a maximum of 5,000 friends, while a Facebook Page is designed for public figures, brands, organizations, and businesses, allowing unlimited followers and providing access to engagement analytics and audience management tools (Edgar, 2024). In this study, both are called Facebook account in the labels.

The five FB accounts with the highest number of followers were Facebook Pages, reaffirming the platform advantage of Pages over Profiles in terms of audience reach and visibility. These accounts were FB Profile 1, FB Profile 4, FB Profile 2, 9FB Profile 5, and FB Profile 6.

Interestingly, four of these accounts were created within the last five years (as of 2022), indicating the participation of relatively new voices in the environmental advocacy space. These accounts included FB Profile 6, FB Profile 18, FB Profile 9, FB Profile 23, and FB Profile 2. On the other hand, five FB accounts did not publicly display the date of their profiles or when the pages were established.

Despite the variety of accounts, only 11 included an introduction or description on their landing pages, a valuable feature for helping audiences quickly understand the account's identity and purpose. The content shared by these accounts reflected their nature: since the majority were personal profiles, posts largely revolved around personal updates, work-related activities, advocacy campaigns, and local events.

Geographically, nine of the accounts originated from Infanta, Quezon, highlighting it as a significant local hub for the Kaliwa Dam issue conversations. The farthest account contributing to the campaign discussions was based in Cebu, indicating the issue's resonance beyond the immediate areas directly affected.

Facebook also provides information categories that help contextualize the purpose and activities of a profile or page (Facebook, n.d.). Among the reviewed accounts, five identified themselves as digital creators, three as environmental conservation organizations, while others were categorized as public figures, youth organizations, radio stations, or business ventures.

**Table 3**

*Masterlist of Facebook accounts extracted from Facebook APIfy*

	FB Profile Code	Profile or page	FB Profile followers	FB Page Established	Introduction FB Profile/Page	Main Contents	Location from	FB Information Category
1	FB Account 1	page	388,000	7-Jan-2009	Campaigning on climate, plastic, energy, livable cities & social justice. Join us today!	- environment - plastics and climate change	Quezon City	Non Profit Organization
2	FB Account 2	page	73,000	15-Oct-2011	Servant of the people / motivational speaker	personal and work activities	Infanta, Quezon	Motivational Speaker, Public Service, Comedian
3	FB Account 3	profile	26,000	12-Jun-2018	n/a	Personal activities	Morong, Rizal	Digital Creator
4	FB Account 4	page	21,000	3-Jul-2019	Awareness campaign on Stop Kaliwa Dam	Anything about Kaliwa Dam	Infanta, Quezon	Environmental Conservation Organization
5	FB Account 5	page	14,000	8-Nov-2013	Radio	Live Streaming of Radio Program	Infanta, Quezon	Radio Station

6	FB Account 6	page	9,200	19-May-2022	Volunteer Driven Movement	Nationwide environmental events/movement	Quezon City	Environmental Conservation Organization
7	FB Account 7	profile	6,300	23-Apr-2019	n/a	Personal and work activities	General Nakar	Digital Creator
8	FB Account 8	page	5,900	July 6, 2011	n/a	Movement on Stop Kaliwa Dam Anything about Sierra Madre	Infanta, Quezon	Non-Government Organization
9	FB Account 9	profile	5,300	22-Feb-2021	Personal blog	Shared post on different topics	General Nakar	Blogger
10	FB Account 10	profile	5,200	3-Jun-2013	Public Figure	Personal, work and school activities	Siniloan, Laguna	Public Figure
11	FB Account 11	profile	5,000	4-Jan-2011	Founder/President of Kakampi Youth Alliance	Personal activities	Infanta, Quezon	low number of engagements
12	FB Account 12	profile	5,000	n/a	n/a	Personal views on social issues; Work activities	Kiangan, Ifugao Quezon City	Public Figure
13	FB Account 13	profile	4,300	11-Feb-2011	n/a	Personal and business	Infanta, Quezon	Digital creator
14	FB Account 14	profile	3,800	1-Feb-2009	n/a	Family/personal events	Infanta, Quezon	Tutor/Teacher
15	FB Account 15	page	3,400	26-Aug-2022	Innovative Technologies in today's generation *Communication *Security Cameras *Structural Cabling	Business and personal activities	Mandaue City	Entrepreneur
16	FB Account 16	profile	2,700	11-Aug-2009	n/a	Personal content/opinions	n/a	Artist/Singer
17	FB Account 17	page	2,600	15-Apr-2022	Youth-led non government and non-profit environmental organization	Environmental	Cebu City	Environmental Conservation organization
18	FB Account 18	profile	2,400	20-May-2020	n/a	personal activities and opinions	Antipolo, Rizal	Digital Creator
19	FB Account 19	profile	1,800	n/a	n/a	Family	Siniloan, Laguna	

20	FB Account 20	profile	1,300	18-Dec-2009	n/a	Family and nature		Digital Creator
21	FB Account 21	profile	945	n/a	Homegrown Artisan Social Entrepreneur	Business, sustainability, environment, and climate	Real, Quezon	Social Entrepreneur
22	FB Account 22	page	782	2-Feb-2021	n/a	Shared posts of other environmental and youth organizations from Infanta	Infanta, Quezon	Community organization
23	FB Account 23	page	505	17-Nov-2022	n/a	Activities of organization	Infanta, Quezon	Youth Organization
24	FB Account 24	profile	69	22-Oct-22	n/a	Personal activities and shared posts	Morong, Rizal	Reels Creator
25	FB Account 25	profile	1,800	n/a	n/a	Personal activities, opinions, and business	Antipolo, Rizal	Digital Creator

**Note.** The details in this table were extracted as of June 2025; some information may have changed or may no longer be publicly visible.

### Type of Content of the Facebook Accounts

The study categorized the type of content format into six types: text-only, image, video, reel, link, and art card.

Summary in Table 4 shows that of the 310 posts, 106 (34%) were image-based followed by art cards (24%), video (22%), and reels (10%). External links made up 26 posts (8.39%). Text-only posts were the least frequently used, with just 5 posts (1.61%) recorded in the dataset.

This pattern highlights a strong preference for visual and multimedia content, which generally generates higher engagement and visibility on Facebook. Hence, image posts often generated the highest engagement in terms of likes, comments, and shares.

**Table 4**

*Summary of the type of content of the FB posts*

<b>TYPE OF CONTENT (N=25)</b>	<b>Total posts (n=310)</b>	<b>Percent</b>
a. Image	106	34.19
b. Art Card	73	23.55
c. Video	68	21.94
d. Reels	32	10.32
e. External Link	26	8.39
f. Text	5	1.61

Details of the type of content for the individual Facebook accounts are found in Appendix 2. Notably, the FB Profile 4 page led in the variety of content types it produced, posting 39 images, 22 videos, 13 Reels, 19 links, 34 art cards, and one text-only post.

Similarly, FB Profile 5 actively used video content, with 17 of its 33 posts being videos, while FB Profile 6 maximized the use of art cards, posting 19 art card-based content pieces alongside other formats. These choices indicate that accounts actively involved in advocacy campaigns tend to prioritize visually driven and easily shareable

formats such as images, videos, and art cards to improve message dissemination and audience engagement.

The type of content suggests that in terms of environmental advocacy campaigns on Facebook, visual narratives are a crucial tool for capturing attention, conveying information, and fostering public involvement. There was a clear preference for visual and multimedia formats, particularly images, art cards, and videos, in online advocacy campaigns concerning the Kaliwa Dam.

The heavy use of images, videos, and art cards by key Facebook accounts like FB Profile 4, FB Profile 5, and FB Profile 6 suggests that visual storytelling is central to effective environmental advocacy on social media. This reinforces the idea that platforms such as Facebook favor visually driven formats in amplifying messages, especially in campaigns that aim to generate public attention and support.

The diversity and frequency of multimedia content imply a deliberate and sustained engagement strategy. Accounts that are deeply embedded in the advocacy movement are not just posting frequently but are also curating content in ways that resonate with digital audiences, leveraging formats that are easy to share and emotionally impactful.

The consistent use of video, image, and art card content likely contributes to higher engagement rates, such as likes, shares, and comments, compared to plain text or link-only posts. Photos are a powerful content type in environmental campaigns as they effectively communicate advocacy messages and raise awareness on issues such as climate change (Na, 2013). This supports the notion that in today's

information-driven environment, images have become central to communication because of their visual appeal and ability to serve as key sources of information, news, and meaning-making on social media platforms (Highfield & Leaver, 2016; Akanda & Choudhury, 2024).

### Facebook Accounts with Top Content on the Kaliwa Dam

The top five content providers about environmental issues specifically on the Stop Kaliwa Dam movement from February 1, 2023, to May 1, 2023 were the following: 1) FB Profile 4 (41%), 2) FB Profile 5 (11%), 3) FB Profile 6 (10%), 4) FB Profile 11 (7%), and 5) FB Profile 8 (7%) (Table 5).

They are described in the next section.

**Table 5**

*Facebook accounts with the most number of posts on the Kaliwa Dam*

	<b>Facebook Account (N=25)</b>	<b>Posts n=310</b>	<b>%</b>
1	FB Account 4	128	41.29
2	FB Account 5	33	10.65
3	FB Account 6	30	9.68
4	FB Account 11	23	7.42
5	FB Account 8	21	6.77
6	FB Account 18	11	3.55

7	FB Account 19	11	3.55
8	FB Account 12	10	3.23
9	FB Account 1	6	1.94
10	FB Account 23	6	1.94
11	FB Account 2	6	1.94
12	FB Account 24	5	1.61
13	FB Account 25	3	0.97
14	FB Account 22	3	0.97
15	FB Account 13	3	0.97
16	FB Account 10	2	0.65
17	FB Account 21	1	0.32
18	FB Account 16	1	0.32
19	FB Account 20	1	0.32
20	FB Account 7	1	0.32
21	FB Account 17	1	0.32
22	FB Account 15	1	0.32
23	FB Account 14	1	0.32
24	FB Account 3	1	0.32
25	FB Account 19	1	0.32

At this point, the five top Facebook accounts with the highest posts for the Stop the Kaliwa Dam movement will be described more in detail.

## FB Account 4 (Page)

The FB Account 4 Page, created on July 3, 2019, serves as an awareness campaign platform dedicated to opposing the construction of the Kaliwa Dam. With a following of approximately 21,000 people, the page has become a significant online presence in the environmental advocacy movement, particularly within Infanta, Quezon, where the proposed dam would have direct local impacts (see Figure 6).

Categorized as an Environmental Conservation Organization, the page regularly shares content focused on the Kaliwa Dam issue, including updates on protests, public statements, news articles, infographics, and community initiatives. Its primary objective is to inform the public about the environmental, cultural, and social risks posed by the project, and to rally collective support for its cancellation.

Having a high number of followers in a network is crucial because it expands the potential reach of messages and increases the likelihood of visibility within online communities. While engagement rate often determines the depth of interaction, follower count represents the breadth of influence. In social network terms, accounts with larger follower bases often occupy more central and visible positions, allowing them to serve as key disseminators of information (Srivastav et al., 2024).

**Figure 6.**

*Homepage of Facebook Account 4*



FB Account 5 (Page)

The FB Account 5's Page, established on November 8, 2013, is the official social media platform of the radio station, based in Infanta, Quezon. With a following of approximately 14,000 people, the page actively engages its audience by offering live streaming of its radio programs, making local and faith-based broadcasting accessible to a wider, online community (Figure 7).

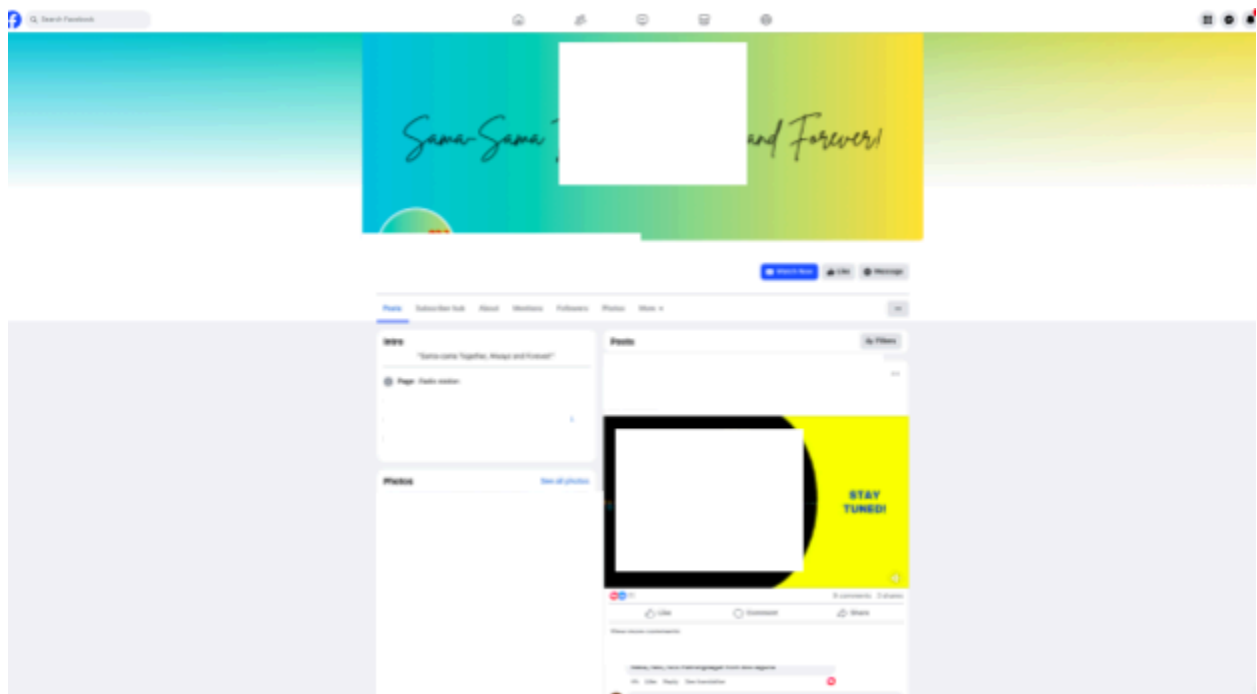
The page features a lively mix of music, community news, public service announcements, spiritual reflections, and local issue discussions. It has also played an

important role in covering and amplifying conversations around environmental and social advocacy efforts, including the Stop Kaliwa Dam campaign.

The Facebook Page leverages live streaming and regular interactive content to maintain a strong connection with both local listeners in Infanta and supporters from other regions. Its active presence helps foster community dialogue and keep important local issues, like the Kaliwa Dam opposition, within public awareness.

**Figure 7.**

*Homepage of FB Account 5*



## FB Account 6 (Page)

FB Account 6's Page, created on May 19, 2022, is a volunteer-driven environmental conservation organization based in Quezon City, Philippines. With a growing community of over 9,200 followers, the page serves as an online platform for promoting nationwide environmental events, movements, and advocacy initiatives (Figure 8).

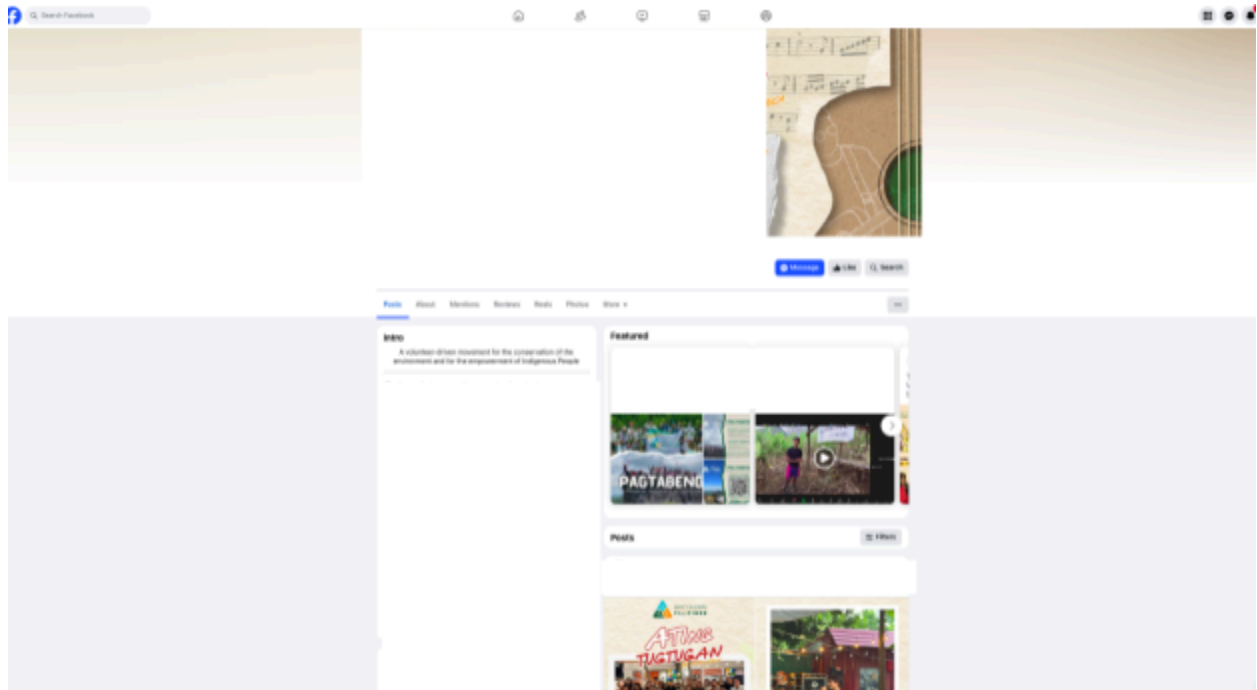
Known for its youthful energy, consistent branding, and regular posting schedule, FB Account 6 actively engages followers with content that highlights environmental awareness campaigns, volunteer opportunities, community clean-ups, tree-planting drives, and solidarity efforts against large-scale ecological threats, including its support for the said campaign.

The page positions itself as a dynamic and inclusive space for young advocates and environmental allies, using visually engaging posts and volunteer-led narratives to inspire participation and community action.

The page is known for its regularly updated content on environmental advocacy, providing followers with timely information about volunteer activities, ecological issues, and solidarity efforts against large-scale environmental threats. It carries a youthful, volunteer-centered voice and visual identity, using engaging visuals and dynamic storytelling to inspire participation, particularly among younger audiences. Through consistent advocacy branding across its posts and events, the page has established a recognizable and trusted online presence.

## Figure 8.

### *Homepage of Facebook Account 6*



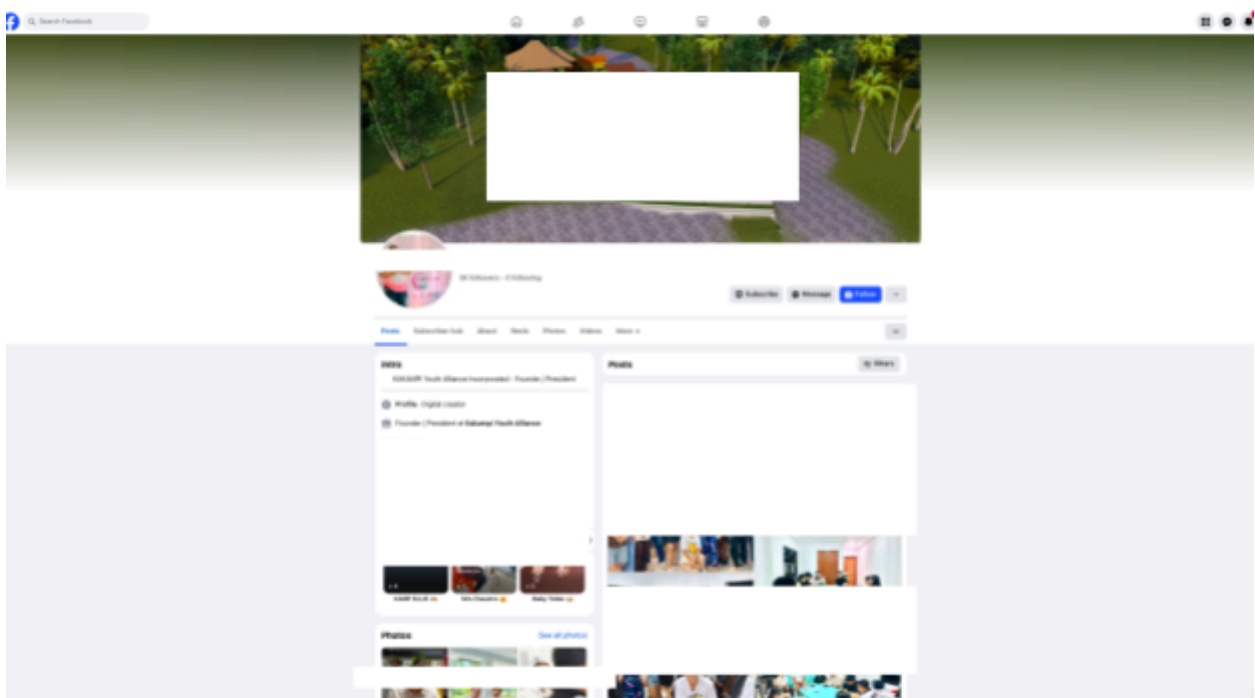
### FB Account 11 (Profile)

FB Account 11 is a personal Facebook profile created on January 4, 2011, currently reaching the maximum friend limit of 5,000 connections. The creator is identified as one of the officials of the Kakampi Youth Alliance, a youth-centered advocacy group based in Infanta, Quezon. While the profile highlights personal activities, community involvement, and advocacy-related posts, it primarily serves as a platform for sharing individual updates and engagements within local initiatives (Figure 9).

Categorized as a Digital Creator, the profile reflects FB Profile 11's leadership role and advocacy interests, though it registers a relatively low number of engagements compared to other accounts within the Stop Kaliwa Dam network. Despite limited interaction metrics, the profile contributes to the broader advocacy conversation through its personal and grassroots-centered content.

**Figure 9.**

*Homepage of FB Account 11*



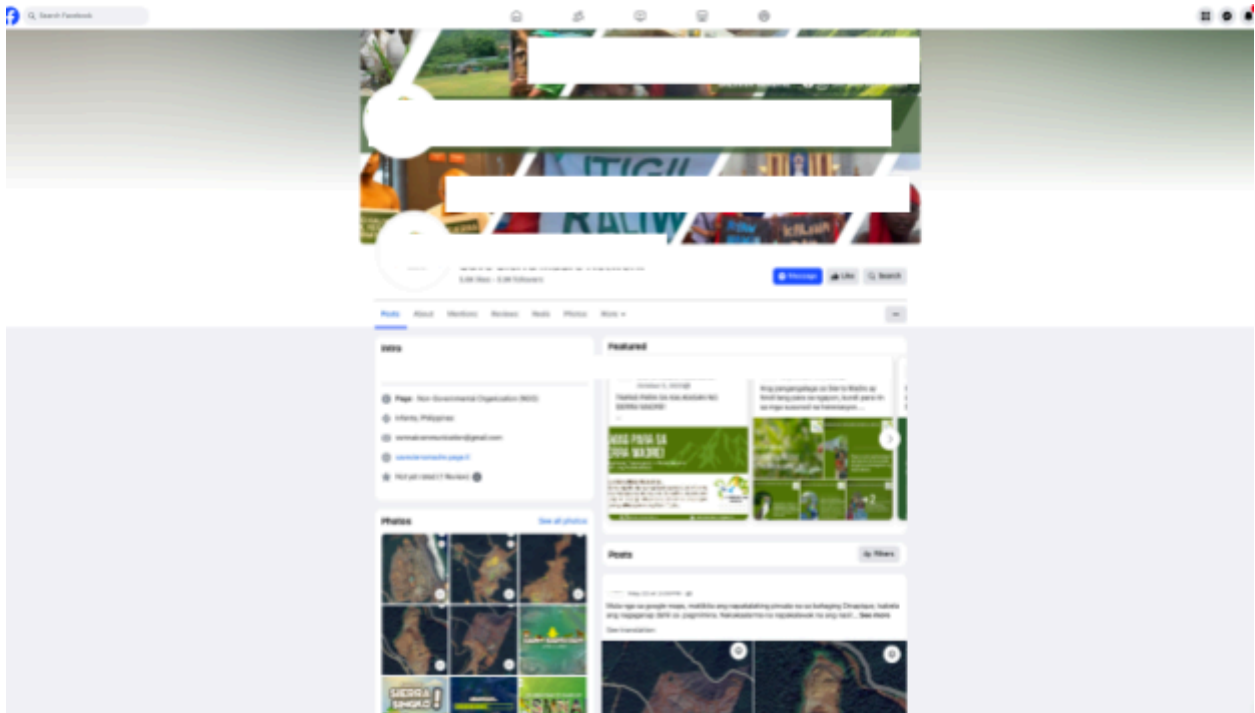
### FB Account 8 (Page)

The FB Account 8 is a page, established on July 6, 2011, which is an advocacy-driven platform managed by a Non-Government Organization (NGO) based in Infanta, Quezon. With a following of approximately 5,900 users, the page is dedicated to raising awareness and mobilizing support for the protection of the Sierra Madre mountain range, particularly in opposition to the Kaliwa Dam project (Figure 10).

Its content focuses on environmental campaigns, advocacy posts, and updates related to issues affecting Sierra Madre's ecological integrity. Functioning as an online hub for conservation advocates, the page regularly shares educational materials, calls to action, and movement updates, contributing to the larger environmental defense network in the Philippines.

**Figure 10.**

*Homepage of FB Account 8*



## **Categories of the Facebook Posts on the Kaliwa Dam**

The 310 posts were classified into different environment-related categories as follows: (1) people: general discussions about individuals involved in the issue; (2) solutions: proposals on ways to address environmental or climate issues; (3) impacts: highlighting the harmful effects of the project on the environment and communities; (4) identifiable persons: mentioning and/or showing well-known personalities; (5) activism advocacy: protests, notably the Alay Lakad from Quezon to Malacañang; (6) causes (of environmental problems): addressing the underlying causes of environmental problems and related phenomena; (7) informative content: providing information on policies, scientific data, and general media; (8) nature: showcasing the beauty of nature, particularly in areas affected by the project (Chetty, Devadas, & Fleming, 2015; Baker & King, 2017; Metag, 2016).

Table 6 presents the number of posts per category of the Facebook accounts regarding Kaliwa Dam. Exemplars are found in Table 7.

**Table 6**

*Categories of the posts uploaded in the 25 Facebook accounts*

Categories	Total posts (n=310)	Percent
1. Activism Advocacy	106	34.19
2. People (in general)	65	20.97
3. General Media	45	14.52
4. Informative Content	36	11.61
5. Impacts	26	8.39
6. Causes (of environmental problems)	23	7.42
7. Identifiable People	5	1.61
8. Nature	3	0.97
9. Solutions	1	0.32

Out of the 310 posts analyzed, the most prominent category was Activism Advocacy, comprising 34.19% of the total posts. An exemplar from Post 210 states:

*“Hindi ipinagdadamot ng aming mga kababayan ang tubig para magamit sa Metro Manila, ngunit maraming alternatibo. Una ay ang pag sasaayos ng mga water concessionaires ng mga leak sa kanilang mga pipes na di umano ay tinatayang nasa 30-40% ang leak o tumatagas sa mga matatagal ng Pipe. Ikalawa ay buhayin ang mga Existing Water Sources structure, rehabilitate tulad na lamang ng Wawa Dam sa Rizal.”*

This reflects the central role of protest-related content in the online discourse, particularly in connection with events such as the Alay Lakad para sa Stop Kaliwa Dam. It also highlights that Facebook has become a central platform for mobilizing opposition and raising awareness against the Kaliwa Dam project. It suggests that advocacy-driven messaging is the dominant communication strategy within this issue network.

The second most common category was People (in general) (21%). These typically involved posts featuring community members, advocates, or individuals expressing views and experiences related to the campaign. This may also be largely due to the Alay Lakad event that took place during the study period. An exemplar stated:

*Post No. 82*

*“Pawang katotohanan po ang aming ipinahahayag. Hinihiling po namin ang inyong suporta alang-alang po sa pangangalaga sa kagubatan na tayo rin pong lahat ang makikinabang!” ani Conchita Calzado sa lakad ngayong umaga.’*

General media followed as the third most frequent theme, with 14.52%, including shared news reports, announcements, and media content relevant to the issue.

*Post no. 37*

*“we are in lent season 2023. Let us contemplate the paschal mystery of Christ reflected on the current planetary state by journeying the new way of the cross in the light of laudato si’.”*

Informative Content, covering factual information, policy updates, and environmental data, constituted 11.61%. These include these exemplars:

Post No. 133

*“Ang FPIC o Free, Prior and Informed Consent ay isang prosesong kailangang pagdaanan para makuha ang pagsang-ayon ng mga katutubo kung may itatayong proyekto sa kanilang lupang ninuno. Dapat ito ay isagawa nang walang pananakot, panlilinlang o panunuhol. Ito ay nakasaad sa Batas 8371, o Indigenous Peoples Rights Act ng Pilipinas.*

*Ang ECC o Environmental Compliance Certificate ay iniisyu ng DENR para payagang sumulong ang operasyon ng mga proyekto dahil nakikita sa evaluation at assessment na walang malaking pinsala sa kalikasan ang mga ito. Kailangan ang pagtingin at deliberasyon ng mga eksperto sa Environmental Impact Assessment bago ito ilabas ng ahensya.*

*Maraming nilaktawan at inikutan sa mga prosesong ito para sa Kaliwa Dam project at panawagan ng ating marchers na i-rebyu at bawiin ang mga permit na inisyu para sa Dam.”*

On the other hand, the strikingly low count for Solutions (1 post) indicates a notable gap in content discussing alternative actions, proposals, or resolutions to the environmental and social concerns surrounding the dam. This could imply a communication imbalance, where the discourse is largely reactive rather than proactive.

This distribution highlights a clear emphasis on protest actions and community engagement, while indicating limited focus on presenting concrete solutions or featuring high-profile personalities in the conversation around the Kaliwa Dam issue.

**Table 7***Exemplars of the Categories of the Posts in the 25 Facebook accounts*

<b>Categories</b>	<b>Total posts (n=310)</b>	<b>Exemplars</b>
Activism Advocacy	106	Post No. 210 <p>“Hindi ipinagdadamot ng aming mga kababayan ang tubig para magamit sa Metro Manila, ngunit maraming alternatibo. Una ay ang pag sasaayos ng mga water concessionaires ng mga leak sa kanilang mga pipes na di umano ay tinatayang nasa 30-40% ang leak o tumatagas sa mga matatagal ng Pipe. Ikalawa ay buhayin ang mga Existing Water Sources structure, rehabilitate tulad na lamang ng Wawa Dam sa Rizal.”</p>
People in general	65	Post No. 82 <p>“Pawang katotohanan po ang aming ipinahahayag. Hinihiling po namin ang inyong suporta alang-alang po sa pangangalaga sa kagubatan na tayo rin pong lahat ang makikinabang!” ani Conchita Calzado sa lakad ngayong umaga.’</p>
General Media	45	Post No. 37 <p>“We are in Lent Season 2023. Let us contemplate the Paschal Mystery of Christ reflected on the current planetary state by journeying tThe New Way of the Cross in the Light of Laudato Si’.”</p>
Informative Content	36	Post No. 133 <p>“Ang FPIC o Free, Prior and Informed Consent ay isang prosesong kailangang pagdaanan para makuha ang pagsang-ayon ng mga katutubo kung may itatayong proyekto sa kanilang lupang ninuno. Dapat ito ay isagawa nang walang pananakot, panlilinlang o panunuhol. Ito ay nakasaad sa Batas 8371, o Indigenous Peoples Rights Act ng Pilipinas.</p> <p>Ang ECC o Environmental Compliance Certificate ay iniisyu ng DENR para payagang sumulong ang operasyon ng mga proyekto dahil nakikita sa evaluation at assessment na walang malaking pinsala sa kalikasan ang mga ito. Kailangan ang pagtingin at deliberasyon ng mga eksperto sa Environmental Impact Assessment bago ito ilabas ng ahensya.</p> <p>Maraming nilaktawan at inikutan sa mga prosesong ito para sa Kaliwa Dam project at panawagan ng ating marchers na i-rebyu at bawiin ang mga permit na inisyu para sa Dam.”</p>
Impacts	26	Post No. 134

		“Aniya, marami ang mawawala kapag naitayo ang Kaliwa Dam sa kanilang lupaing ninuno sa Sierra Madre - hindi lamang samu’t saring buhay at kagubatan, kundi kabuhayan, pagkukunan ng pagkain, pati ang kanilang kultura. Ang pagtatayo ng Kaliwa Dam at pagkasira ng kagubatan ay banta sa kinabukasan ng kabataan.”
Causes (of environmental problems)	23	Post No. 145  “Bilang isang tour guide, matindi ang pangamba niyang mawawala ang isa sa ikinabubuhay ng mga kasamang Dumagat-Remontado na nakaasa sa turismo, pagsasaka at pangingsda sakaling matuloy ang Kaliwa Dam.  Bagamat inuumpisahan na ang pagtutunnel sa Teresa, naniniwala siya na sa pamamagitan ng pagsama sa paglalakad ay mapipigilan pa ang pagtatayo ng Kaliwa Dam.”
Identifiable People	5	Post No. 210  “Very peaceful march of 300-strong Dumagats and friends Including volunteers of Angat Kalikasan Pilipinas Angat Kalikasan Pilipinas in Infanta going to Real, Quezon.”
Nature	3	Post No. 160  #StopKaliwaDam #ItigilAngKaliwaDam
Solutions	1	Post No. 104  “Noong Oktubre 2022, naghanda ang lahat para sa pananalasa ng Bagyong Karding at ng malakas na hangin at ulan sa mga komunidad. Bagamat ramdam pa rin, naphina ng Sierra Madre ang mga epekto ng bagyo sa mga komunidad. Ang Sierra Madre ay natural na pananggalang natin laban sa hagupit ng mga bagyo at supertyphoon na pumapasok sa Philippine area of responsibility.”

As to the categories of the individual Facebook accounts, FB Account 4’s page was the most active, contributing 128 posts, of which the majority were on activism advocacy (36), followed by people (29), informative content (31), and impacts (13) (Appendix 3).

Other highly active profiles included FB Account 5 with 33 posts, largely on Activism Advocacy (14) and General Media (13), and FB Profile 6 with 30 posts, emphasizing General Media (10) and Activism Advocacy (7).

Additionally, individual accounts like FB Account 11 (23 posts) and FB Account 18 (11 posts) actively contributed posts, mostly about People and Activism Advocacy, reflecting grassroots-level engagement and citizen participation in digital activism. Although the issue directly concerns natural resources and ecological risks, the Nature theme was scarcely posted (3 out of 310 posts), suggesting that environmental framing might be secondary to human-interest and advocacy narratives in the online conversation.

There is a predominance of advocacy and activism content in the Facebook conversation on the Kaliwa Dam, highlighting that the discourse is highly advocacy-driven and centered on mobilization, protest narratives, and appeals for collective action. Social media plays a crucial role in amplifying such campaigns by enabling participation beyond physical boundaries, allowing individuals to support causes without being physically present (Susanto, 2021). The use of visual formats, particularly photos, further enhances the virality and visibility of advocacy messages (Shahbaznezhad et al., 2021). Beyond mobilization, social media also facilitates environmental knowledge-sharing, fosters dialogue between activists and the public, and encourages everyday pro-environmental actions (Zhang & Skoric, 2018).

The high volume of *People* posts suggests that personal appeals and testimonials are central to framing the issue. Human-centered narratives personalize

the advocacy, foster empathy, and highlight the role of ordinary citizens in shaping the movement. Non-identifiable people in visuals, especially spontaneous and emotion-driven images, have been found effective in communicating climate change and mobilizing support (Leon et al., 2022).

Conversely, *Nature* content appeared less frequently, suggesting that environmental discourse was often overshadowed by human-centric and advocacy narratives despite the ecological context of the issue. Identifiable people posts, though present, played a limited role in driving engagement, consistent with findings from O'Neill (2017) and Leon (2022) showing that such images did not generate significantly higher interactions compared to non-identifiable representations on social media and traditional platforms.

## **Engagement of the Organizations' FB Accounts**

This section summarizes the overall engagements of the Facebook pages based on the 310 posts on Kaliwa Dam in terms of likes, comments, and shares. The likes and comments will later serve as inputs into the social network analysis (SNA) to determine the centrality of the Facebook accounts in the digital network.

### **Overall Engagement on the Posts About Kaliwa Dam**

Overall, there were 70,634 reactions within the study period. Of these reactions, there were more likes (69%), followed by shares (27%), than comments (4%) (Table 8).

The high standard deviation values in likes and shares indicate a wide variation in audience engagement among different posts. Additionally, this reveals a highly variable pattern of audience engagement across the 310 posts, characterized by a small number of viral posts significantly raising the average number of likes and shares.

The disparity between mean and median values suggests a positively skewed distribution, in which most posts had moderate reach and select viral posts drove the overall averages.

On the other hand, there is a relative consistency in comment counts indicating stable audience interaction in this category. These findings point to selective virality among the three engagement types with likes having the highest on average, followed by shares, and then comments. This pattern reflects typical audience behavior on

Facebook, where likes are the lowest-effort interaction, while comments require more active participation.

**Table 8**

*Summary of the audience engagements on the Facebook posts*

REACTIONS	N =310	Mean	Median	Std. Deviation	Minimum	Maximum
Posts	310	34.44	26	34.17	1	106
Likes	48,848 (69%)	5,538.67	1,653	8,514.97	180	26,632
Comments	2,877 (4%)	319.67	68	583.30	11	1,836
Shares	18,909 (27%)	2,101	501	3,877.57	24	18,909
Valid N (No. of Content)						310

*Note: Descriptive statistics summarize the engagement of Facebook posts on various categories (N = 310).*

The details of the like, comments, and shares of 25 Facebook engagements among the 25 Facebook pages are also analyzed (Table 9).

FB Account 4 garnered the highest level of engagement, with 27,000 likes, 1,237 comments, and 8,112 shares. This account also contributed the most posts to the study, with a total of 128 posts. The dominance of this page in both content output and engagement metrics confirms its central role as a leading mobilizer within the Facebook

discourse on the Kaliwa Dam issue. Its consistent posting and high interaction rates position it as a primary information source and advocacy driver.

Coming second is the FB Account 2 with 12, 915 likes, 943 comments, and 7,156 comments. And this Facebook had only 6 posts, suggesting that high-quality or high-impact content can achieve significant interaction even with a smaller number of posts. This also suggests a strong influencer effect or the power of a public official's endorsement within online advocacy campaigns. This underscores the significance of strategic collaborations with local leaders to amplify issue awareness and public mobilization.

The third Facebook account with the third highest engagement would be FB Account 5 with 3,274 likes, 313 comments, and 1,827 shares. This came with 33 posts. The results demonstrate the continued relevance of traditional media institutions and environmental advocacy groups in bridging information to broader publics, especially in advocacy networks operating in both online and offline spaces.

Coming in fourth is Facebook Account 11 with 23 posts yet with 1,590 likes, 217 comments, and 488 shares.

Facebook Account 12 comes fifth with only 10 posts but with 1,568 likes, 50 comments, and 288 shares.

While individual users such as FB Account 10 and FB Account 18 contributed a fair number of posts, their engagement levels were lower compared to organizational pages or official accounts. This pattern is consistent with studies showing that central or

organizational actors often dominate discourse and attract greater visibility within networks (Kitikamdhorn & Ramasoota, 2023). At the same time, the literature underscores that both follower count and engagement rate shape influence online, with engagement often exerting a stronger impact than sheer audience size (Srivastav et al., 2024). Thus, even if individual accounts generate fewer interactions than organizations, they can still function as micro-influencers within the network by mobilizing reactions and extending the conversation.

And lastly, FB Account 1 also elicited high engagement with 1,040 likes, 13 comments, and 373 shares with just six posts probably because of its influence and possibly credibility considering its longstanding militancy in environmental issues.

**Table 9**

*Number of engagements per Facebook account*

<b>FB Profile</b>	<b>No. of Content</b>	<b>Likes</b>	<b>Comments</b>	<b>Shares</b>
FB Account 4	128	27,000	1,237	8,112
FB Account 5	33	3,274	313	1,827
FB Account 6	30	1,393	22	487
FB Account 11	23	1,590	217	488
FB Account 8	21	202	8	59
FB Account 18	11	181	27	13

FB Account 9	11	26	0	3
FB Account 12	10	1,658	50	288
FB Account 1	6	1,040	13	373
FB Account 23	6	26	0	14
FB Account 2	6	12,915	943	7,159
FB Account 24	5	261	22	18
FB Account 25	3	26	7	21
FB Account 13	3	19	3	3
FB Account 22	3	2	0	0
FB Account 10	2	44	0	0
FB Account 21	1	2	0	5
FB Account 16	1	5	0	0
FB Account 20	1	30	2	0
FB Account 7	1	21	0	0
FB Account 17	1	58	0	17
FB Account 15	1	2	0	1

FB Account 14	1	46	11	8
FB Account 3	1	14	2	10
FB Account 19	1	13	0	3
Total	310	49,848	2,877	18,909

Overall, the distribution pattern shows that engagement is highly concentrated among a small number of profiles, highlighting the unequal distribution of influence in the campaign’s online network. This mirrors broader findings in environmental communication research, which noted that while social media can serve as an equalizer by enabling participation beyond traditional membership structures, engagement remains uneven, with certain actors and organizations drawing disproportionately higher interaction (Zhang & Skoric, 2018).

Similarly, public engagement is shaped by existing interpretative frames and sociocultural factors, meaning that even in open digital spaces, only a subset of actors effectively capture attention and mobilize participation (Wibeck, 2013).

Finally, this further reinforced this by showing that although digital tools expand opportunities for interaction, they often reproduce inequalities of influence, raising questions about inclusivity and the quality of engagement outcomes (Hafferty et al., 2024). With this, it can underline that while social media networks offer new avenues for advocacy, influence and visibility tend to cluster around a few central nodes, leaving engagement highly uneven across participants.

### Engagement by Type of Content

Table 10 shows that the majority of posts were images or photos, followed by infographics and reels. Image posts consistently garnered the highest engagement across likes (56.15%), comments (54.95%), and shares (66.21 %). Videos (17.91%) and infographics (15.21%) received the next highest number of likes after images; for comments, videos (26.49%) and infographics (8.13%) followed image posts; while in terms of shares, infographics (13.33%) and videos (12.40%) ranked next to images.

Images emerged as the most frequently posted and most engaging content type, reflecting a clear preference for visual content among Facebook users engaged with the Stop Kaliwa Dam issue. Their dominance in likes, comments, and shares indicates that images are highly effective for advocacy messaging and audience mobilization in social media campaigns.

Videos and infographics also demonstrated strong engagement, particularly in terms of likes and shares, indicating that multimedia content is effective in capturing audience attention and encouraging interaction. This suggests that multimedia formats elicit more active user participation and discussions compared to static content. While reels and links generated relatively lower engagement compared to images, they still played a meaningful role in fostering user conversations, especially through comments.

Reels supported audience interaction through comments, while external links provided informational depth, likely redirecting users to external articles or advocacy

materials. This suggests that although less dominant, reels and links contribute to sustaining dialogue and engagement within the online campaign. Reels and links, though less dominant than images, play distinct but complementary roles in sustaining engagement. Reels stimulate interactive dialogue through comments, while links provide informational depth by redirecting users to external advocacy materials. This dynamic reflects how digital platforms foster multi-layered engagement, combining participation, dialogue, and knowledge-sharing to strengthen environmental advocacy (Zhang & Skoric, 2018; Wibeck, 2013; Hafferty et al., 2024).

As expected in a highly visual platform like Facebook, text-only posts garnered minimal interaction, reaffirming the importance of incorporating visuals to enhance audience reach and participation in advocacy-related content. The strong engagement of images, videos, and infographics in the Stop Kaliwa Dam campaign aligns with findings that visual formats enhance virality, visibility, and mobilization in online advocacy (Susanto, 2021; Shahbaznezhad et al., 2021). Social media's interactive and multimedia nature also fosters dialogue and pro-environmental actions, making visual content especially effective for sustaining engagement in environmental campaigns (Zhang & Skoric, 2018).

**Table 10***Engagement by type of content of the Facebook accounts*

Type of format	Total	Percent	No. of likes	%	Comments	%	Shares	%
Image	106	34.19	27,991	56.15	1,581	54.95	12,519	66.21
Art Card	73	23.55	7,584	15.21	234	8.13	2,520	13.33
Video	68	21.94	8,926	17.91	762	26.49	2,345	12.40
Reels	32	10.32	2,375	4.76	175	6.08	416	2.20
External Link	26	8.39	2,751	5.52	106	3.68	1,061	5.61
Text	5	1.61	221	0.44	19	0.66	48	0.25
Total	310	100.00	49,848	100.00	2,877	100.00	18,909	100.00

**Table 11***Summary of statistics on the engagement of posts per type of format*

Image	N	Total Engagement	Maximum	Mean	Std. Deviation
Text	5	288	221	57.60	89.18
Image	106	42,091	27,991	397.08	10834.67
Video	68	12,033	8,926	176.96	3535.01
Reels	32	2,966	2,375	92.69	985.21
Link	26	3,918	2,751	150.69	1093.63
ArtCard	73	10,338	7,584	141.62	3071.24
Valid N (listwise)	310				

### Engagement by categories of issues in the FB accounts

The dominance of activism-themed content in both volume and engagement highlights social media's central role in mobilizing collective action, consistent with findings that online networks amplify advocacy, dialogue, and pro-environmental participation as seen in Table 12 (Zhang & Skoric, 2018; Susanto, 2021).

The Activism Advocacy category had the highest average engagement, suggesting that content focused on activism and advocacy resonates strongly with the audience. Overall, posts in this category received 40,262 interactions, the highest among all categories. In contrast, categories like Nature and Identifiable People had lower average engagement, indicating less interaction with these types of posts.

The standard deviations reveal significant variability within each content type, particularly in Activism/Advocacy and People in General, where some posts achieved exceptionally high engagement while others did not. This suggests that while certain themes are generally engaging, the success of individual posts can vary widely based on factors not captured by the content type alone.

The alignment of this surge in content with the Alay Lakad Laban sa Kaliwa Dam event reflects how offline mobilizations can reinforce and expand digital conversations, highlighting the interplay between physical activism and online advocacy (Susanto, 2021). Posts centered on People-themed narratives, about personal experiences, emotions, and appeals from individuals and communities, sustained consistent engagement, aligning with findings that personal storytelling fosters dialogue and

mobilizes citizens in environmental campaigns (Zhang & Skoric, 2018). Although not as dominant as activism advocacy, this category secured the second-highest number of likes and comments, affirming the importance of personal storytelling in environmental and social issue campaigns (Leon et al., 2022; O'Neill, 2017).

Despite having a lower volume of posts, Informative Content demonstrated strong performance in terms of shares, accounting for 16.30% of total shares. This suggests that fact-based, educational posts like those particularly explaining policies, legal frameworks, and environmental risks, are valuable resources that users are inclined to disseminate within their networks.

On the other hand, the relatively low engagement for categories like Nature, Identifiable People, and Solutions suggests that these topics were underutilized or less prioritized by audiences and content creators during the study period.

Advocacy activism, people-centered narratives, and informational content generated the highest engagement, showing how campaigns strategically blend mobilization, storytelling, and credible information. Activism posts amplified collective action online (Susanto, 2021), while personal stories fostered dialogue and mobilized citizens (Zhang & Skoric, 2018; Leon et al., 2022). Informational content, though fewer in number, gained strong shares as credible resources (Shahbaznezhad et al., 2021; Wibeck, 2013). These results highlight that advocacy campaigns are most effective when combining calls to action with personal and educational content to maximize reach and participation.

**Table 12***Engagement by categories of issues in the FB accounts*

Categories	Total (n=310)	Percent	No. of likes	%	Comments	%	Shares	%
Activism Advocacy	106	34.19	26,422	53.01	1,821	63.30	12,019	63.56
People (in general)	65	20.97	8,906	17.87	371	12.90	2,092	11.06
General Media	45	14.52	2,928	5.87	216	7.51	582	3.08
Informative Content	36	11.61	7,602	15.25	297	10.32	3,083	16.30
Impacts	26	8.39	1,642	3.29	65	2.26	494	2.61
Causes (of environmental problems)	23	7.42	1,429	2.87	61	2.12	373	1.97
Identifiable People	5	1.61	367	0.74	17	0.59	59	0.31
Nature	3	0.97	288	0.58	18	0.63	42	0.22
Solutions	1	0.32	264	0.53	11	0.38	165	0.87
Total	310	100.00	49,848	100.00	2,877	100.00	18,909	100.00

**Note:** Table presents the distribution of Facebook post engagement by category (N = 310). Engagement metrics include likes, comments, and shares.

### **Timeline of Engagements with the Facebook Posts About Kaliwa Dam**

Figure 11 visually presents the engagements (number of likes, comments, and shares) received by Facebook posts concerning the Kaliwa Dam issue during the period of the study. Displayed as a clustered bar chart, it uses three color-coded bars for each date: blue for likes, orange for comments, and yellow for shares.

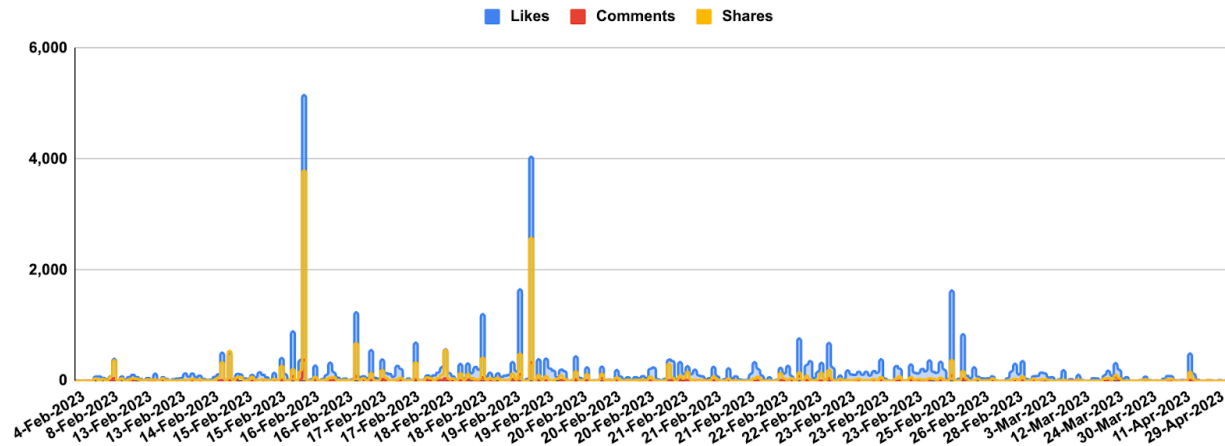
There was a notable peak in public engagement at the start of the Kaliwa Dam project campaign between February 15, 2023 until February 23, 2023 and during the week of the Alay Lakad Laban sa Kaliwa Dam event on February 15, 2023 until February 23, 2023 from General Nakar, Quezon Province, to Malacañang.

Between February 16 and 19, 2023, multiple posts or 73 uploaded contents recorded significantly higher interactions, with the most popular post receiving over 5,000 likes. However, engagement levels declined in the weeks following the event, indicating a decrease in public interest about the issue. The volume of engagement gradually declined in the succeeding days, with most posts garnering fewer than 1,000 reactions, comments, or shares.

The chart captures how specific protest activities and public statements during mid-February 2023, notably the Alay Lakad protest and accompanying community declarations against the Kaliwa Dam project, prompted heightened public engagement on Facebook. The visible decline in interactions after this period underscores how audience attention clustered around these critical protest dates before tapering off in the days that followed.

**Figure 11.**

*Timeline of engagement with Facebook content about the Stop Kaliwa Dam movement*



Based on a closer look at the Facebook pages, posts with detailed information, compelling narratives, or visually engaging media (such as infographics and videos) attracted more interactions than plain text posts. Engagement levels fluctuated between February 1 and May 1, 2023, with a clear surge during the *Alay Lakad<sup>2</sup> Laban sa Kaliwa Dam* event (February 15–23). The highest spike occurred on February 16–19, when offline mobilization translated into heightened online visibility. This pattern illustrates how major events amplify digital conversations, as offline activism often strengthens online engagement (Susanto, 2021).

However, the sharp decline in interactions after February 20 shows that event-driven peaks are often short-lived, echoing Wibeck's (2013) point that sustaining public engagement requires addressing broader barriers through consistent messaging and education. Similarly, Hafferty et al. (2024) emphasize that digital engagement is

<sup>2</sup> "Alay Lakad" is a Filipino term that translates to "walk offering"

highly context-dependent and often uneven, requiring continuous strategies to maintain participation. Thus, while the Alay Lakad event catalyzed a temporary surge, long-term engagement around the Stop Kaliwa Dam issue depended on sustained content strategies combining advocacy, storytelling, and credible information.

### **Exemplars from Facebook Accounts with the Highest Engagements**

The content from FB Account 2 got the highest recorded engagement in this dataset. This was posted on February 16, 2023, which features the “Alay Lakad para sa Kaliwa Dam” participants with the Indigenous Peoples and various advocacy groups. Some are seen wearing rain gear or covering themselves against the sun, embodying the resilience and determination behind their cause (Figure 12).

This post generated remarkable engagement, with 5,154 likes, 381 comments, and 3,793 shares, demonstrating how personal advocacy from public figures and authentic documentation of grassroots movements can resonate widely with the public on social media. As Leon et al. (2021) note, personal stories and images of ordinary people, particularly those that appear spontaneous and emotionally expressive, are especially effective in fostering empathy and sustaining audience engagement.

Based on the caption, the march symbolically journeyed from their communities to Malacañang, calling for a dialogue with government leaders regarding the controversial Kaliwa Dam project. Moreover, the caption shows as a public appeal (panawagan), urging fellow citizens to show empathy and support to the marchers, who

continue their protest under harsh conditions, enduring intense heat, cold amihan winds, and heavy rains. It emphasizes how many people remain unaware of the deeper implications of the protest and the sacrifices being made by the affected communities. The post also reiterates that the project encroaches upon protected areas and violates the rights of Indigenous communities.

**Figure 12.**

*Screenshot of FB Account 2's content about the ongoing Alay Lakad to Malacañang*

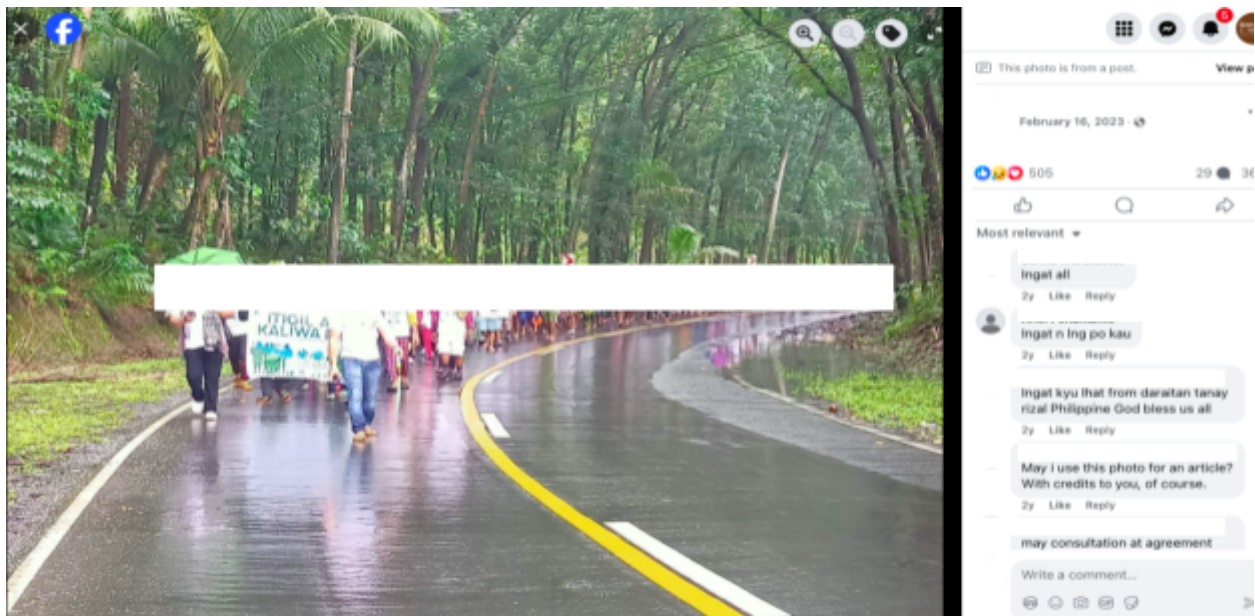
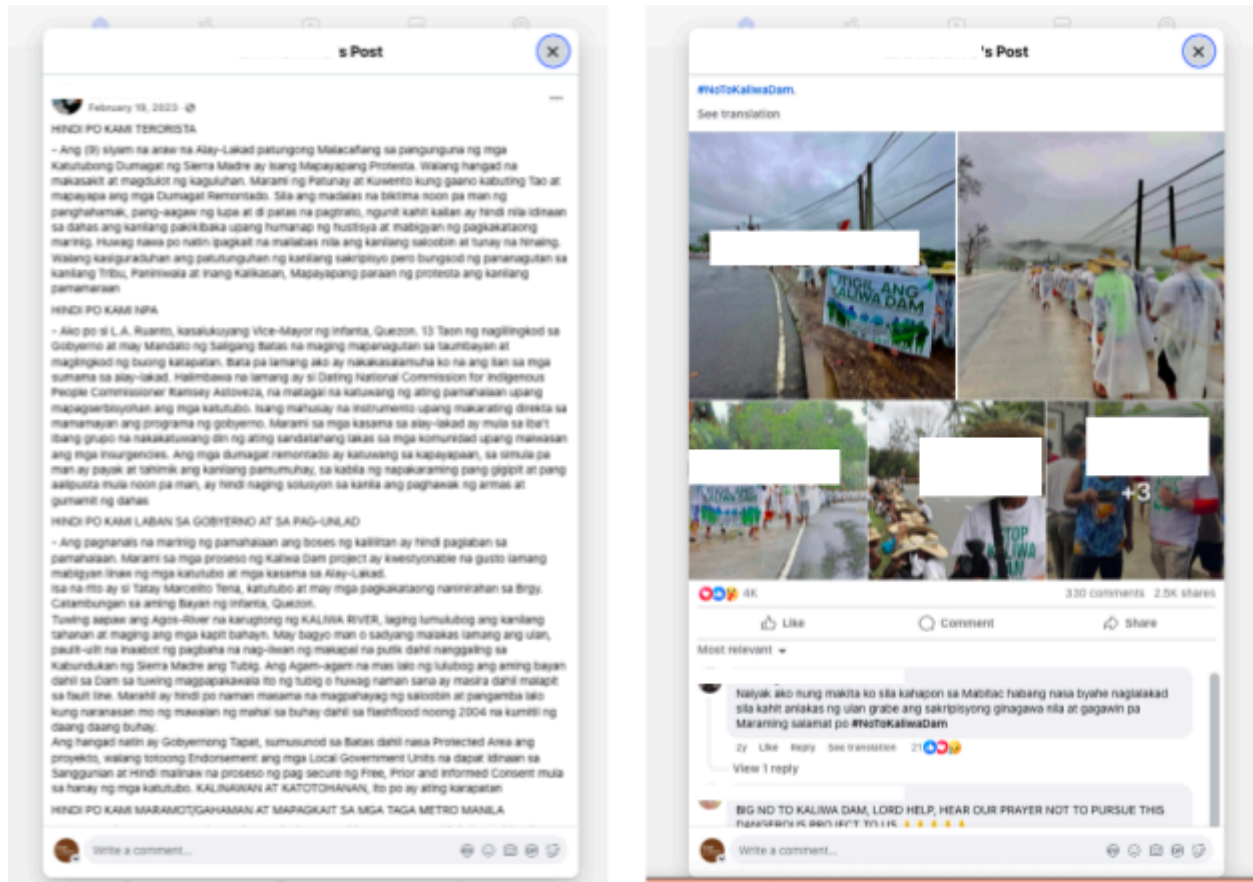


Figure 13.

Screenshot of FB Account 2's Facebook content caption highlighting the long-standing injustices faced by the Dumagat Remontado



Another post from FB Account 2 gained the second highest engagement with 4,043 likes, 331 comments, and 2,581 shares. This was posted on February 19, 2023, which features a heartfelt and impassioned message, in defense of the Dumagat-Remontado community and their peaceful protest against the Kaliwa Dam project (see Figure 14).

In his caption, the FB account directly addresses misconceptions and derogatory labels aimed at the Indigenous Peoples, firmly asserting that they are neither terrorists nor insurgents, but peace-loving individuals fighting to protect their ancestral land, culture, and the environment. The post sheds light on the long-standing injustices endured by the Dumagat Remontado, from land grabbing to systemic marginalization, while emphasizing their unwavering commitment to peaceful advocacy.

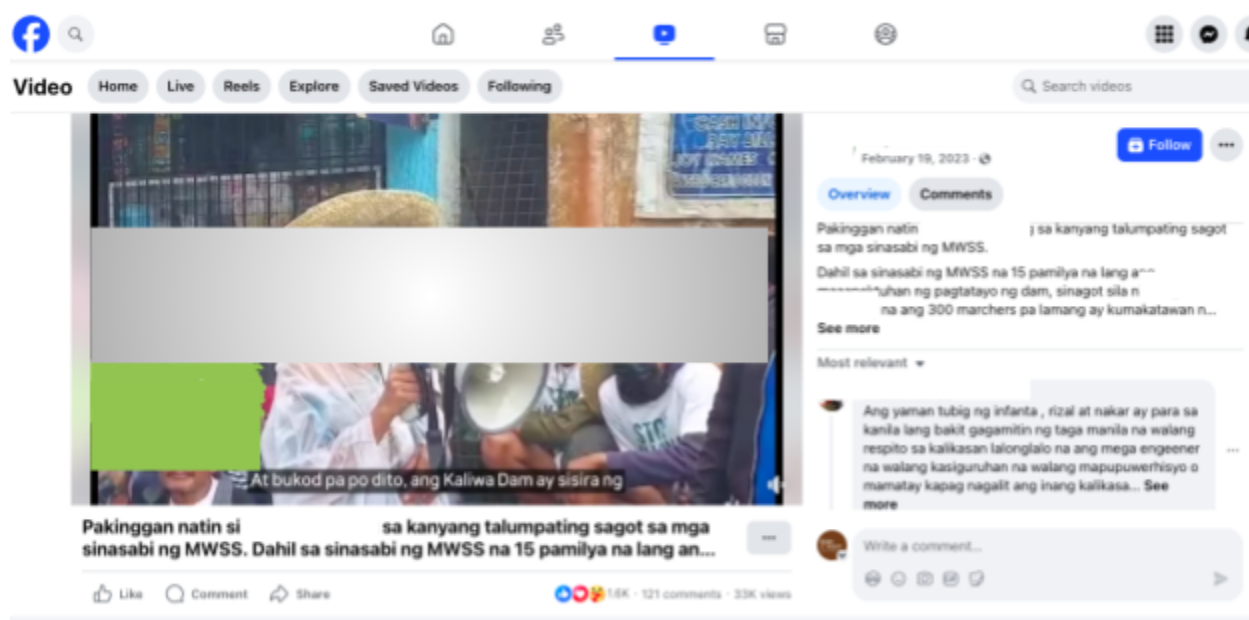
The caption also recounts personal and communal stories, including the tragedy of the 2004 flash flood, the looming threat posed by the dam's proximity to an active fault line, and the lack of transparent government processes in securing the community's Free, Prior, and Informed Consent (FPIC). FB Account 2 stresses that the indigenous community is not against development or Metro Manila's water supply needs; rather, they advocate for alternative, sustainable, and environmentally responsible solutions. The post likewise condemns baseless accusations branding the protesters as mercenaries or agitators, underscoring the daily sacrifices made by the participants during their nine-day protest march to Malacañang.

Accompanying the caption is a powerful image capturing members of the Dumagat-Remontado community alongside local supporters, marching resolutely with banners and placards that read "Hindi Kami Terrorista" and "No to Kaliwa Dam", set against the verdant landscapes and winding roads of the Sierra Madre. The image poignantly conveys the unity, courage, and sincerity of a community standing up for their rights and environment through peaceful, determined means.

In addition, the post includes seven more photos documenting the participants of the Alay Lakad, braving the elements as they continued their protest march regardless of the weather, further emphasizing their resilience, solidarity, and dedication to the cause.

### Figure 14.

*Screenshot of a video of FB Account 4 showing one of the leaders in the community rendering a powerful speech*



A video, posted by FB Account 4 on February 19, 2023, had the third highest engagement. This video post garnered 33,000 views, along with 1,650 likes, 121 comments, and 490 shares. It features a compelling speech from a leader and a voice of the Dumagat-Remontado community challenging the claim made by the Metropolitan Waterworks and Sewerage System (MWSS) that the Kaliwa Dam project would displace

only 15 families. The leader firmly refuted this assertion by explaining that the 300 marchers participating in their protest already represent around 200 families, exposing efforts to downplay the true scale of displacement and community impact.

The caption reinforces the leader's message, reaffirming the community's unwavering commitment to defend their ancestral land, protect the Sierra Madre,<sup>3</sup> and safeguard their livelihood and cultural heritage. It calls on the public to express solidarity by joining the protest march and supporting the campaign through petitions and donations. The post concludes with rallying hashtags such as #StopKaliwaDam and #SaveSierraMadre, along with links to online platforms for further support.

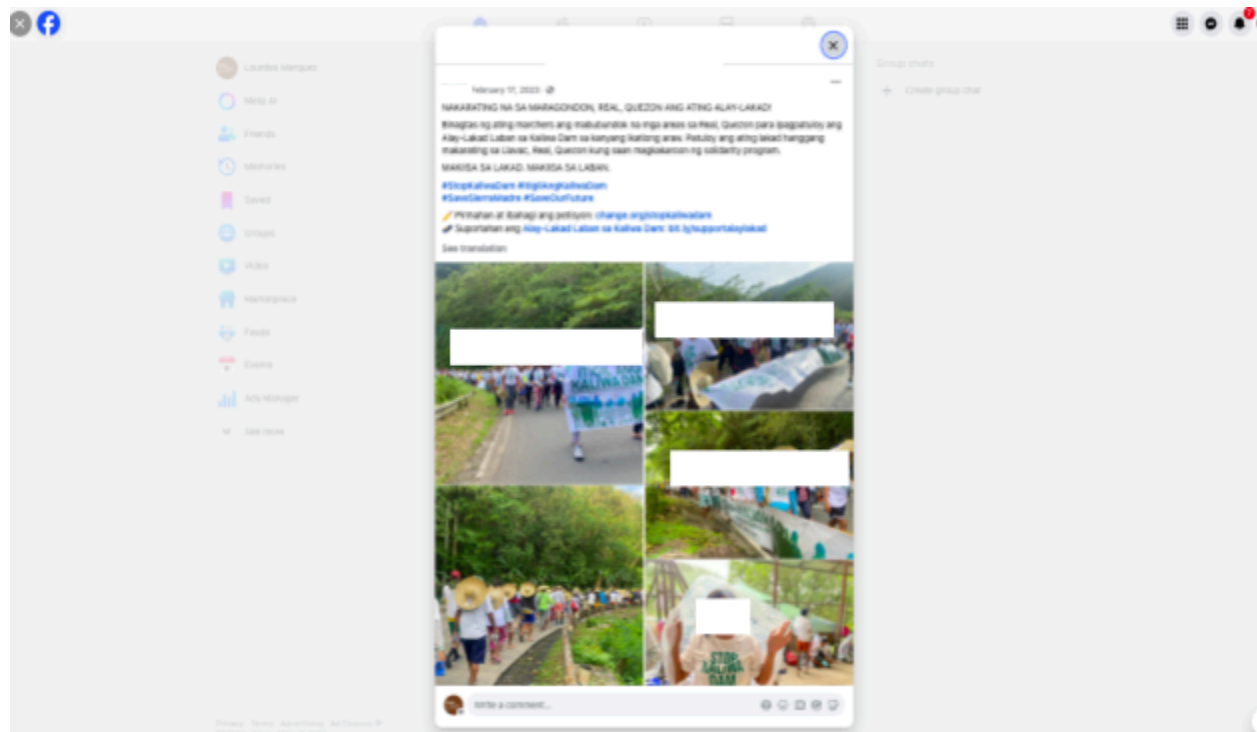
The video powerfully captures the leader's impassioned address before fellow protesters, embodying the collective strength, courage, and determination of the indigenous people and their allies in this ongoing environmental and human rights struggle.

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<sup>3</sup> The Sierra Madre is the longest mountain range in the Philippines, stretching approximately 540 km along the eastern side of Luzon Island. Known as the "backbone of Luzon," it stands as a natural fortress and serves a vital role as a typhoon shield, slowing and deflecting strong Pacific storms. It spans ten provinces, supports a massive portion of the country's forest cover, and sustains rich biodiversity (Climate Change Commission, 2024).

## Figure 15

Screenshot of content from FB Account 4 showing real-time updates of Alay Lakad to Malacañang participants in Real, Quezon



The content from FB Account 4 is a protest-themed post categorized under images, featuring a caption and five photos of people participating in the Alay Lakad protest march in Real, Quezon. This was published on February 17, 2023, which received 1,235 likes, 84 comments, and 679 shares.

The caption announces that the Alay-Lakad marchers have reached Maragondon, Real, Quezon on the third day of their protest walk against the Kaliwa Dam project. It highlights how the participants have traversed the mountainous areas of Real, Quezon, continuing their advocacy journey despite challenging terrain. The post

also informs followers that the group would proceed to Llavac, Real, Quezon, where a solidarity program would be held as part of their continuing campaign activities. The caption calls for public support, inviting people to join the march, stand with the cause, and participate in collective action against the dam's construction. It ends with rallying hashtags like #StopKaliwaDam, #SaveSierraMadre, and links to an online petition and a donation drive supporting the Alay-Lakad protest.

The accompanying photos capture moments from the protest march, showing groups of people walking along provincial roads, surrounded by lush greenery and hilly landscapes. Some images feature participants holding placards and banners bearing protest slogans, symbolizing solidarity and determination as they continue their advocacy to protect their ancestral lands and the Sierra Madre mountain range.

Other examples of highly engaged Facebook posts can be found in Appendix 4.

## Part 2

### Network Centrality of the FB Accounts

This section measures the centrality of the networks formed by the FB accounts. Centrality was chosen over the other network indices because it measures their level of engagements and connections in the network. Centrality has influence in shaping the information exchanges and the ease of information flow among the network members. In this study, centrality of the Facebook or online advocates was presumed to be able to shape or structure the critical communication movement, which was the Stop the Kaliwa Dam Campaign.

Centrality can be measured in terms of closeness, degree (indegree and out degree), and betweenness.

The closeness centrality measures how quickly a node (profile) can reach all other nodes in the network, reflecting its proximity and accessibility within the network structure.

The degree centrality can measure how long it is to spread information from the node to all other nodes. The out-degree centrality measures the likes given by a Facebook account to another account, while the in-degree centrality measures the number of likes received from another Facebook account.

The betweenness centrality quantifies how often a node acts as a bridge or intermediary along the shortest path between other nodes, thus indicating control over information flow within the network.

The FB accounts were considered as nodes, while the relationships or connections among other nodes were considered as edges.

The centrality networks were measured based on two ways: on the likes received and on the comments received by the FB account.

As discussed earlier, information from the Facebook accounts were extracted using FB APIfy. The datasets were transformed into Google and Excel files. The networks formed were visualized after applying the ForceAtlas layout algorithm in Gephi. Gephi is an open-source software designed for visualizing and analyzing large network graphs. This layout arranges nodes based on the strength of their connections, pulling highly connected profiles closer to the center while pushing less connected nodes toward the periphery.

Node sizes were ranked according to their degree centrality values, meaning larger nodes indicate Facebook accounts with a higher number of direct connections or like reactions. Colors were assigned using a partition by degree ranking, allowing for easier identification of groups or clusters of profiles with similar levels of engagement within the network. This organized visualization highlights key actors at the core of the network on the Facebook accounts that received the highest number of like reactions and maintained the most direct connections with others.

The discussion will first show the numerical figures computed for the Top FB accounts with the highest postings or uploads about the Kaliwa Dam. For simplicity of discussion, only the top 10 or so FB accounts are presented here and the full 25 FB

accounts are shown in the Appendices. Then the visualization of the three networks (showing degree, closeness, and degree centralities) are presented.

### Network Centrality Based on Like Reacts

Table 13, 14, and 15 show the numerical figures for the centrality.

For **degree and betweenness centrality** with similar rankings, the top 7 FB accounts are the following (Table 13):

**Table 13**

*Top FB accounts for degree and closeness centrality based on likes*

Rank	Degree Centrality		Betweenness Centrality	
	Node	Value	Node	Value
1	FB Account 4	2325	FB Account 4	5470580.112
2	FB Account 5	687	FB Account 5	1809884.298
3	FB Account 6	166	FB Account 6	459673.435
4	FB Account 11	159	FB Account 11	434201.650
5	FB Account 8	125	FB Account 8	291687.209
6	FB Account 12	98	FB Account 12	270552.978
7	FB Account 2	58	FB Account 2	165691.972

For **closeness centrality**, the top 6 Facebook accounts are the following:

**Table 14***Top FB accounts for Betweenness centrality based on likes*

Rank	Closeness Centrality	
	Node	Value
1	FB Account 16, FB Account 17, FB Account 12	1.000
2	FB Account 4	0.620
3	FB Account 11	0.468
4	FB Account 8	0.426
5	FB Account 18	0.397
6	FB Account 5	0.383
7	FB Account 6	0.339

**Table 15***Summary of centrality measures based on FB likes*

FB Account	No. Posts	Centrality		
		Degree (in-degree)	Closeness	Betweenness
FB Account 4	128	2325 (1)	0.620 (2)	5,470,580.112 (1)
FB Account 5	33	687 (2)	0.383 (6)	1,809,884.298 (2)
FB Account 6	30	166 (3)	0.339 (7)	459,673.435 (3)
FB Account 11	23	159 (4)	0.468 (3)	434,201.650 (4)
FB Account 8	21	125 (5)	0.426 (4)	291,687.209 (5)
FB Account 18	11	64	0.397 (5)	23,3078.599
FB Account 12	10	98 (6)	0.330	270,552.978 (6)
FB Account 1	6	52	0.329	150,801.914 (7)
FB Account 2	6	58 (7)	0.321	16,5691.972
FB Account 21	1	2	1 (1)	1
FB Account 16	1	5	1 (1)	10
FB Account 7	1	1	0.383 (6)	0
FB Account 17	1	10	1 (1)	45.000

**Table 16**

*Statistical parameters of network centrality measures based on Likes*

Centrality Measure	Mean	Standard Deviation	Standard Error
Degree	154.000	463.648	92.72964575
Closeness	0.393	0.258	0.0516338159
Betweenness	385183.359	1098648.657	219729.7315

**Degree Centrality.** The mean degree centrality is 154, but with a high standard deviation of 463.648, indicating a highly uneven distribution of likes across the nodes. Only a small number of profiles received a large volume of likes, while the majority garnered minimal engagement. This reflects the typical right-skewed distribution observed in online social networks, where influence is concentrated in a few highly connected actors (Akhtar et al., 2013; Scaibu, 2024).

Notably, FB Account 4 emerged as the most influential node in the network, recording the highest values in degree centrality with 2,325 connections or likes. As a community organization actively leading the campaign against the Kaliwa Dam project, its strong centrality underscores the ability of organizational pages to mobilize large-scale support and serve as central hubs for advocacy communication (Nouh & Nurse, 2015).

The second highest in degree centrality is FB Account 5 (687 connections), the Facebook page of a community radio station with 13,000 followers and 7,600 likes. This account frequently disseminates updates about local initiatives in Infanta, Quezon,

including activities under the Alay Lakad para sa Kaliwa Dam issue campaign, suggesting its key role in bridging different network clusters.

FB Account 6 holds the third-highest degree centrality score with 166 connections or likes. This non-governmental organization, with 8,100 followers and 6,700 likes, has been actively sharing environmental advocacy content and mobilization updates, positioning it as another critical actor in the network's information flow.

FB Account 11 ranks fourth in degree centrality, registering 159 direct connections within the network. This FB account is managed by the leader and founder of another civil society group included in the 25 Facebook accounts studied. The strong presence underscores the influential role of individual actors in amplifying environmental advocacy on social media platforms.

In fifth place is the Facebook Account 8, which recorded a degree centrality of 125. This non-government organization primarily shares content advocating for the preservation of the Sierra Madre mountain range and actively supports the Stop Kaliwa Dam movement.

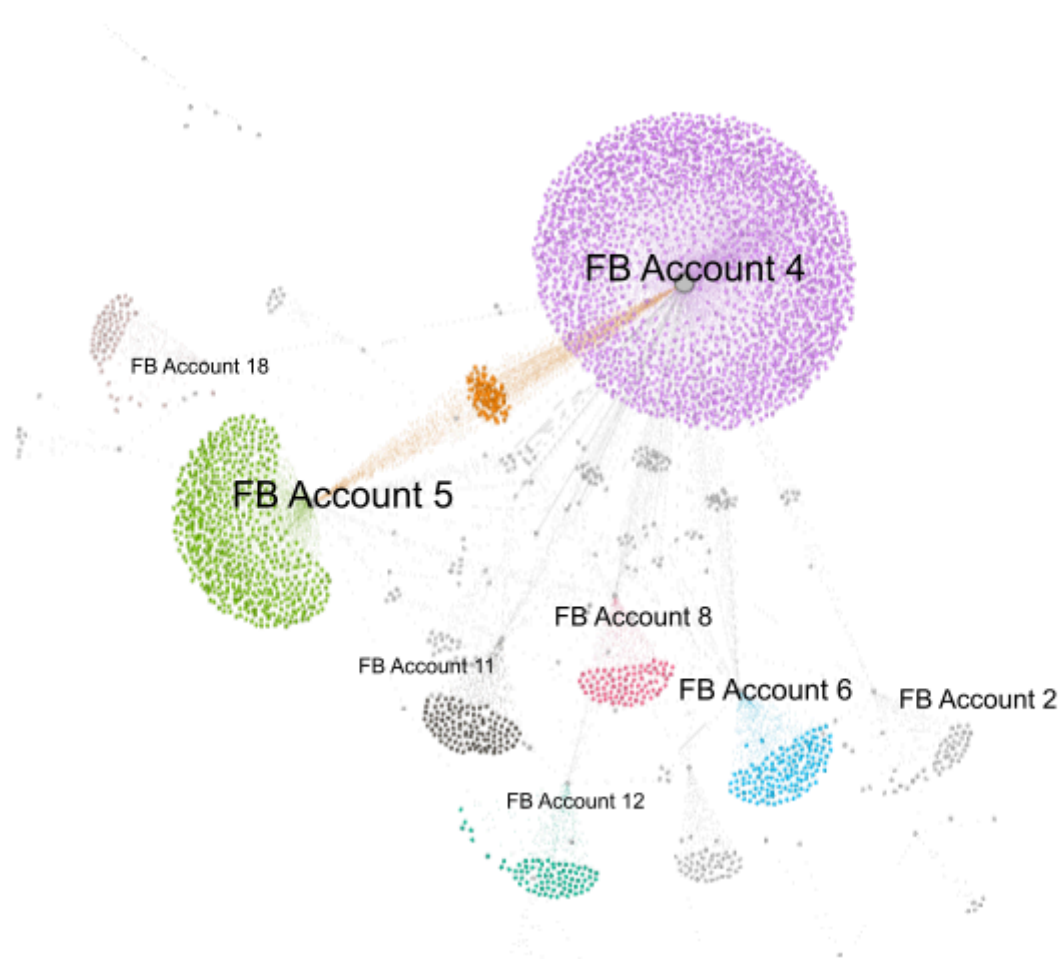
Ranking sixth is FB Account 12, a public figure with 5,000 followers. This profile holds a degree centrality score of 98. Its content centers on personal views regarding various social issues, as well as posts related to the owner's professional engagements and advocacy work.

Seventh in rank is the FB Account 2, with a degree centrality of 58. The page has over 73,000 followers and identifies the account owner as a public figure and a

motivational speaker. The content mostly features personal updates, public service-related activities, and advocacies.

**Figure 16.**

*Network on degree centrality based on Facebook likes*



The graph shows a highly right-skewed distribution, where the majority of nodes (FB profiles) have very low degree centrality, while only a few nodes exhibit very high degrees. Nearly 3,200 nodes have minimal or no connections, while a small fraction of profiles reaches degree values as high as over 2,000. This pattern indicates the presence of a small number of highly connected actors dominating interactions while the majority remain peripheral (Akhtar et al., 2013; Scaibu, 2024). Such concentration of ties suggests that information flow and engagement within the network are not evenly spread but clustered around central hubs.

Additionally, this suggests that the information flow and engagement within the network are concentrated among a few key actors, reinforcing the centrality analysis results presented in earlier figures. These influential nodes likely play a critical role in disseminating information, mobilizing supporters, and amplifying the advocacy message against the Kaliwa Dam project (Nouh & Nurse, 2015; Derr, 2023). At the same time, the large number of minimally connected participants indicates a wide but shallow reach, where peripheral nodes contribute to visibility but rely on central actors to access campaign content (Senekal, 2014). This pattern underscores the dependency of digital advocacy movements on a few dominant nodes to sustain momentum and achieve broader diffusion, aligning with prior studies on environmental and social movement campaigns that show how organizational accounts anchor engagement while individuals amplify narratives through personal networks (Can & Alatas, 2019; Kitikamdhorn & Ramasoota, 2023).

**Betweenness centrality.** The betweenness centrality based on 'likes' also shows the same top FB accounts with the same ranking (Table 15).

The mean betweenness centrality is 3,451.22 with extremely high standard deviation of 97,839.19. This confirms a highly skewed network where a small number of nodes serve as a major bridge connecting others.

Here, FB Account 4 dominates this measure again with a very high value of 5,470,580.11, followed by FB Account 5, and FB Account 6. These nodes serve as key intermediaries in connecting different parts of the network.

FB Account 11 came fourth (434,201.650); FB Account 8 (291,687.209), FB Account 12 (270,552.978), and FB Account 1 (150,801.914).

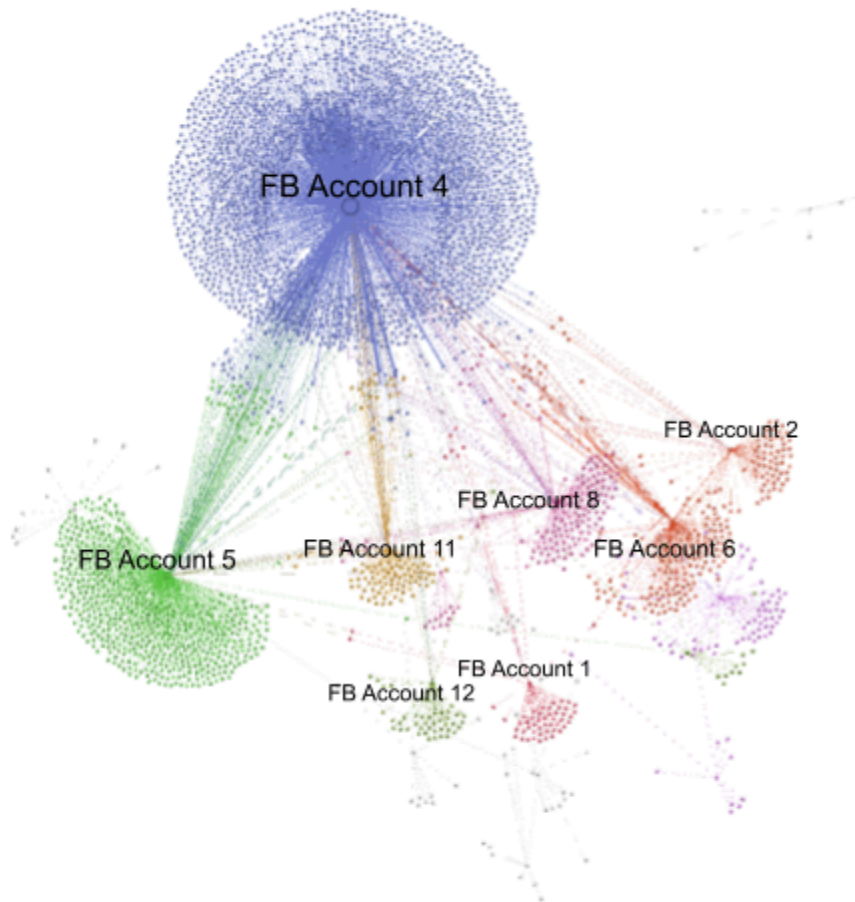
Similar to the degree and closeness centrality, most nodes registered low betweenness centrality values, reflecting limited influence in connecting other profiles within the network.

The presence of high-betweenness FB accounts is crucial for the network's overall cohesion, as these profiles act as intermediaries or "brokers" who bridge different advocacy communities (Freeman, 1977; Wasserman & Faust, 1994). This finding aligns with Noun and Nurse (2015), who note that betweenness centrality identifies gatekeepers responsible for the flow of information across clusters. In the context of advocacy campaigns, such nodes, often organizational pages, media outlets, or influential individuals, facilitate coordination and visibility across otherwise fragmented audience groups (Derr, 2023).

The dominance of a few key accounts is characteristic of social advocacy networks, where structural inequality in influence ensures that most engagement depends on strategic connectors (Senekal, 2014). This reflects Can and Alatas (2019), who emphasize that high-betweenness actors play a pivotal role in sustaining online mobilization by keeping diverse participants linked to the broader campaign narrative. In the Stop Kaliwa Dam movement, these accounts served not only as amplifiers of protest calls but also as bridges enabling grassroots voices to reach broader publics. Such dynamics affirm Kitikamdhorn and Ramasoota (2023), who argue that advocacy success in digital spaces relies on both central hubs for visibility and intermediaries for cross-community diffusion.

**Figure 17.**

*Network on betweenness centrality based on Facebook likes*



**Closeness centrality.** As Hanneman and Riddle (2005) explain, closeness centrality reflects how near an actor is to all others in a network, emphasizing the average distance between nodes. A high closeness score does not necessarily mean an actor is connected to many others; rather, it can imply strategic positioning within a

local cluster. In this case, while the accounts appear central in terms of distance, their influence may be localized rather than network-wide.

Three FB accounts have a score of 1 in closeness centrality measures, namely: FB Account 17, FB Account 16, and FB Account 21. This indicates that these three nodes are directly connected to other nodes in the network with a highly central position with the shortest possible paths to everyone.

Unfortunately, the followers and following are not publicly visible in Facebook search, which hinders me from checking the groups they are connected to.

Majority of the nodes exhibit low closeness centrality scores, indicating that most profiles are relatively distant from others in terms of direct and indirect connections. A small number of profiles show higher closeness centrality values, suggesting their ability to interact efficiently with many other nodes in the network, thus positioning them strategically to access and disseminate information quickly. This pattern aligns with Noun and Nurse (2015), who emphasized that closeness centrality can reveal actors with the potential to diffuse information broadly and quickly, even if they are not the most visible hubs. Similarly, Can and Alatas (2019) highlight that nodes with high closeness centrality contribute to the robustness of online social networks by connecting fragmented communities. In advocacy contexts, these actors are often responsible for ensuring that messages are not confined within echo chambers but instead spread across diverse audience groups.

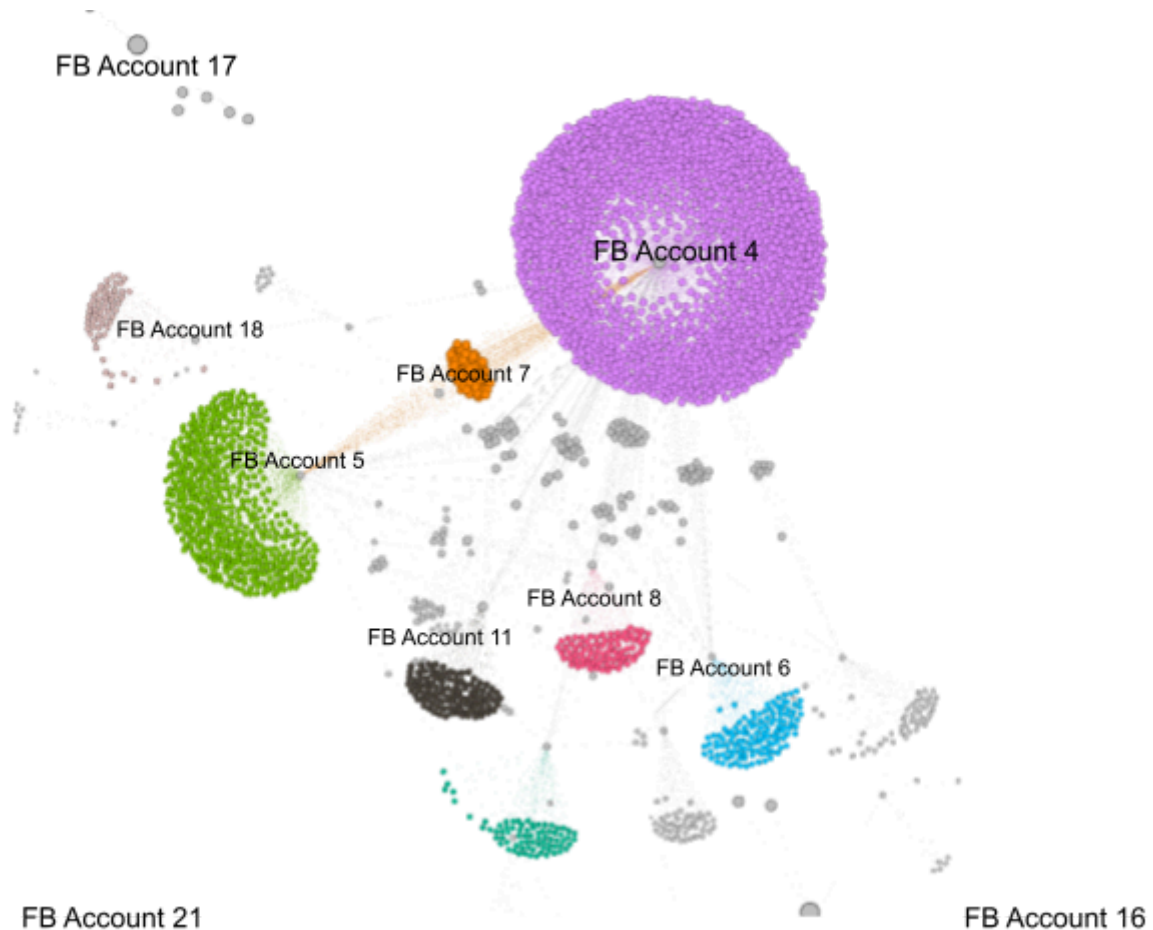
The distribution reinforces earlier degree centrality findings, confirming that only few number of accounts, like FB Account 4 (0.620), FB Account 11 (0.468), FB Account 8 (0.426), FB Account 18 (0.397), FB Account 5 (0.383), FB Account 7 (0.383), and FB

Account 6 (0.339) hold strategically advantageous positions in the network, capable of rapidly bridging communication gaps across different clusters in the online conversation on the Kaliwa Dam issue.

Furthermore, findings are consistent with Kitikamdhorn and Ramasoota (2023), who found in their study of COVID-19 advocacy networks that actors with higher closeness scores were more effective in disseminating timely information during peak attention periods. For the Stop Kaliwa Dam movement, this suggests that while degree and betweenness centrality capture visible influence and bridging power, closeness centrality highlights efficiency in message delivery. Thus, these strategically positioned actors enhance the network's ability to respond rapidly to opportunities for mobilization and visibility in environmental communication campaigns.

**Figure 18.**

*Network on closeness centrality based on Facebook likes*



In summary, FB Account 4 consistently ranked highest across all centrality measures based on like reactions, underscoring its pivotal role in the online advocacy network. Its prominence reflects both its ability to attract the highest number of direct engagements (degree centrality) and its function as a key connector bridging different

audience groups (betweenness and closeness centrality). This confirms that highly central actors are critical for the cohesion of advocacy networks, ensuring that messages circulate effectively across otherwise fragmented clusters (Nouh & Nurse, 2015).

Overall, the diversity of centrality measures across the accounts reveals a multi-layered influencer structure within the Stop Kaliwa Dam campaign. Community-based organizations, advocacy groups, and individual actors occupy distinct yet complementary positions in the network. Their strong centrality scores demonstrate not only their capacity to disseminate information widely but also their ability to strategically connect subgroups and facilitate cross-community interactions. As Can and Alatas (2019) note, such diversity enhances the resilience of advocacy networks by distributing influence across both visible hubs and less prominent but strategically positioned actors.

While a small number of pages dominate engagement, the role of smaller or less active FB accounts should not be overlooked. These peripheral actors extend the network's reach, contributing to the broader diffusion of advocacy messages, consistent with Kitikamdhorn and Ramasoota's (2023) finding that even accounts with modest activity can enhance message circulation during key mobilization periods. This layered influencer structure illustrates how both central and peripheral nodes collectively sustain momentum in digital advocacy campaigns, reinforcing earlier observations of network skewness as described by Senekal (2014) in his mapping of activist networks.

## **Network Centrality Based on Comments**

Based on comments, the FB accounts with high degree centrality include the following in order: 1) FB Account 4; 2) FB Account 2; 3) FB Account 11; 4) FB Account 12; and 5) FB Account 8.

The same trend is observed in betweenness centrality with almost the same ranking: 1) FB Account 4; 2) FB Account 2; 3) FB Account 11; 4) FB Account 12; 5) FB Account 8; and 6) FB Account 18.

FB Account 18 is a digital creator with approximately 2,400 followers on Facebook. The account actively shares content related to personal activities, public service, and social commentary. Notably, the account has been actively engaging in posts and discussions concerning the Kaliwa Dam issue, amplifying awareness and support for the movement. In addition, the FB Account 18 also participated in the Alay Lakad Laban sa Kaliwa Dam, reflecting both online and offline involvement in the campaign.

On the other hand, those with high closeness centrality were a bit different. These include: 1) FB Account 25 and FB Account 13 got 1.0; 2) FB Account 18; 3) FB Account 2; 4) FB Account 5; 5) FB Account 22; and 6) FB Account 12.

FB Account 13 is a digital creator with approximately 4,300 followers, sharing content related to personal life and business activities.

FB Account 22 is a Facebook page representing a local community organization based in Infanta, Quezon. It has around 782 followers and features sporadic content,

primarily consisting of shared posts from other content creators related to environmental efforts. Its engagement levels are relatively low, suggesting limited audience interaction despite its structural position in the network.

However, at the time of rewriting this paper, FB Account 25 could no longer be found, indicating that the account may have been deactivated or deleted.

**Table 17**

*Summary of FB centrality based on comments*

FB Profile	No. Posts	Centrality		
		Degree	Closeness	Betweenness
FB Account 4	128	548 (1)	0.580 (1)	344,774.59 (1)
FB Account 5	33	8	0.378 (4)	7, 585, 767
FB Account 6	30	15	0.32	5,708.43
FB Account 11	23	114 (3)	0.51 (2)	95,894.50 (3)
FB Account 8	21	27 (5)	0.34	7,163.94
FB Account 18	11	14	0.30	9,215.50 (5)
FB Account 9	11	1	0.27	0
FB Account 12	10	39 (4)	0.35 (6)	27,046.57 (4)
FB Account 1	6	8	0.27	6,461.00
FB Account 23	6	1	0.27	0
FB Account 2	6	249 (2)	0.42 (3)	179,661.22 (2)
FB Account 24	5	0	0	0
FB Account 25	3	3	1	0
FB Account 13	3	2	1	1
FB Account 22	3	1	0.37 (5)	0

**Table 18**

*Statistical parameters of network centrality measures based on comments*

Centrality Measure	Mean	Standard Deviation	Standard Error
Degree	41.960	115.619	23.124
Closeness	0.525	0.346	0.069
Betweenness	27,598.421	75,453.960	15,090.792

**Degree centrality.** First, the degree centrality recorded FB Account 4 with the highest value of 548 connections based on comments received, followed by FB Account 2 with 249 and FB Account 11 with 114 connections. These nodes received the highest number of direct interactions through comments, indicating strong audience engagement with their content. FB Account 12 ranked fourth (with 110), while FB Account 8 followed with 27.

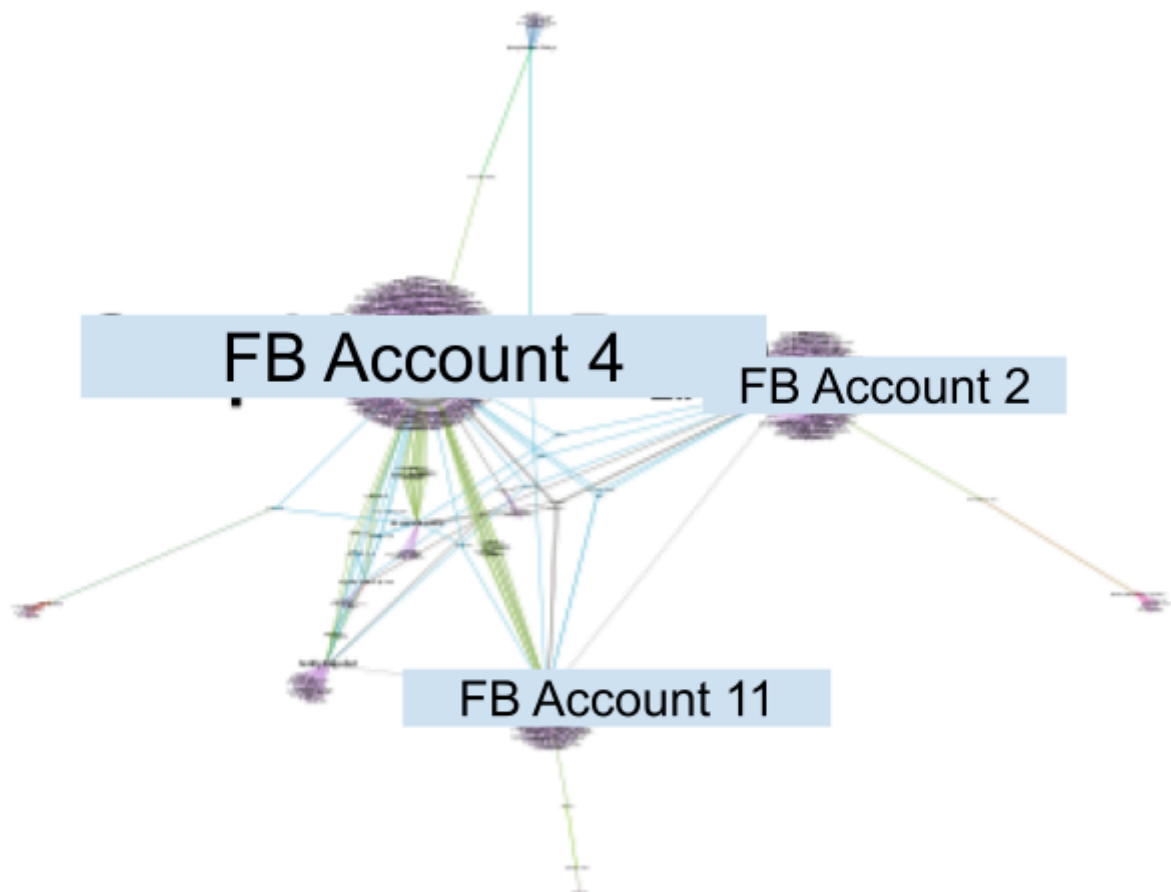
The mean degree centrality for comments was 41.960, with a standard deviation of 115.619. This reflects an uneven distribution of audience interaction across the network, though the disparity was less pronounced compared to the likes-based network. Such skewness in comment activity aligns with Akhtar et al. (2013), who note that Facebook networks often concentrate interaction on a small set of highly active nodes, leaving most accounts with minimal connections.

High comment-based degree centrality is significant because comments often reflect deeper engagement than likes, allowing for dialogue and opinion exchange. As Nouh and Nurse (2015) emphasize, nodes with high degree centrality serve as hubs of

discourse, amplifying advocacy messages by fostering discussions that sustain attention within activist networks. Similarly, Kitikamdhorn and Ramasoota (2023) found in their study of Facebook engagement that comments, though fewer in number compared to likes, serve as indicators of meaningful deliberation and can strengthen the impact of advocacy campaigns.

**Figure 19.**

*Network visualization of degree centrality based on Facebook comments*



**Betweenness centrality.** Similar to the degree centrality results, FB Account 4 also recorded the highest betweenness centrality, underscoring its role as the primary bridge in facilitating comment-based engagements. This means that FB Account 4 not only received the highest number of comments but also functioned as a key connector, ensuring that discussions flowed across different clusters of the network. Its high betweenness also complements its high closeness centrality, reinforcing its capacity to reach and connect diverse audiences efficiently.

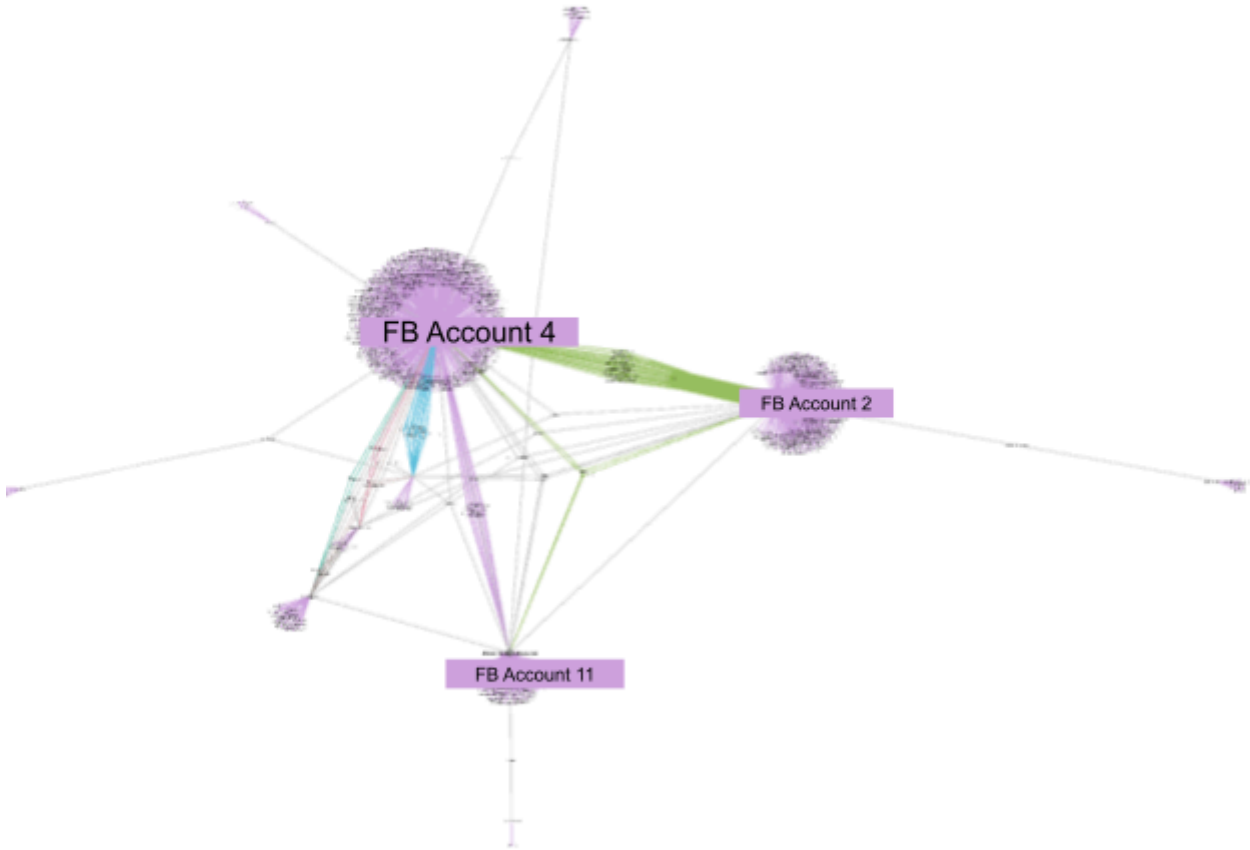
The mean betweenness centrality was 27,598.421, with a large but comparatively lower standard deviation of 75,453.960 compared to the likes-based network. This suggests the presence of influential bridging nodes, although the disparities between accounts were less extreme than in the likes-driven interactions. Such a pattern reflects what Nouh and Nurse (2015) highlighted in their study on activist groups, high-betweenness nodes serve as “gatekeepers,” enabling information to circulate between otherwise disconnected parts of the network, making them crucial for advocacy campaigns.

FB Account 2 also showed a substantial betweenness centrality rank, indicating its importance in connecting different clusters of users through comment interactions. FB Account 11 similarly displayed strong scores in both connections and betweenness values, reinforcing its influence in facilitating discussions within the network. Additionally, accounts such as FB Account 12 (fourth in rank) and FB Account 18 (fifth) demonstrated moderate levels of both degree and betweenness centrality. While not as dominant as FB Account 4, they still play meaningful intermediary roles. The distribution of centrality across multiple actors highlights the layered influence structure of online

networks, where even mid-level nodes contribute to maintaining engagement and sustaining the flow of advocacy messages (Can & Alatas, 2019).

**Figure 20.**

*Network visualization of betweenness centrality based on Facebook comments*



**Closeness Centrality.** Closeness centrality, which reflects how efficiently a node can reach all others in the network via the shortest paths, was measured based on comments. The mean closeness centrality was 0.525, lower than that of the likes-based network, with a standard deviation of 0.346. This suggests a generally less cohesive commenting network, where messages or interactions take longer to circulate among nodes on average.

Nodes that can most efficiently reach other nodes in the commenting network, based on closeness centrality scores, include, in order: FB Account 4, FB Account 11, FB Account 2, FB Account 5, FB Account 22, and FB Account 12.

The FB Account 4 page, which is primarily dedicated to the anti-Kaliwa Dam campaign, demonstrates a strong capacity to access and influence various parts of the network quickly. This supports Freeman's (1979) assertion that closeness centrality reflects how swiftly a node can disseminate information across a network. Its strategic position allows it to facilitate rapid communication and coordination, particularly on environmental concerns like the Kaliwa Dam issue.

Similarly, FB Account 2, a public official, holds a central position in the network. The high level of engagement suggests strong connectivity and an ability to disseminate information quickly to other nodes in the network.

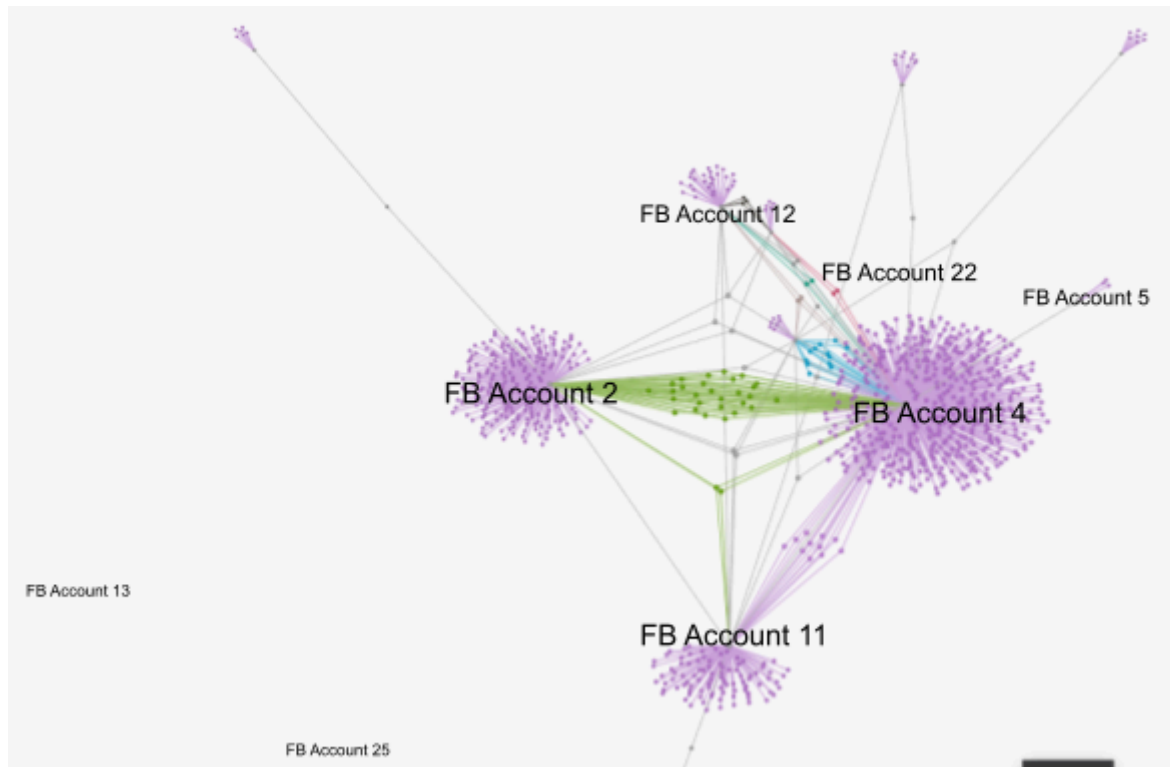
Content creators such as FB Account 11 and FB Account 12, who focus on environmental topics, have also secured influential positions within the network. Their content likely resonates with audiences concerned about environmental issues, enabling faster spread of information.

Lastly, although FB Account 22 and FB Account 5, both local organizations based in Infanta, Quezon, exhibit lower engagement levels, their central positions indicate a critical role in the structure of the network. They serve as important conduits for message dissemination within their local communities.

These results align with Nouh and Nurse (2015), who found that actors with strong centrality scores often serve as bridge nodes for sustaining network-wide communication in activist campaigns. Similarly, the nodes occupying central positions in Facebook-based advocacy networks enable faster response times and strengthen collective mobilization (Kitikamdhorn & Ramasoota, 2023). Identifying these strategically positioned accounts is critical for improving the flow of information in online networks, ensuring that advocacy messages are not only amplified but also efficiently circulated across diverse clusters (Can and Alatas, 2019).

**Figure 21.**

*Network visualization of closeness centrality based on Facebook comments*



In summary, the SNA reveals a centralized engagement pattern in the comment interactions, where a few dominant profiles are in control for both volume and flow of comments within the network. The centrality metrics of FB Account 4, FB Account 2, and FB Account 11 were the primary drivers of engagement and discussion.

Overall, consistent with the likes-based network, FB Account 4 ranks highest in all three centrality metrics for comments. It not only receives the highest number of comments, but it also serves as the primary bridge and connection point within the commenting network. This reinforces its central role in the campaign's online discourse.

As Freeman (1979) emphasized, central nodes function as critical facilitators of interaction, enabling faster and broader dissemination of information across the network.

Thus, the distribution highlights the critical importance of a few actors in sustaining comment interactions to ensure continuous flow of information around the Stop Kaliwa Dam issue on Facebook. Moreover, the comment-based network appears somewhat more decentralized, with a wider mix of individual accounts surfacing in the top 20 for betweenness and closeness compared to the like-based network. This indicates that conversations in the comment sections involved a broader range of participants, providing a more distributed pattern of discourse. Such findings align with Valente (2010), who noted that decentralized interactions in communication networks often encourage inclusivity and diversified perspectives, allowing more participants to shape the conversation.

Nevertheless, it has a lower degree of interconnectedness, indicating more fragmented or loosely connected conversations. According to Borgatti and Everett (2006), lower cohesion in networks reduces efficiency in information flow, but it can also highlight the emergence of sub-communities where localized discussions thrive.

Moreover, the large standard deviations in betweenness centrality for both networks (likes and comments) reaffirm that a few highly connected accounts like Stop Kaliwa Dam played key roles in bridging disparate clusters of users. This resonates with Nouh and Nurse (2015), who described such actors as strategic connectors that maintain information circulation between otherwise disconnected groups. The difference

in dispersion levels indicates that while 'likes' depended heavily on a few central influencers, comments were spread over a wider range of participants.

Fostering meaningful discussions through comments benefits from engaging a broader range of participants to sustain interaction. High standard deviations, particularly in degree and betweenness centrality, indicate positively skewed distributions where a limited number of nodes occupy disproportionately influential positions.

From a General Systems Theory perspective (von Bertalanffy, 1968), this reflects how the Facebook advocacy network functions as an interconnected system where the effectiveness of communication depends on the interaction of all its components. Central actors, like FB Account 4, play a stabilizing role in maintaining the flow of information across otherwise fragmented clusters, while smaller and less active accounts serve as feedback loops that ensure adaptability and resilience of the system. Thus, strategies should balance reliance on highly central accounts with efforts to strengthen peripheral actors to sustain an open, adaptive, and participatory advocacy network.

### **Framework for Enhancing Centrality in FB Accounts' Network**

The Kaliwa Dam project remains a contested issue, with delays and public opposition documented in news and investigative reports (Flores, 2025; PCIJ, 2024). Within this context, social media advocacy seeks to amplify public voices and foster social mobilization. This study draws on General Systems Theory (von Bertalanffy,

1968) and cybernetics to explain how engagement functions through feedback loops, where inputs generate responses (likes and comments), which in turn shape network positioning and advocacy influence.

Likes capture attention and affective approval but are relatively passive (Burke et al., 2011). Comments, on the other hand, reflect deeper cognitive processing, dialogue, and deliberation, while also linking participants across clusters (Kwak et al., 2010). Findings reveal that likes often correlate with degree centrality (visibility and direct ties), whereas comments are stronger predictors of betweenness and closeness centrality (bridging and information efficiency). Centrality cannot therefore be explained by likes alone, since they tend to cluster around popular accounts without necessarily creating structural connections.

In the context of advocacy, network centrality plays a crucial role, encompassing three key functions. Degree centrality measures visibility and attention, while betweenness centrality highlights the ability to act as a gatekeeper and bridge different communities. Closeness centrality indicates the efficiency of a network member in reaching others. For effective advocacy, prioritizing degree and betweenness is essential, as they ensure a balance between broad visibility and connecting fragmented publics (Borgatti & Everett, 2006).

This understanding of centrality leads to a framework based on an Input–Throughput–Output process. The input phase focuses on optimizing content formats and categories, with visual materials and personal stories being particularly effective for capturing audience attention and increasing reach. The throughput stage

involves managing feedback signals like likes and comments. A strategic balance is needed: likes generate visibility, while comments foster dialogue and bridging between communities. Encouraging cross-commenting is key to enhancing betweenness. Finally, the output is measured by centrality scores that transform engagement into network influence. High content volume alone does not guarantee influence; as demonstrated by FB Account 4, strategic positioning as a bridge between clusters is equally, if not more, important.

The findings also reveal a notable decline in online engagement following the onsite event *Alay Lakad laban sa Kaliwa Dam*. This suggests that onsite activism and online advocacy are not isolated, but rather interconnected forms of collective action. Offline protest events often serve as catalysts for online surges, generating immediate attention through photos, live updates, and narratives (Tufekci & Wilson, 2012). However, once the physical event concludes, online engagement tends to taper off as the symbolic moment passes and content production slows down (Poell & van Dijck, 2018). This pattern posits that systems require continuous inputs and feedback to sustain activity (Wiener, 1948). Without follow-up stories, interactive content, or renewed calls to action, the flow of attention in the network declines. The temporary spike during the onsite protest gave way to lower online engagement, showing that volume alone does not sustain centrality. This confirms Borgatti and Everett's (2006) insight that influence in a network depends not just on activity but on strategic structural positioning. Similarly, centrality measures such as betweenness and closeness capture how well nodes can sustain information flow across groups, a dynamic that weakens if

momentum from offline activism is not channeled back into digital dialogue (Hanneman & Riddle, 2005).

Moreover, this reminds us that online platforms like Facebook function as hybrid spaces where both broad visibility (likes) and deliberative engagement (comments) are needed to maintain networked advocacy (Kwak et al., 2010). Thus, advocacy groups must strategically convert the energy of onsite protests into ongoing online interactions, through visual storytelling, participant narratives, or interactive campaigns, if they are to sustain influence and centrality in the long term.

This study culminates in a Framework for Action designed to optimize advocacy efforts (Figure 18). Onsite activism can serve as a critical input, generating testimonies, images, videos, and infographics that feed into online dialogue and sustain engagement.

The first step is to strengthen inputs by using formats such as visuals and authentic storytelling, which effectively capture attention and engage diverse audiences (Leon et al., 2021).

The second step is to balance throughputs by encouraging both likes (as indicators of attention) and comments (as markers of dialogue and deliberation), while actively stimulating cross-community interaction to enhance betweenness centrality (Kwak et al., 2010; Burke et al., 2011).

The third step is to monitor outputs by tracking degree, betweenness, and closeness centrality to identify influential nodes, while also supporting moderately

central accounts to prevent over-reliance on a single dominant actor (Borgatti & Everett, 2006).

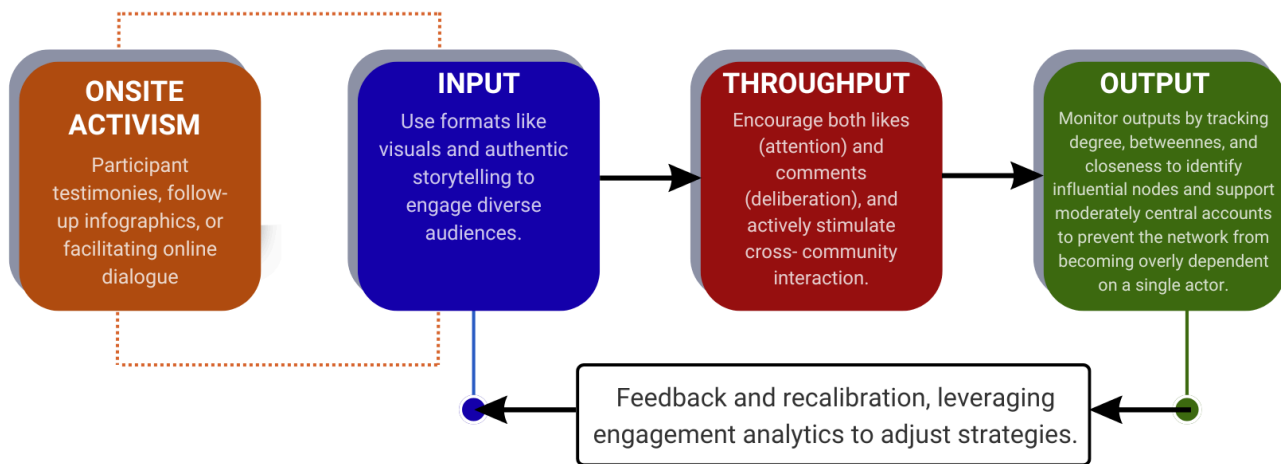
The final step involves feedback and recalibration, leveraging engagement analytics to adjust strategies, such as shifting to more interactive formats if comments are low, or recalibrating posting frequency to encourage bridging rather than clustering. This approach reflects cybernetics theory, which emphasizes feedback loops and system adaptation (Wiener, 1948), and draws on General Systems Theory, which underscores interdependence and wholeness in complex systems (von Bertalanffy, 1968). It also aligns with network theory, which highlights the strategic importance of centrality in ensuring visibility, bridging, and efficient information flow within networks (Freeman, 1979; Borgatti & Everett, 2006).

Overall, this framework demonstrates that effective advocacy depends does not only on message dissemination or sharing but also on strategic structural positioning. By conceptualizing engagement as a systematic process of inputs, throughputs, and outputs, advocacy groups can sustain influence and empower marginalized voices, thereby advancing Development Communication principles of participation, empowerment, and strategic mobilization.

**Figure 23.**

*Proposed model to enhance FB accounts' centrality in networks*

## **PROPOSED MODEL TO ENHANCE FB ACCOUNTS' CENTRALITY IN NETWORKS**



## **Chapter V**

### **SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

#### **Summary**

This study explored how organizations through their Facebook accounts featured the Stop Kaliwa Dam issue and engaged with each other about it.

Underpinned by the cybernetics tradition, it employed a Content Analysis and Social Network Analysis between February 1 to May 1, 2023 to examine the posts as well as the relationships (centrality) of the organizations using Facebook to post about the Stop Kaliwa Dam movement. These dates covered the Alay Lakad laban sa Kaliwa Dam Project conducted on February 15-23, 2023.

For the content analysis, the study analyzed the type of content, the categories of issues, and participants' engagement. For the social network analysis, it measured the network centrality, specifically degree, closeness, and betweenness centrality, using social network analysis (SNA).

Some highlights of the summary are the following:

#### **Number and Types of Content**

There were 310 Facebook posts gathered from 25 Facebook accounts dealing with the Stop Kaliwa Dam movement. The top five Facebook accounts with the highest number of posts from the samples were FB Account 4 (41%), FB Account 5 (11%), FB Account 6 (10%), FB Account 11 (7%), and FB Account 12 (7%).

The five accounts with the largest follower bases were Facebook Pages, reaffirming the advantage of Pages over personal profiles in terms of reach.

Notably, four influential accounts were created within the last five years, reflecting the emergence of newer voices in environmental advocacy. However, only 11 out of all accounts provided a profile introduction, limiting audience context about their identity and purpose.

Geographically, nine accounts were based in Infanta, Quezon, making it a key local hub for the movement's online conversation, while one contributor from Cebu showed the issue's broader reach.

### **Type of Format of the FB Contents**

Among the 310 posts extracted from 25 FB accounts, image posts were the most frequently used (34.19%), followed by art cards (23.55%), videos (21.94%), and reels (10.32%). Text-only posts were the least common at just 1.61%.

By far the most engaging type of post is images, which exhibit a very high mean engagement and significant variability. This indicates that while images generally attract a lot of attention, the level of engagement can vary widely. This suggests that images are highly effective in capturing attention and generating user interaction on Facebook. Video and ArtCard posts also demonstrate substantial mean engagement, though not as high as images. Text-only and reel formats tend to generate less engagement on average, suggesting that users might prefer more visually appealing content. Lastly, while links are useful, they attract moderate engagement compared to more visually engaging formats. The predominance of images and videos highlights that visual

content is crucial for maximizing engagement on Facebook. The variability in standard deviations across different post types also suggests that some formats, particularly images and videos, can occasionally go viral, attracting significantly more engagement than others (R1).

In environmental advocacy campaigns on Facebook, visual narratives such as images, videos, and art cards have emerged as essential tools for capturing public attention, communicating messages effectively, and encouraging engagement. Facebook pages like FB Account 4, FB Account 5, and FB Account 6 show a clear preference for these visually driven formats, highlighting the central role of visual storytelling in online advocacy. Their use of diverse and frequent multimedia content reflects an intentional strategy to engage audiences through formats that are easily shareable and emotionally resonant.

This approach not only enhances the visibility of their messages but also aligns with the platform's algorithmic preferences, which favor content that drives interaction through likes, shares, and comments. Consequently, the success of such campaigns underscores the importance of adapting content strategies to maximize reach and impact in the digital advocacy landscape.

### **Categories of the FB Contents**

The online content was categorized according to nine pre-established themes derived from existing literature on environmental social media content. Data were coded

manually using Atlas.ti, guided by a codebook adapted from related studies. Descriptive statistics was applied to interpret the thematic distribution of the posts.

Regarding categories of issues, advocacy-related posts were the most common, largely due to the high volume of posts about the Alay Lakad event during the study period. The frequent posting of protest-related content reflects a strong interest in direct action and high engagement from users.

Posts focusing on individuals, including personal stories and profiles, were the second most common and fostered a strong emotional connection with the audience, driving significant engagement. Notably, solution-oriented content, despite being represented by only one post, achieved a high average of likes and shares. This suggests a valuable opportunity to increase focus on solution-based content to drive positive interaction and engagement.

Given the rapid growth of social media platforms worldwide, social networks are expanding quickly, aiming to build online engagement and foster relationships and mutual understanding (Nguyen, n.d.). The standard deviations indicate significant variability within each content type, particularly in Activism/Advocacy and People in General, where some posts achieved exceptionally high engagement while others did not. This suggests that while certain themes are generally engaging, the success of individual posts can vary widely based on factors not captured by the content type alone.

## **Engagements of the FB Accounts' Posts**

In terms of engagement, image posts generated the highest number of likes, comments, and shares, with videos and art cards following closely. This content distribution highlights a strong preference for visual and multimedia formats in environmental advocacy campaigns on Facebook, emphasizing the effectiveness of images, videos, and infographics in capturing attention and encouraging public interaction.

The data show substantial variation in engagement across different types of content, with image posts generally attracting the most interaction, followed by video posts. Text posts, while fewer in number, also exhibited high variability in engagement. The mean engagement levels indicate that image posts were the most engaging on average, followed by videos and art cards, while reels and link posts had lower average engagement.

In terms of themes, the activism or advocacy category had the highest average engagement, suggesting that content focused on activism and advocacy resonates strongly with the audience. In contrast, categories like nature and identifiable people had lower average engagement, indicating less interaction with these types of posts. The standard deviations reveal significant variability within each content type, particularly in Activism/Advocacy and People in General, where some posts achieved exceptionally high engagement while others did not. This suggests that while certain themes are generally engaging, the success of individual posts can vary widely based on factors not captured by content type alone.

## Centrality of Organizations with FB Accounts

One of the most important concepts in Social Network Analysis (SNA) is centrality, with degree centrality being the most straightforward measurement, referring to the ties or links of one node to another (Wasserman & Faust, 1994; cited by Guo, 2012). The more ties an attribute has with others, the more centrally it is located within the network.

Social network theory identifies three key measures of structural centrality: degree, closeness, and betweenness (Freeman, 1979).

The analysis of likes and comments for the Social Network Analysis (SNA) revealed a network dynamic where engagement was unevenly distributed, dominated by a few central actors. such as FB Account 4, FB Account 5, and FB Account 6.

Through SNA, the study identified a small group of Facebook profiles that held high centrality scores, serving as key influencers within the digital advocacy network. The FB Account 4 emerged as a central hub, while community-driven pages and religious organizations, such as FB Account 5, FB Account 6, and FB Account 8, served as vital connectors. Individual profiles include FB Account 11 and FB Account 18.

Aside from that, there were actors who not only produced highly engaging content but also served as bridges connecting otherwise fragmented advocacy clusters such as FB Account 12, FB Account 2, and FB Account 1. Their role in shaping discourse and sustaining momentum online was critical in amplifying the visibility of the Kaliwa Dam movement.

Nevertheless, the majority of profiles remained peripheral and with no engagement with other Facebook profiles, underscoring the network's dependence on a core group of actors to lead and maintain environmental engagement on Facebook.

These results revealed a highly centralized engagement structure where a small number of key profiles dominated interactions and information flow within the network. Degree centrality distributions showed that most profiles had minimal connections, while a few influential nodes accumulated high engagement, acting as hubs or bridges across network clusters.

The engagement of the profiles echoed this pattern, with FB Account 4 leading across all metrics. The study highlights that while the advocacy network appeared extensive, effective influence and flow of information were concentrated in a handful of actors, suggesting that sustained information dissemination and public mobilization relied heavily on these central profiles.

This uneven structure poses risks for information bottlenecks and limited message reach should key profiles disengage, underscoring the strategic importance of identifying and empowering more influential nodes to strengthen advocacy communication networks. Thus, this distribution highlights the critical importance of a few key actors in sustaining comment interactions, shaping the discourse, and ensuring the continuous flow of information around the Stop Kaliwa Dam issue on Facebook.

## Framework for Action

This study developed a Framework for Action that shows how advocacy groups can optimize online and offline strategies by treating communication as a system of inputs, throughputs, outputs, and feedback. Onsite activism provides content inputs, such as testimonies, images, and videos, that fuel online dialogue. The input phase emphasizes using compelling content formats like visuals and personal stories to capture attention. Visual storytelling and authentic narratives strengthen engagement, while balancing likes and comments ensures both attention and deliberation. The throughput phase requires a strategic balance of likes and comments, actively encouraging cross-community dialogue to foster connections. The output is the resulting network influence, measured by centrality scores. Tracking centrality measures helps identify influential actors while preventing overreliance on a single account. Feedback through engagement analytics supports recalibration, allowing groups to adjust formats and strategies to maintain momentum.

Grounded in cybernetics (Wiener, 1948), general systems theory (von Bertalanffy, 1968), and network theory (Freeman, 1979), the framework underscores the importance of structural positioning, adaptability, and participation in sustaining advocacy. Ultimately, centrality and visual content are not just tools for engagement but drivers of empowerment and influence in environmental movements. The study distinguishes between two forms of network engagement: likes, which represent passive attention and correlate with degree centrality (visibility), and comments, which signal deeper deliberation and predict betweenness and closeness centrality (bridging and information efficiency).

Processes such as optimizing content inputs, balancing engagement throughputs, monitoring centrality outputs, and continuously recalibrating strategies operate as a system. The system demonstrates that successful advocacy is not just about uploading posts or messages but about strategically positioning oneself (centrality) within a network to empower voices and mobilize the public.

The integration of content analysis with social network analysis offers a nuanced understanding of how online advocacy functions not just through message dissemination/ sharing, but through interconnected relationships that strengthen collective action and digital solidarity.

## **Conclusion**

To improve digital environmental advocacy, visually engaging content such as images, infographics, and videos can generate interaction and raise awareness. The predominance of visual images with raw narratives reflects the communicative logic of social media like Facebook. Visuals not only capture attention but also evoke affective and cognitive responses that stimulate participation. When narratives highlight solutions and hopeful futures, they strengthen advocacy resonance, offering the public something to look forward to rather than despair alone. Hence, integrating multimedia storytelling with network-based targeting could strengthen the efficacy of advocacy campaigns, making them more resonant and shareable. This is particularly plausible in development settings, where digital storytelling through visuals can overcome barriers of literacy,

access, and attention, contributing to more equitable participation in environmental and social development discourse.

This indicates a need to shift from the usual uploading approaches on social media toward more network-informed, participatory strategies. Rather than attempting to address the entire online public uniformly, communicators can empirically map network structures and strategically engage with influential actors to stimulate meaningful interactions and foster dialogue in under-engaged areas of the network. This approach not only optimizes limited communication resources but also supports inclusive content and agenda-building and more democratic communication flows.

Empirically, the identification of key actors with high betweenness centrality suggests that information sharing within online advocacy networks is not evenly distributed but instead relies heavily on a few influential nodes. These central profiles act as information brokers, linking otherwise disconnected subgroups, making them ideal targets for coordinated messaging strategies. Development campaigns that collaborate with or amplify these actors are more likely to achieve broader diffusion of their messages across the network, increasing the likelihood of reaching both active participants and passive observers.

The findings reveal a notable decline in online engagement following the onsite event *Alay Lakad laban sa Kaliwa Dam*. This suggests that onsite activism and online advocacy are not isolated or separate, but rather interconnected forms of collective action or interdependent processes within the advocacy network. High-profile offline events tend to generate an initial surge of online attention, photos, live updates, and

narratives stimulate immediate likes, shares, and comments. For example, offline protest actions (e.g., Alay Lakad laban sa Kaliwa Dam) generate powerful symbolic and visual content that serves as input into the online sphere. Once shared, these materials circulate within the Facebook network as throughputs, stimulating likes, shares, and comments that expand visibility beyond the immediate participants of the protest. This circulation reinforces output in the form of centrality, where influential accounts amplify the message by bridging clusters and sustaining the discourse.

However, once the physical event concludes, engagement tends to taper off as the symbolic moment passes and content production slows down. This shows that when documentation and follow-through content are lacking, engagement tends to decline, weakening centrality and fragmenting the movement's online presence. Hence, advocacy groups should intentionally view onsite and online advocacy as interlinked nodes in one larger communication system, ensuring continuous feedback to sustain momentum, reinforce solidarity, and keep central actors active in shaping discourse (Castells, 2012).

Overall, the Stop Kaliwa Dam movement is a loose network, where engagement is concentrated in a few highly central Facebook accounts. These accounts, particularly those with high degree and betweenness centrality, play pivotal roles in amplifying discourse, bridging fragmented publics, and sustaining engagement. Therefore, digital advocacy, when strategically executed and networked, can become a powerful tool for shaping environmental agendas and mobilizing public participation.

Centrality during the protest was heightened by the concentration of attention on key nodes (e.g., organizers, media outlets). Yet maintaining long-term influence requires distributed engagement beyond peak moments. Advocacy groups must therefore design strategies to sustain momentum online after onsite activism, for example, by curating testimonies, releasing follow-up infographics, or mobilizing ongoing dialogue.

Onsite activism can act as a catalyst for online surges, but sustained influence depends on post-event network strategies that maintain centrality and prevent fragmentation in discourse.

Nevertheless, the study emphasizes the strategic use of Facebook by environmental organizations to influence public discourse, foster community involvement, and amplify resistance to development projects like the Kaliwa Dam.

## Implications and Recommendations

- Findings show the predominance of the images, infographics, and videos, suggesting that images are highly effective in capturing attention and generating user interaction on Facebook. Likewise, the predominance of images and videos highlights that visual content is crucial for maximizing engagement on Facebook. Hence, advocacy groups should prioritize producing visually compelling materials, such as infographics, photo essays, and short videos, because these formats not only attract attention but also sustain audience interest in environmental campaigns.
- The variability in standard deviations across different post types also suggests that some formats, particularly images and videos, can occasionally go viral, attracting significantly more engagement than others. Thus, these content types stimulate user reactions and engagement which can turn to further creation of content relative to environmental advocacy. Hence, advocacy groups should deliberately invest in content experimentation and analytics to identify which visual strategies trigger virality, then replicate and adapt them to strengthen the campaign's reach and resonance.
- Posts featuring images and community event documentation garnered the highest engagement rates, suggesting that visual and narrative-driven content was most effective in mobilizing audiences. Hence, the frequent posting of protest-related content reflects a strong interest in direct action and high engagement from users. Notably, solution-oriented content, despite being

represented by only one post, achieved a high average of likes and shares. This suggests a valuable opportunity to increase focus on solution-based content to drive positive interaction and engagement.

- The analysis of likes, comments, and shares revealed a network dynamic where engagement was unevenly distributed, dominated by a few central actors. Aside from that, there were actors who not only produced highly engaging content but also served as bridges connecting otherwise fragmented advocacy clusters. Their role in shaping discourse and sustaining momentum online was critical in amplifying the visibility of the Kaliwa Dam movement. This underscores the importance of both strategic content creation and network positioning in mobilizing public awareness and digital solidarity.
- Documentation of protests and community actions can be transformed into highly engaging visual content, like participants's testimonies, short clips, photo narratives, and infographics, that sustain the height of the movement even after the event itself has ended. This continuity of inputs ensures that online engagement does not sharply decline after offline activities. Moreover, sustained posting of activism-derived content enhances centrality, as consistent audience interaction strengthens the position of advocacy accounts in the network, ensuring they remain visible, influential, and capable of bridging communities over the long term.

## **For Future Researches**

Based on the findings of this study, the following recommendations are proposed:

1. While this study focused on Facebook, other social media platforms like Twitter, Instagram, and TikTok also play significant roles in shaping public perception.
2. A comparative analysis across different platforms could highlight variations in network structures related to environmental and climate issues. Future research could involve collecting and analyzing data from multiple social media platforms to compare how network centrality and engagement metrics differ and their relative influence on public discourse.
3. Combining network analysis with deeper sentiment analysis could offer a more nuanced understanding of how different emotional tones or sentiments within networks influence public perception and agenda-setting on social media. Integrating sentiment analysis into the examination of network structures can reveal how positive or negative sentiments spread through networks and how they correlate with the prominence and acceptance of climate change and environmental agendas.
4. Social media networks and their influence on public perception vary widely across distinct cultural and political contexts. Expanding research to include global perspectives could offer valuable insights into how network structures operate in diverse environments.
5. Conducting cross-cultural studies on the application of social network analysis could highlight how different societal factors influence the effectiveness and reach of network structures in shaping public opinion.

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## Appendix Table 1

### Brief Description of the 25 Facebook Accounts

	FB Account	profile or page	FB Profile Followers	FB Page Established	Introduction FB Profile/Page	Main Contents	Location from	FB Information Category	Why do they have high numbers of engagements and posts
1	FB Account 1	page	388,000	7-Jan-2009	Campaigning on climate, plastic, energy, livable cities & social justice. Join us today!	- environment - plastics and climate change	Quezon City	Non Profit Organization	Daily content
2	FB Account 2	page	73,000	15-Oct-2011	Servant of the people / motivational speaker	personal and work activities	Infanta, Quezon	Motivational Speaker, Public Service, Comedian	public servant daily posts or shared posts
3	FB Account 3	profile	26,000	12-Jun-2018		Personal activities	Morong, Rizal	Digital Creator	Teacher
4	FB Account 4	page	21,000	3-Jul-2019	Awareness Campaign on Stop Kaliwa Dam	Anything about Kaliwa Dam	Infanta, Quezon	Environmental Conservation Organization	- regular posting - branded posts
5	FB Account 5	page	14,000	8-Nov-2013	#FeelingTheBest @18 "Sama-sama Together Always and Forever!"	Live Streaming of Radio Program	Infanta, Quezon	Radio Station	live radio programs

6	FB Account 6	page	9,200	19-May-2022	Volunteer Driven Movement	Nationwide environmental events/movement	Quezon City	Environmental Conservation Organization	-regular posting youthful vibes consistent branding
7	FB Account 7	profile	6,300	23-Apr-2019	n/a	Personal and work activities	General Nakar	Digital Creator	priest
8	FB Account 8	page	5,900	July 6, 2011	n/a	Movement on Stop Kaliwa Dam Anything about Sierra Madre	Infanta, Quezon	Non-Government Organization	Advocacy about Saving Sierra Madre
9	FB Account 9	profile	5,300	22-Feb-2021	Personal Blog	Shared post on different topics	General Nakar	Blogger	personal posts
10	FB Account 10	profile	5,200	3-Jun-2013	Public Figure	Personal, work and school activities	Siniloan, Laguna	Public Figure	Youth audience
11	FB Account 11	profile	5,000	4-Jan-2011	Founder/President of Kakampi Youth Alliance	Personal activities	Infanta, Quezon	Digital creator	low number of engagements
12	FB Account 12	profile	5,000	n/a	n/a	Personal views on social issues Work activities	Kiangan, Ifugao Quezon City	Public Figure	Has 2 FB Profile, the other one has 85,000 followers
13	FB Account 13	profile	4,300	11-Feb-2011	n/a	Personal and business	Infanta, Quezon	Digital creator	
14	FB Account 14	profile	3,800	1-Feb-2009	n/a	Family/personal events	Infanta, Quezon	Tutor/Teacher	Teacher

15	FB Account 15	page	3,400	26-Aug-2022	Innovative Technologies in today's generation *Communication *Security Cameras *Structural Cabling	Business and personal activities	Mandaue City	Entrepreneur	n/a
16	FB Account 16	profile	2,700	11-Aug-2009	n/a	Personal content/opinions	n/a	Artist/Singer	n/a
17	FB Account 17	page	2,600	15-Apr-2022	Youth-led non government and non-profit environmental organization	Environmental	Cebu City	Environmental Coservation organization	Youth activities on environment
18	FB Account 18	profile	2,400	20-May-2020	n/a	personal activities and opinions	Antipolo, Rizal	Digital Creator	
19	FB Account 19	profile	1,800	n/a	n/a	Family	Siniloan, Laguna		Family
20	FB Account 20	profile	1,300	18-Dec-2009	n/a	Family and nature		Digital Creator	
21	FB Account 21	profile	945	n/a	Homegrown Artisan Social Entrepreneur	Business, Sustainability, environment, and climate	Real, Quezon	Social Entrepreneur	
22	FB Account 22	page	782	2-Feb-2021	n/a	Shared posts of other environmental and youth	Infanta, Quezon	Community organization	- low engagements - not regular postings

						organizations from infanta			
23	FB Account 23	page	505	17-Nov-2022	n/a	Activities of organization	Infanta, Quezon	Youth Organization	Photos of activities
24	FB Account 24	profile	69	22-Oct-22	n/a	Personal activities and shared posts	Morong, Rizal	Reels Creator	
25	FB Account 25	profile	1,800	n/a	n/a	Personal activities, opinions, and business	Antipolo, Rizal	Digital Creator	

## Appendix Table 2

*Content type of the 25 Facebook Accounts About Kaliwa Dam*

<b>Name of FB Profile/Page</b>	<b>No. of Posts about Kaliwa Dam</b>	<b>Text Only</b>	<b>Image</b>	<b>Video</b>	<b>Reels</b>	<b>Link</b>	<b>Art Card</b>
FB Account 5	33	0	12	17	0	0	4
FB Account 25	3	0	1	1	1	0	0
FB Account 21	1	0	1	0	0	0	0
FB Account 6	30	1	4	4	1	1	19
FB Account 16	1	0	0	0	1	0	0
FB Account 20	1	0	0	0	1	0	0
FB Account 7	1	0	0	0	1	0	0
FB Account 17	1	0	0	0	0	0	1
FB Account 15	1	0	0	0	1	0	0
FB Account 13	3	0	0	1	2	0	0
FB Account 1	6	0	4	1	0	0	1
FB Account 10	2	0	0	0	1	0	1
FB Account 11	23	1	11	5	5	0	1
joseph.paluyo.5	11	1	4	0	1	3	2
FB Account 23	6	0	5	0	0	1	0

FB Account 9	11	1	5	3	0	0	2
FB Account 14	1	0	0	0	1	0	0
FB Account 24	5	0	2	2	1	0	0
FB Account 22	3	0	1	1	0	1	0
FB Account 3	1	0	0	0	1	0	0
FB Account 8	21	0	10	5	0	1	5
FB Account 19	1	0	0	1	0	0	0
FB Account 4	128	1	39	22	13	19	34
FB Account 12	10	0	5	2	0	0	3
FB Account 2	6	0	2	3	1	0	0
<b>n=310</b>	<b>310</b>	<b>5</b>	<b>106</b>	<b>68</b>	<b>32</b>	<b>26</b>	<b>73</b>

*Note:* List is arranged based on the alphabetical order of the Facebook profiles/pages

### Appendix Table 3

#### *Categories of the posts About Kaliwa Dam uploaded in the Facebook Accounts*

Name of FB Profile/Page	No. of Posts about Kaliwa Dam	1. People (in general)	2. Solutions	3. Impacts	4. Identifiable People	5. Activism Advocacy	6. Causes	7. Informative Content	8. General Media	9. Nature
FB Account 5	33	2	0	2	0	14	2	0	13	0
FB Account 25	3	0	0	1	0	2	0	0	0	0
FB Account 21	1	0	0	0	0	1	0	0	0	0
FB Account 6	30	2	0	4	3	7	3	1	10	0
FB Account 16	1	0	0	0	0	0	0	0	1	0
FB Account 20	1	0	0	0	0	0	0	0	1	0
FB Account 7	1	0	0	0	0	1	0	0	0	0
FB Account 17	1	0	0	0	0	1	0	0	0	0
FB Account 15	1	1	0	0	0	0	0	0	0	0
FB Account 13	3	0	0	0	0	3	0	0	0	0
FB Account 1	6	2	0	0	0	3	1	0	0	0
FB Account 10	2	0	0	0	0	0	1	0	1	0
FB Account 11	23	10	0	0	0	8	3	0	2	0
joseph.paluyo.5	11	2	0	0	0	6	2	0	1	0
FB Account 23	6	4	0	1	0	1	0	0	0	0
FB Account 9	11	0	0	3	0	5	1	0	1	1
FB Account 14	1	0	0	0	0	0	0	0	0	1
FB Account 24	5	0	0	0	0	4	0	0	1	0
FB Account 22	3	1	0	0	0	2	0	0	0	0
FB Account 3	1	0	0	0	0	1	0	0	0	0
FB Account 8	21	9	0	0	0	4	0	2	6	0
FB Account 19	1	1	0	0	0	0	0	0	0	0
FB Account 4	128	29	1	13	1	36	10	31	6	1
FB Account 12	10	2	0	2	1	3	0	2	0	0

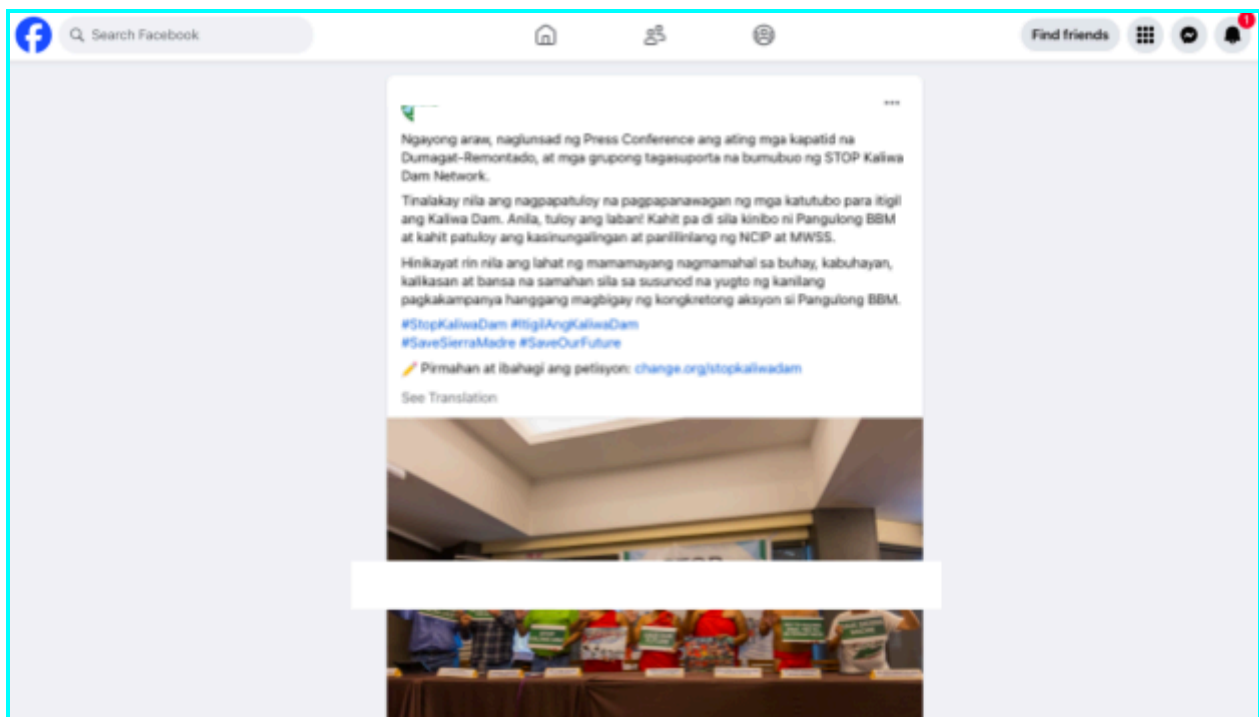
FB Account 2	6	0	0	0	0	4	0	0	2	0
Total	310	65	1	26	5	106	23	36	45	3

## Appendix 4. Examples of Most Engaged Facebook Content on Kaliwa Dam

Figure 1 presents a screenshot of a Facebook post from the FB Account 4 featuring a press conference held as part of their ongoing campaign to oppose the construction of the Kaliwa Dam. In the accompanying video, members of the Indigenous Peoples community and volunteers explain the objectives of the Alay Lakad initiative and express hope for increased public support. This post exemplifies a recurring pattern within the dataset, wherein advocacy groups actively utilize social media updates to mobilize public awareness, document collective actions, and sustain momentum for their cause.

### Figure 1.

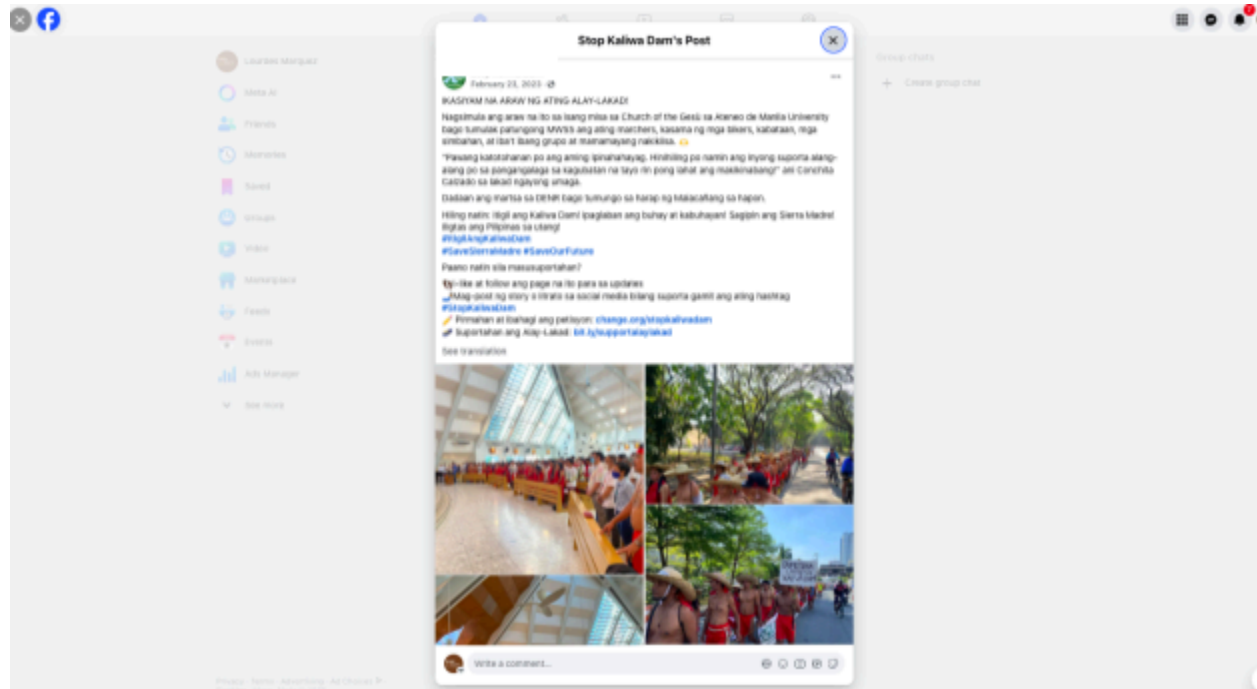
*Screenshot of Facebook post from the FB Account 4 about their press conference for the campaign to halt the project*



Another frequently occurring content theme in the dataset was 'People (in general)', with 67 posts falling under this category. These posts accounted for 17.87% of total likes, 12.90% of comments, and 11.06% of shares, reflecting steady audience interest in community-centered narratives and personal appeals related to the Kaliwa Dam issue. This suggests that posts featuring local voices, personal experiences, and messages from community members are consistently effective in fostering audience engagement. The post highlights the participation from the community members affected by the dam project, exemplifying how localized, people-centered content can generate meaningful online interaction and contribute to sustaining public interest in the advocacy campaign.

**Figure 2.**

*Screenshot of content under the People theme with highest number of engagements*



## **Involvement of Indigenous People**

Figure 3 narrates the 9-day activity of indigenous peoples and volunteers who participated in the event. The caption highlighted the struggles and challenges faced by the participants in pursuit of their advocacy. It also discussed the reasons behind their opposition to the construction of the Kaliwa Dam and suggested possible alternatives to address Metro Manila's water supply shortage. An image of the participants during the Alay Lakad was included to visually support the post's message.

Figure 3.

Screenshot of a content shared by FB Account 2

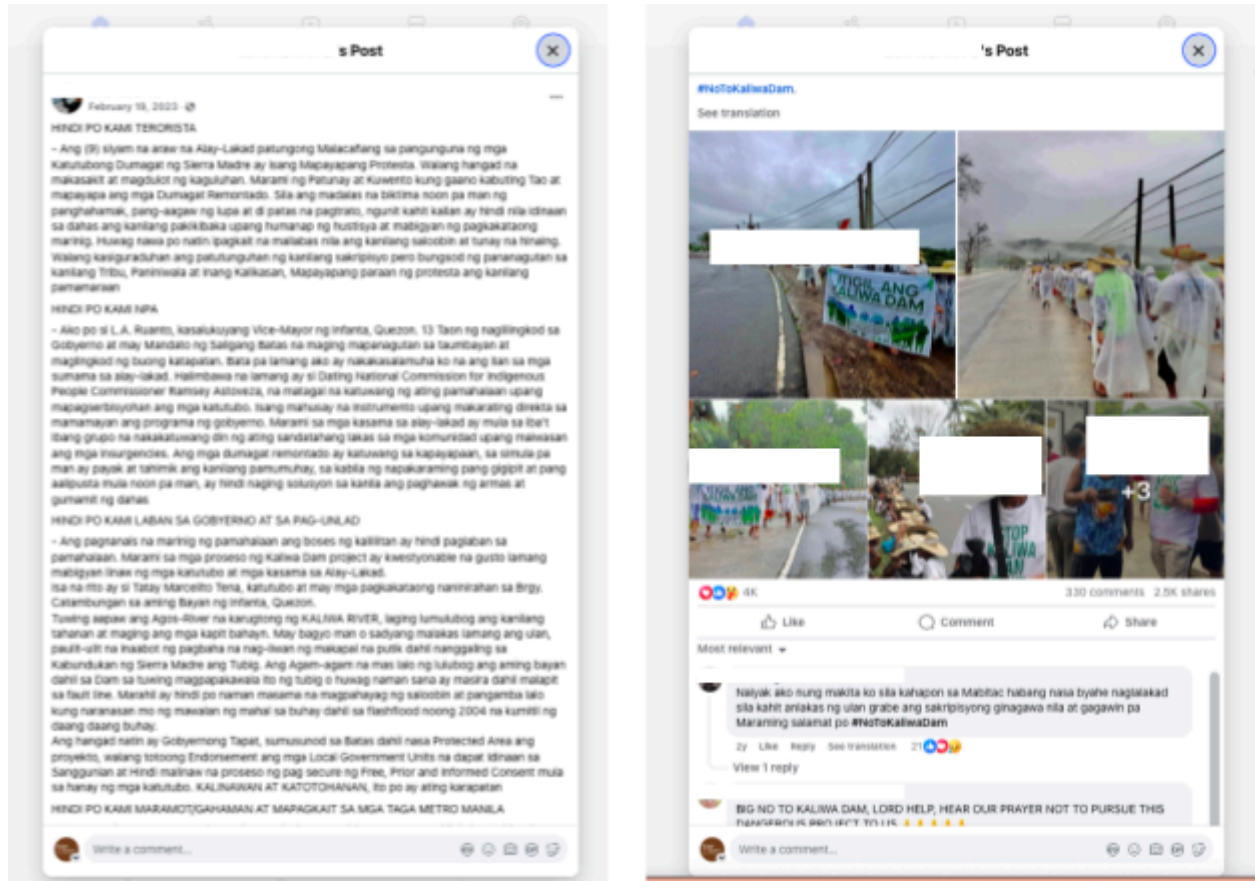


Figure 4 is a screenshot of a reel featuring an Indigenous Peoples (IP) volunteer, named Boniknik, who shared his thoughts on the possible consequences of the dam's construction. He expressed concerns about its impact on their community, food security, local livelihoods, and cultural heritage.

**Figure 4.**

*Screenshot of an interview with “Boniknik” (not the real name)*



Figure 5 is a shared post featuring images of participants from the Alay Lakad as they arrived at Ateneo de Manila University and held a mass. The caption included a quote from one of the protest leaders, emphasizing that they are simply stating the facts and underscoring the need to protect the forest, as it is ultimately humanity who benefits from its preservation.

## Figure 5.

*Participants attending the mass at the Ateneo de Manila University*

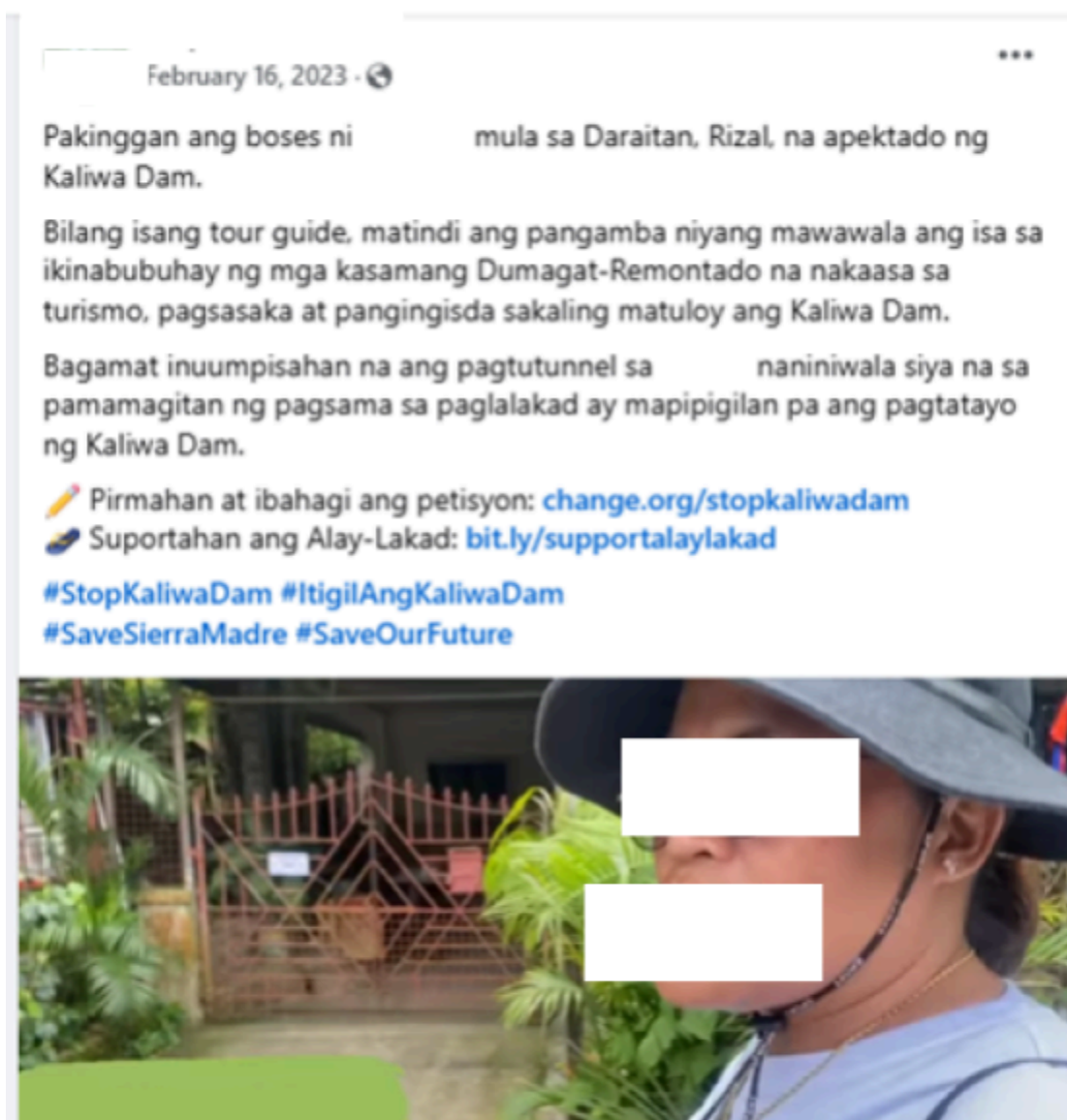


Figure 6 is a reel featuring one of the participants, with a local tour guide. In her statement, she mentioned that tunnel construction is already underway in Brgy. Teresa. However, she expressed hope that through the *Alay Lakad* activity, their environmental

concerns will gain attention and that the movement's call to protect their community and environment will be addressed.

**Figure 6.**

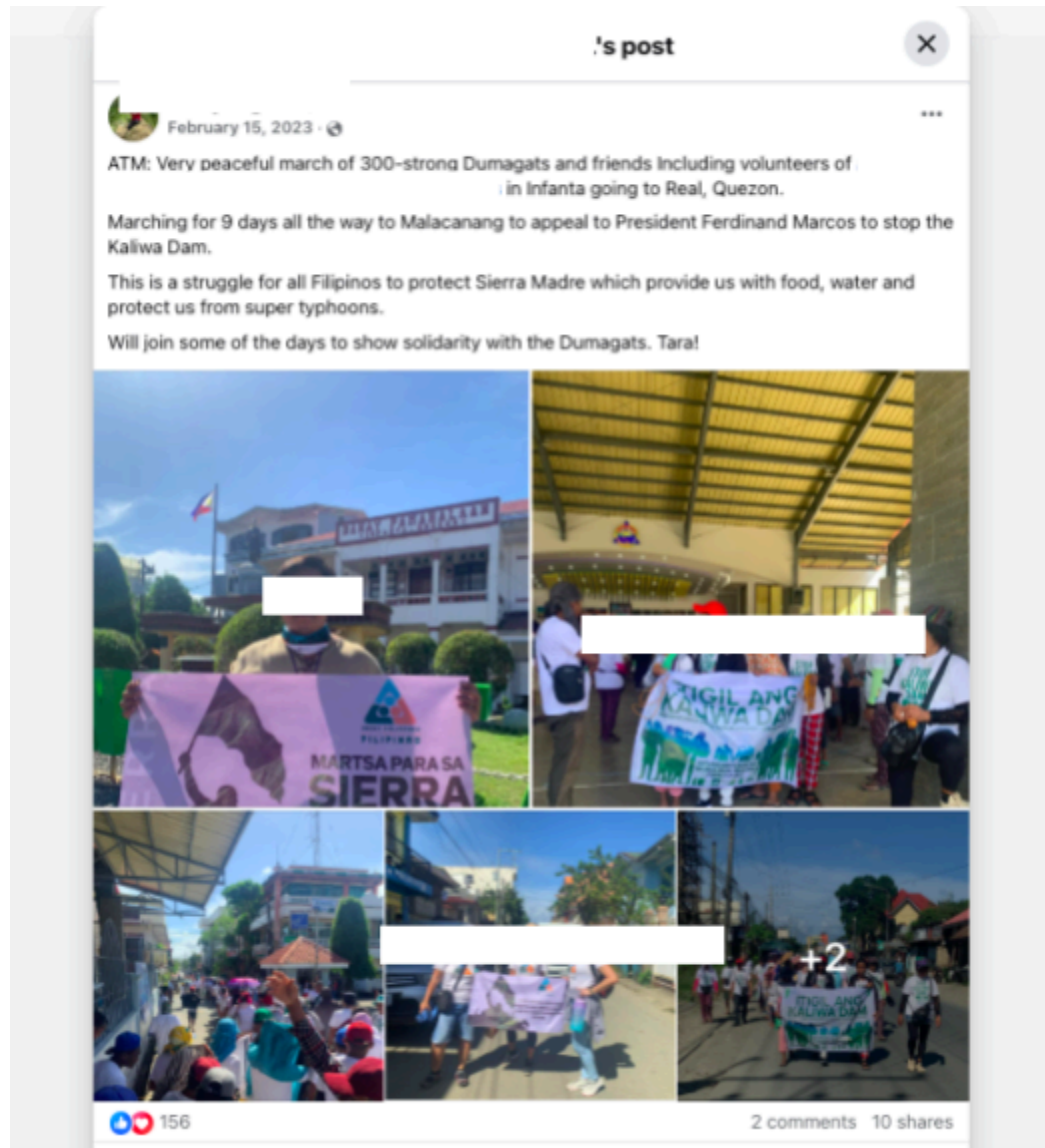
*Screenshot of an interview with a volunteer while participating the Alay Lakad*



For the identifiable person, Figure 7 features FB Account 12 joining the Dumagat community in their Alay Lakad movement, advocating against the construction of the Kaliwa Dam and for the protection of the Sierra Madre. This post falls under the Identifiable Person category, as it highlights Baguilat, a well-known environmental advocate and a member of the Indigenous Peoples as an Ifugao. His participation amplifies the visibility of the cause and underscores the solidarity among Indigenous groups in environmental campaigns.

Figure 7.

Screenshot of FB Account 12 participating the event



Pictures with the least number of engagement are shown in Figures 8 and Figure 9. Here it features a photo showcasing the greenery in the area of Infanta. The content includes an external link to a news article from [Inquirer.net](http://Inquirer.net) covering the protest march organized by Indigenous Peoples groups. The caption is minimal, using only two hashtags to convey its message: #SaveSierraMadre and #ItigilAngKaliwaDam.

**Figure 8.**

*Screenshot of a shared post of FB Account 4 from inquirer.net*

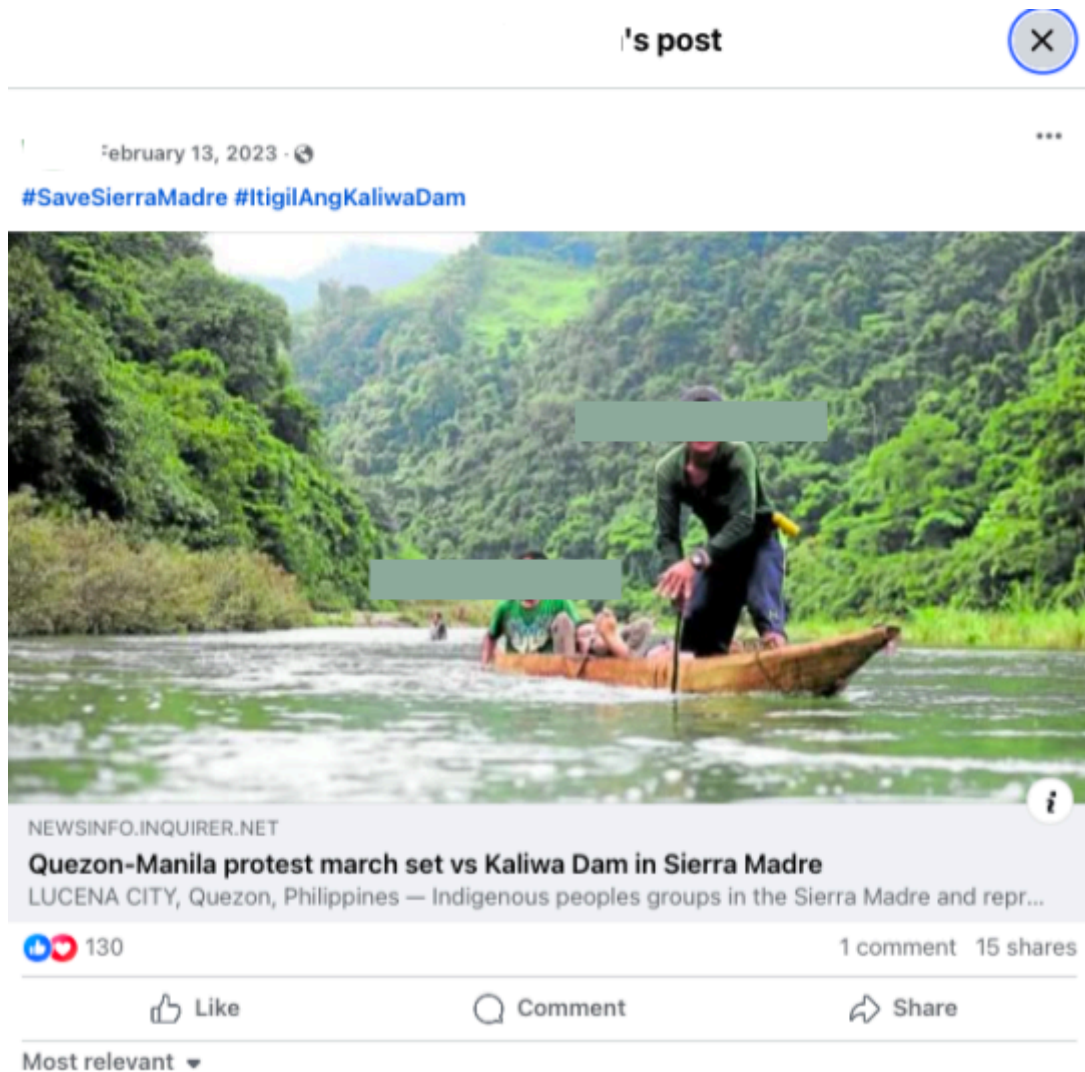


Figure 9 is the only content categorized under the Solution theme. The post highlights how the Sierra Madre mountain range serves as a natural barrier against strong typhoons in the Philippines, emphasizing that the construction of the Kaliwa Dam

poses significant environmental risks. As a proposed solution, the post encourages the public to access the provided link, support the Alay Lakad event, and sign the accompanying petition to oppose the dam project.

**Figure 9.**

*Screenshot of FB Account 4 sharing content and idea of solving the water supply problem*

