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IN THIS ISSUE

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TABLE OF CONTENTS

Editor's Notes

"Somewhere, something incredible is waiting to be known."
-Carl Sagan

"Every great advance in science has been issued from a new audacity of imagination."
-John Dewey

To discover, to revise knowledge, to contribute to scholarship – these are among the many reasons people do research. Hence, writing is indispensable. It is not enough to simply answer posited research questions; the results need to be published, which somehow justifies why something needs to be problematized in the first place. Welcome to the first issue of Silliman Journal 2023. In this issue, six full research are featured.

The first article explores the sustainability of a small-scale, community-led mining project in Compostela Valley. In her paper, Rowena Joy Decena examines the efforts undertaken by the government and its allies to solve the problems associated with small-scale mining and to stop technology-based initiatives from using a "top-down" management style.

The second article aims to identify how the components of the energy balance are distributed throughout the various biomes in the province of Laguna. Employing solely remotely sensed data that have been further processed using the S-SEBI model, Rehel Diaz, Jose Edwin Cubelo, Arsenio Bulfa, and Kezia Shem Brusola measure the heat flux received in Laguna; provide downscaled maps of net radiation, latent heat flow, sensible heat flux, and ground heat flux; and explain how the energy components of different biomes may be compared.

The third article provides an overview of the institutional processes surrounding the development of local renewable energy in the municipality of Naujan in Oriental Mindoro. Nico Jayson Anastacion, May Celine Thelma Vicente, Sheryl Rose Reyes, and Malvin Biguerras discuss the institutional policies and arrangements

in relation to the municipality's sociocultural and geographic setting, emphasizing how these may affect the development of renewable energy.

The fourth article tackles an issue in community-based blood donation program. Kim Sarong evaluates the relationship between young people's knowledge, attitude and practice; and determines the motivational variables that may be considered in drafting further proposal efforts in blood donation drives.

The fifth article examines the benefit of juice extracted from noni fruit. Specifically, Florita Maslog tests the antibacterial susceptibility of PhilNONI juice against *Salmonella typhi*, *Staphylococcus aureus* and *Escherichia coli.*

The last article delves into faith and homosexuality. In their paper, Mark Anthony Quintos and Samuel Brando Piamonte investigate how Filipino gays in the Santero community navigate their sexual identity in the context of a religious belief system that normally is against homosexuality.

Aside from these six full articles, a lone article in the Notes Section is included. Juliet Padernal explores how translation, code switching, and code mixing are used in the bilingual or multilingual classroom.

The cover art is a photograph taken by Rhanwil Tubilag, a staff member of the Silliman University High School who considers himself a mobile photography enthusiast that captures art in the ordinary. He calls the photo *Boketto*, which reminds him to "be still, be blank, stare off into the distance, and rewire."

Enjoy!

Warlito S. Caturay Jr., PhD

Mining Technology for Sustainability: Practices, Challenges, and Sustainability of Community – Managed Small-Scale Mining Project through Community – Led Integrated Non-Cyanide, Non-Mercury Gold Extraction Method (CLINN-GEM) in Compostela Valley, Philippines

Rowee Joy Decena
Davao De Oro State College

Abstract

To assess the sustainability of development projects for small-scale mining, this qualitative and descriptive study examined the practices and challenges of the Community–Led Integrated Non-Cyanide, Non-Mercury Gold Extraction Method (CLINNGEM) project in Compostela Valley province, now Davao de Oro. The case study showed the efforts of the government and its partners to address the challenges of small-scale mining in the country and its attempts to quash the "top-down" management approach of technology-based projects. Acceptability of the project, information gap, project delays, availability of utilities, safety and security, and sustainably were the challenges encountered in implementing the project. Logistics, economic, community, equity, institutional and environmental dimensions were factors which affected the prospects of the project's sustainability. Thus, aside from ensuring efficiency, all issues and problems were addressed. Therefore, to perfectly manage the mineral processing plant, the following are recommended: 1) promoting and popularizing the technology by allowing the people to access and use the mineral processing plant; 2) reducing information gap by increasing information dissemination efforts and education activities, developing information tools as well as education and communication materials, and conducting trainings and workshops; and 3) enhancing people's sense of ownership of the project by organizing and mobilizing them, thereby allowing them to participate in and decide on future activities, recognize their own capacities, and be treated as active members of the community.

Keywords: small-scale mining, community-led projects, CLINN-GEM project, Compostela Valley.

Background of the Study

Mining is an emerging development topic not only because of its expanding international opportunities nor because of its adverse effects on the environment but because of how it has been reformed to concur with the principles of sustainable development. Recent mining technologies are developed to improve production and the quality of life of the people in mining communities while mitigating the adverse effects of mining to the environment.

In highly mineralized countries like the Philippines, mineral resource development is perceived to be an economic driver that spurs development. However, in a study conducted by the Senate Economic and Planning Office, the results revealed that the Philippine mining industry has not lived up to its potentials. The industry has had a negligible contribution to the domestic economy and has absorbed only a few workers. Also, the industry has had a destructive impact on the environment and the welfare of the people (SEPO, 2013).

Therefore, this project is an answer to the call of providing clean and low-cost alternative technology for the small-scale miners through the Department of Science and Technology Region XI and the University of the Philippines Diliman, along with the Provincial Government of Compostela Valley, BLGU of Katipunan, MLGU of Nabunturan, Nabunturan Integrated Miners Development Cooperative (NIMDC), with the assistance of Compostela Valley State College (CVSC) and the Municipal LGU of Nabunturan Implemented the Community – Led Integrated Non-Cyanide, Non-Mercury Gold Extraction Method (CLINN – GEM) Project in Barangay Katipunan, Nabunturan, Compostela Valley. As a development project, CLINN-GEM is a bold step toward addressing the human insecurities of small-scale miners brought about by low and destructive mining technology. However, not all development projects in developing countries succeed or are sustained. International funding institutions and ministries of less developed

countries still report serious problems in project execution while usually ignoring factors affecting the longer-term sustainability of project benefits (Rondinelli, 1976). Because of these problems, development projects either become unsustainable or fail to create a social impact on communities. Thus, this paper explores the link between the practices and processes of the CLINN-GEM and its sustainability. Anent this, this article aims to describe the status of the current practices of the CLINN-GEM Project, identify the challenges and factors have affected its sustainability, and assess its prospects as an innovative development project.

Research Methodology

This study examined the sustainability of the CLINN GEM, which is a technology-based project, in a small-scale mining community. The case study approach was employed to investigate the practices, processes, key players, and organizational mechanisms project. Further, the study also examined the issues, challenges, and factors that affected the project's sustainability (Alkin, 1972, as cited in Rutman, 1977).

Historically, development projects were introduced and popularized by the so-called "developed countries," and therefore the traditional understanding of projects is "dole - out." Similarly, the conceptual definition of project sustainability is western, so the primary limitation of the study was the difficulty of finding an appropriate term for sustainability in the local dialect, to suit the local context. Another limitation of the study is the timing of the data-gathering schedule. Data gathering was conducted during the commissioning phase of the project. At this phase, the project's economic performance had not yet been established; thus, dimensions of sustainability were primarily determined through the participants' experiences with Carbon-in-Pulp (CIP) plants and their future outlook.

Data were obtained through key informant interviews, focus groups discussions, and document review. There were 19 focus group discussion participants comprised by barangay residents, small-scale miners, and CLINN-GEM operations group members.

Meanwhile, there were four critical informants from the local government units and the project team. All the participants were selected through criterion sampling. Their ages ranged from 20–61. There were 13 males and 10 females. Moreover, the documents reviewed included the Project Proposal, Memorandum of Agreements, Organizational Structure, and other related texts and documents.

To determine the project's sustainability, the study employed a program sustainability analysis (Khan, 2000), taking into account the different dimensions of program sustainability such as logistical, economic, community, equity, institutional, and environmental dimensions.

The CLINN-GEM Project and Its Sustainability

The data gathered were summarized and discussed based on two themes: description of the CLINN-GEM project and discussion of the implications for sustainability. The first theme covers the development, processes, and practices of the CLINN-GEM project, as well as issues and challenges encountered. The second theme covers definition, dimensions of sustainability, and prospects of the project as an innovative development project.

The CLINN - GEM Project

History and Nature of the CLINN – GEM Project

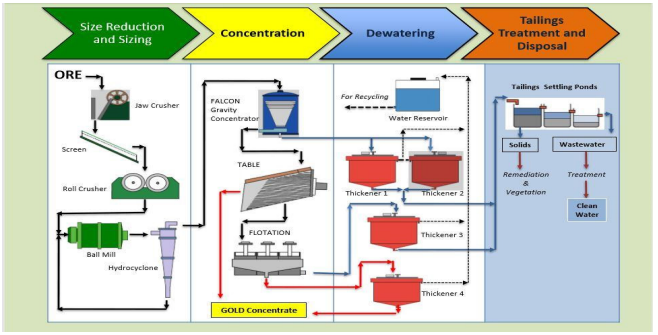
The history of CLINN-GEM Project can be traced from the technology produced by Project C (Copper Flotation Technology for Small Scale Mining) and project D (Alternative Methods to Amalgamation and Cyanidation in the Recovery of Gold) of the Better Mine Program of the Environment and Infrastructure track of the Engineering Research and Development for Technology (ERDT) in 2015. These projects led to the establishment of GoldCopper Integrated Mineral Processing Pilot Plant in four regions: 1) sitio Basil, Barangay Gumatdang, Itogon Benguet in Cordillera Administrative Region (CAR); 2) Barangay Sta. Rosa Norte, Jose

Panganiban, Camarines Norte (Bicol); 3) Barangay Del Pilar, Cabadbaran City (CARAGA); and 4) Barangay Katipunan, Nabunturan Compostela Valley (Davao Region). The integrated gold-copper mineral processing plant is composed of four major components, namely: a) Beneficiation: size reduction and concentration (Crushing, Grinding, and Flotation Section), b) Quality Control: sampling and analysis (Laboratory Section), c) Extraction and Refining (Extractive Section), and d) Tailings disposal and water treatment. Also, the plant is capable of processing 10-15 metric tons per day of gold ore.

The field Implementation of the Integrated Gold-Copper Mineral Processing Pilot Plant in the in selected small-scale mining regions/ communities is a bold step towards introducing and promoting an environment-friendly and high yielding alternative process of extracting gold from ores, using enhanced gravity concentration to separate fine gold values, and flotation to separate fine gold values associated with sulphide minerals, like pyrite (FeS2). The alternative processes of Flotation and Gravity concentrations are emerging as the "GREENER" technologies, which have shown high recovery of gold and other valuable minerals like copper at higher efficiencies. One significant feature of this technology is the high recovery of gold values that reaches up to 90-95 % as compared to only 40% recovery by the existing small scale mining operations. The process flow (see Figure 1) includes ore size reduction, concentration, dewatering, tailings treatment, and disposal.

Figure 1

The Process of the UP-DOST Integrated Gold-Copper Mineral Processing Plant

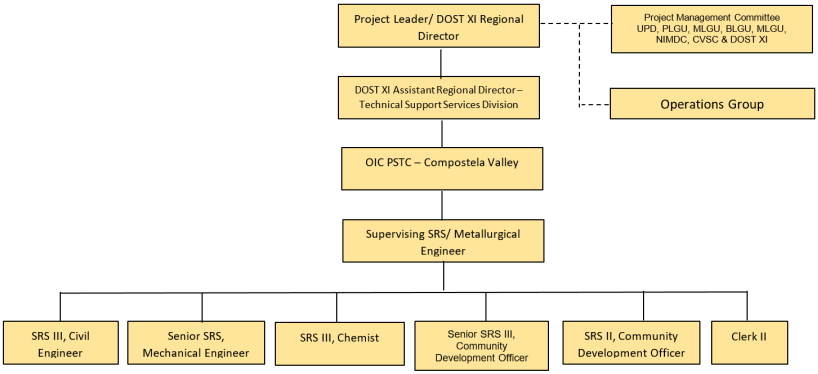


Establishing a technology that would significantly improve the gold recovery and mitigate damage to the environment in small-scale mining operations will boost the overall gold production of the country and improve the quality of lives of the small-scale miners, thus contributing to economic growth. However, growth does not always translate to development. Therefore, though the project's primary goal is technology validation, it is also essential to include social development dimensions in the project. Putting people in the center of development (inclusion), strengthening the social fabric of communities so that their members can work together (cohesion), and finding ways for people to exercise their voice to authorities (accountability) in the projects are vital operation principles to promote social development in projects (ADB, 1994).

CLINN – GEM Project Structure

Putting people at the center of development and strengthening the social fabric of communities are the underlying principles that govern the project structure. "Community-led" as the project title suggests the project structure (see Figure 2) embodies collective and collaborative governance through multi-stakeholder design to ensure participation and cooperation among the different stakeholders. This governance framework is manifested through the presence of a Project Management Committee composed of UP Diliman, DOST XI, PLGU Comval, MLGU Nabunturan, BLGU Katipunan, and NIMDC, as well as CVSC which served as the highest decisionmaking body of the project. The implementing team (DOST XI) was composed of the project technical staff headed by the project leader who supervised and monitored the implementation of the project. Along with the UP DMMME is the operations group that managed the operations during the commissioning, marketing and management, and turn-over phases. The operations group was comprised by residents and small-scale miners in Barangay Katipunan and its neighboring barangays.

Figure 2
CLINN – GEM Project Structure



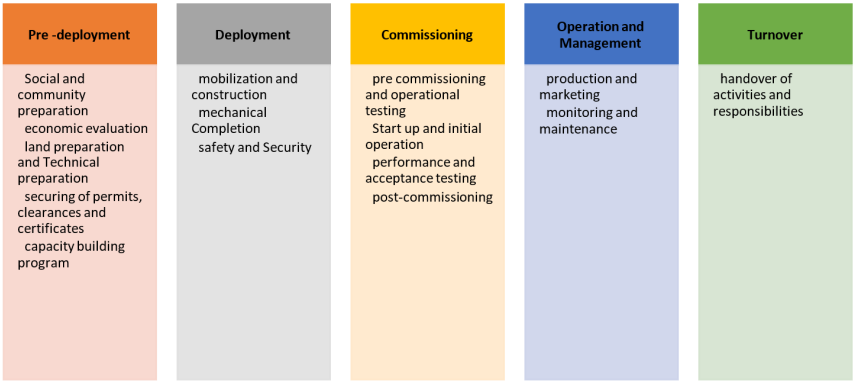
CLINN – GEM Project Phases

The inclusion of people in project planning and implementation are vital factors for sustainability. Thus, like other development projects, the implementation of the CLINNGEM project involved five phases: pre-deployment, deployment, commissioning, operation and management and turnover (See Figure 3). Each stage consisted of different activities involving different stakeholders.

The Implementing Agency (DOST-XI) was responsible for undertaking the pre-deployment and deployment phases with the supervision of the team from DMMME-UP. DMMME – UP provided all the technical data and specifications needed in all the activities under the said phases and conducted workshops for the project technical staffs who were directly involved in the project. Afterward, DMMME-UP would take over during the Commissioning phase, Operation and Management, and Turnover phases in coordination with DOST-XI, Provincial Local Government Unit (PLGU) of Compostela Valley, and other stakeholders. The specific activities under each phase are as follows:

Figure 3

CLINN – GEM Project Phases



Pre-Deployment Phase. Activities in the pre-deployment phase were primarily characterized as social/ community and technical preparations. Regional partners such as the PLGU, DENR (EMB, MGB), MLGU, CVSC, and small-scale miner groups were actively involved during coordination and organization, drafting of management and technical tasks, development of a curriculum and training modules, and identification. The local people attended and participated in information dissemination and consultation meetings and research activities (value chain analysis).

Deployment Phase. The activities during deployment phase included mobilization and construction. During this phase, some barangay residents were directly involved in the project as skilled and unskilled construction workers of the mineral processing plant.

Commissioning Phase. The activities in the commissioning stage were divided into three components: 1) pre-commissioning and operational testing. 2) Start-up and initial operation; and 3) performance and acceptance testing. During this phase, the operations group were able to observe the processes in the mineral processing plant. They also had their preliminary operation.

Operation and Management Phase. The activities in the operation and management phase primarily included production and marketing and monitoring and maintenance. Along with UP-DMMME, the operations group took a partnership stance with

DOST XI. The operations group was directly involved in the operations of the mineral processing plant.

Turnover Phase. Handover of activities such as workshops for planning are conducted to ease out the transition and delegation of the process implementation, maintenance, and monitoring. During this phase, the operations group directly manages the day-to-day activities of the plant under the supervision of the PLGU as the state representative. This mechanism allows the people to have control over the technology and decisions about the operations of the mineral processing plant.

Issues and Challenges

Implementation of project design is about translating concepts into reality. Project management is a crucial element in the implementation of projects. Political, economic, operational, social, and physical difficulties either seriously delay projects or cause them to fail. In implementing the CLINN-GEM project several issues and challenges were identified. Some issues were addressed while others have remained as challenges.

Acceptability of the Project

The residents and small-scale miners of barangay Katipunan and their neighboring barangays expressed different reactions upon hearing about the CLINN-GEM. Some residents were happy to hear about the non-mercury non-cyanide gold processing technology while others were excited to witness the high recovery of gold which the project espouses. While the residents believed that the mineral processing plant would be the answer to their poverty, they also expressed their concerns about the project. They were apprehensive due to the following reasons. First, they questioned the efficiency of the technology because they had never heard of such technology until then. Second, the people were apprehensive of the possible social and environmental impact of the processing plant. They argued that if the processing plant would yield gold and provide more income to the people, social problems such as prostitution, alcoholism,

domestic violence, and dysfunctional families would also occur. In regards to environmental impact, high yield and income encouraged more miners to operate, which could lead to the destruction of mountains, rivers, and other natural resources. The participants also pointed out a possible increase in mining waste and noise pollution if mining operations would not be regulated.

Information Gap

Since the project is technology-based and highly technical, the implementing team had difficulty in communicating the project aims and processes to the people using the layman's language. This problem was expressed by the project staff and was observed during the focus group discussions. The people had a limited idea of what the project is all about. They also had difficulty in explaining the operations of the project. As such, their perceived benefits from the project were limited to employment in the processing plant rather than improving their quality of life through the increase in income and environmental security.

Project Delays

There were three types of delays experienced by the people and the project implementing team. First was the delay in the procurement and construction. Since the project was a governmentfunded project, purchase of supplies and materials had to undergo government procedures. Bidding procedures and the highly bureaucratic procurement system were identified as primary reasons for the delays in procurement and construction of the mineral processing plant. The weather conditions also contributed to the delays in construction as it started during a rainy season. Second, procurement and construction delays had spilling effects to the payment of salaries of the construction workers as their payments were based on their accomplishments. And third, on the management level, the multi-stakeholder project structure made problem-resolution and decision-making more time consuming as members of the Project Management Committee met once every

three months to discuss problems and concerns of the project.

Availability of Utilities such as Water, Electricity, and Chemicals

Because the project industrial, utilities such as water, eletricity, and chemicals needed as inputs are essential. One of the most significant challenges of the project was to acquire a three-phase transformer because securing such would mean additional work for the implementing team. They underwent several activities to comply with the electrification requirements. Activities conducted solely to address this problem include consultation of the affected landowners and tree planting to replace those that were cut and removed.

Safety and Security

With regards to safety and security, the research participants were very much aware of the possible security threats. The first threat was associated with the presence of the New People's Army (NPA) in the province. According to the participants, there were two possible scenarios where the NPA would interfere and pose a threat to the project operation. First, if the NPA would collect the revolutionary tax and the plant management refused to pay; second, if the NPA heard complaints of injustices in the operations and management of the mineral processing plant, then most likely, the NPAs would burn the entire mineral processing plant. On the other hand, crimes such as robbery and kidnapping were identified as significant threats to small-scale miners who were processing their ores in the mineral processing plant.

Sustainability

Given that the technology was new to the people, and the process flow was complicated, the research participants feared that the project would not be sustainable. Dimensions of sustainability identified by the participants are discussed in the succeeding sections.

Implications for Sustainability

Defining Sustainability

There seems to be as many definitions of sustainability as there are different stakeholders in development projects. The differing definitions of sustainability are brought about by the varying views of the different stakeholders – the project donors, implementers, partners, and beneficiaries. The leading definitions of sustainabilitycome from the international financial and non-governmental organizations which focus on the continuation of significant benefits and maintenance of an acceptable level of benefit, which flows after the donor has completed the projector throughout its economic life (Hutaserani & Bayley, 2010). Moreover, the definition of sustainability varies depending on the nature of the project. In community–managed infrastructure and service delivery projects, sustainability is defined as the capacity of the community to maintain the service (Lockwood et al., 2015). Meanwhile, the research participants' emphasized that a "sustainable project" is one that adds value to all three dimensions of sustainability – economic, social, and environmental. As such, their definition is comprised of three aspects: operation, impact and technology transfer, and adoption.

The first aspect is on the economic, social, and environmental feasibility of the project (mineral processing plant operation). The research participants explained that sustainable projects must be self-sufficient/financing and environmentally sound, where the beneficiaries manage them. Sustainable projects also emphasize the importance of the plants' effects on the environment since they are highly aware of the environmental degradation they are experiencing.

The second aspect of the definition of sustainability centers on the impact of the project on human development, health, livelihood, and the environment of their community. The research participants pointed out that the CLINN-GEM project must improve the quality of life of the people (i.e., through improved income, health, education, and other social services) and increase gold production as well as the income of people. Moreover, the participants believed that the

project must not contribute to environmental problems of the community.

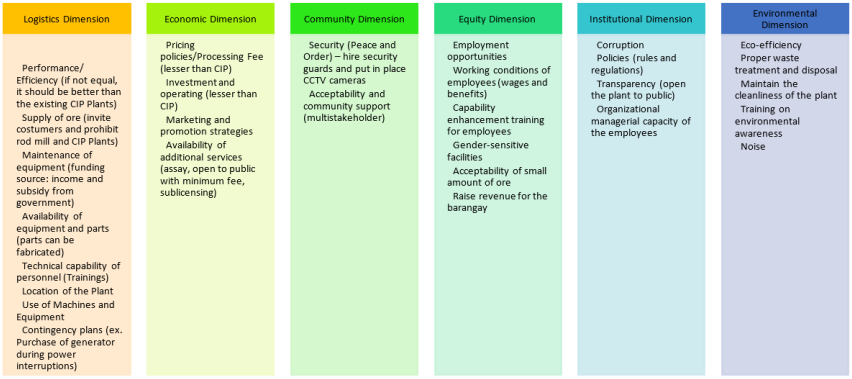
Lastly, the research participants expounded that a sustainable project is one that is adopted by the end-users, which, in this context, refers to the small-scale miners. The participants claimed that it was not enough that the mineral processing plant would operate continuously; instead, technology must be accessed, used, and adopted by the small-scale miners. Thus, the adoption aspect of the project highlights utilization and adoption of technology as fundamental considerations in measuring the sustainability of the CLINN-GEM project, and other economic, social, and environmental factors.

Dimensions for Sustainability

For innovative projects, such as the CLINN-GEM project, to become sustainable, they must be popularized, utilized, adopted, and owned by the people. These processes require time, resources, capacity building, and participation. Ali et al. (2016) stressed that project management has great potential for the design of sustainability especially on organizational parameters and human side factors. Sustainability indicators are essential tools in helping individuals, institutions, communities, and societies make different and better choices about their future (Lawrence, 1998). In this study, the research participants were asked to identify factors which could affect the sustainability of the project. Using Khan's (2000) classification of dimensions in analyzing program sustainability, a summary of factors that could affect the Sustainability of the CLINNGEM Project were identified (see Figure 4).

Figure 4

Summary of Factors that could Affect the Sustainability of the CLINNGEM Project



As can be viewed from among the different dimensions identified above, logistics dimensions have the most number of factors which need to be considered. The performance or efficiency of the processing plant is a significant consideration for sustainability. Since the technology is new, the people are expecting that it can deliver what it has promised. They said that the mineral processing plants' performance if not equal should be better than the Carbon in Pulp (CIP) plants. In measuring efficiency, Martens and De Carvalho (2014) suggest considering indicators such as cost, time, and scope.

Other factors identified by the participants include the funding source, availability of parts for the maintenance of equipment and the technical capacity of the operations group to handle mechanical problems. The participants expressed some apprehensions as regards the maintenance of the plant since they knew that post-construction maintenance would require a significant amount of money. A side from budget the participants were also unaware of the availability of the parts and the technical capabilities of the operations group. They explained that the operations group members were not engineers and therefore did not possess the proper technical training; thus, troubleshooting of mechanical problems might be a challenge . This finding supports the idea that sustainability of projects is not only determined by community management but also by the strength of post-construction support (Bakalian & Wakeman, 2009). Therefore, there is a need for government and development

partners to strengthen post-construction support on operations and maintenance systems (Foster, 2013).

Furthermore, the participants also shared the reasons why most CIP plants failed, aside from lack of budget for maintenance . One reason was that the owners also had problems with theirlocation and the supply of ore. According to the participants, the processing plant should be accessible and strategic. The location of the processing plant is not very strategic because it is far from tunnels with regular operation. With this, small-scale miners will not be interested in processing their ores in the plant because of the possible high transportation cost, which, in turn, can affect the supply of ore and its operation. In view of these problems and other factors to be considered, the participants suggested that the management team must address post-construction problems by providing funding support and technical training, and formulating contingency plans.

Aside from efficiency of the processing plant, economic dimensions, such as pricing policies/processing fees, investment and operating costs and availability of additional services are essential factors that influence small-scale miners's decision to patronize mineral processing plants' services. The participants emphasized that owners of CIP plants were collecting too much. Thus, the participants, who were small-scale miners, were expecting that the mineral processing plant would ease this burden with minimal fees. Likewise, the participants affirmed that the minimal fees and the availability of other services such as assaying, firing, and sublicensing were the comparative advantages of the mineral processing plant. The participants proposed that the management team must plan for its marketing and promotions strategies, so it could reach its desired market.

Apart from the logistics and economic dimensions, community dimension specifically on peace and security and community support were pointed out by the participants. The participants expressed their security concerns because they have heard and witness mining equipment burnt by the New People's Army while some experienced robbery. They argue that both the mineral processing plant and their community are threatened by the presence of NPA in the province. Thus, problems on security must

be addressed by hiring security personnel, installing CCTV cameras and asking the people to secure their community to ensure that the operation of the plant will not be affected.

On equity dimension, the CLINN-GEM project was expected to provide employment opportunities to the residents of Barangay Katipunan and its neighboring barangay. The participants were highly aware that the management must abide by labor standards including good working conditions, provision of wages and benefits, capability enhancement training, and gender-sensitive facilities. They made sure that while the management focused on the technical operation of the mineral processing plant, they should also establish a good working relationship with employees and customers , who play significant roles in the plant operation. Also, inclusivity was identified as an essential factor for sustainability. Since the project was designed for small-scale miners, the participants were curious if the plant would accommodate a small amount of ore (5 metric tons); if this is true , then the project could be beneficial to miners who have lesser produce. Finally, the success of the project was perceived to be helpful to the barangay, for it could raise revenue that could be used to provide social services to the people.

In relation to the foregoing, there are four different aspects of institutional dimensions identified by the research participants: The presence of corruption, the existence of policies and standards of operation, transparency, and organizational and managerial capacity of employees. The participants observed corrupt practices in government projects and CIP plants, and they posited that developing standard operating procedures would be of great help in minimizing corruption. They stressed that penal sanctions should be imposed on employees guilty of bribery and corruption. The participants further argued that once there was corruption inside the plant, then problems and the downfall of the operation would follow. Furthermore, they also mentioned that some CIP plants did not disclose their operations to the public due to security and trade concerns. However, theparticipants asserted that the processing should be open to the public. Opening the plant to the public is a marketing strategy and could mean extra income; but more than this , doing so would be a manifestation of transparency. The participants

further reasoned that opening the operation to the public would allow the people to witness how the technology worked and would enable them to check if indeed the plant was environmentally friendly and if it used non-harmful chemicals. In sum, opening the operation to the public was viewed by the participants as a way of making the technology close to people.

On the other hand, some of the participants were worried about the preparedness of the people to adopt the technology while others were hesitant of to accept innovations. They posited that they lacked the organizational and managerial capacities to handle and operate the mineral processing plant. With this, they tapped UP Diliman and DOST for support. These findings imply that sustainability is not only determined by financial and technical indicators but also by leadership capacities (Annis, 2006). Since mining is associated with environmental destruction (Hentschel, 2003), the participants were very critical of the environmental dimensions. They emphasized that for the mineral processing plant to be sustainable, it must be eco-efficient; it must treat and dispose of its wastes properly; it must also maintain cleanliness; and it must be aware of its possible effects to the environment, such as noise pollution. Environmental programs such as training on environmental awareness have helped to sustain the project. They explained that eco-efficiency could be achieved when production is maximized as the environmental impacts of production are also reduced or mitigated. Moreover, the participants were also very meticulous in regards to treatment and disposal of waste because most of the CIP and ball mill processing plants did not maintain cleanliness and disposed of their wastes in the creeks and rivers, resulting in the death of fish and farm animals.

Participation as a Dimension for Sustainability

Participatory development seeks to engage local people in development projects. It hopes that development projects will be more sustainable and successful through the engagement of local people in the process. As regards innovative projects such as the CLINN – GEM, Chambers (1997) argues that outsiders do not

transfer technology; they share methods which local people can use for their appraisal, analysis, planning, action, monitoring, and evaluation. Outsiders do not impose their reality; instead, they encourage and enable local people to express themselves. In participatory development play an active role in the development of the project, as the project progresses, the peoples' roles and responsibilities also increase.

Looking at the typologies of participation (Pretty 1995, as cited in Oxford Policy Management, 2013) the types of participatory activities in the CLINN-GEM project phases were passive participation, participation by consultation, participation for material incentives, and interactive participation. During the pre-deployment phase, the people were both passive and active participants of the project. They attended and participated in consultations conducted by the Implementing Team. The results and discussions during consultations were used to design plans and activities for the people. During the deployment phase, some residents participated in the construction of the mineral processing plant. Interactive participation was evident among the members of the Project Management Committee and the operations group as they were the ones who developed action plans, decided on solutions to solve problems, and managed the mineral processing plant. These groups took control over local decisions and determined how available resources are used, so they have a stake in maintaining structures or practices.

While efforts to include the local people in the different project's phases are evident, still the concept of "communityled"remained unclear. As regards the degree or level of people'sparticipation (Arnstein, 1969, as cited in Oxford Policy Management, 2013), activities participated in by the local peoplewere categorized as tokenism (e.g., informing, consultations) although there were few who exercised citizen power (e.g., partnership, delegation, citizen control), such as the Implementing Group, the Project Management Committee, and the Operations Group. This seemingly disproportionate degrees of participation have posed a significant challenge to powersharing, technology-adoption, and ownership concerns.

Prospects of Sustainability

At present, the CLINN-GEM project has caught the local people's attention; however, it is not yet part of their everyday life. When asked about the prospects of sustainability of the project on a scale of 1-10, with 10 as the highest rating, the participants gave responses that were categorized into the following themes:

1. The efficiency of the technology. The sustainability of the project depends on the efficiency of the new technology. One participant rated the project 7-8 because there was a need to wait for the mathematics of the project (i.e., the actual production cost and percentage of gold recovery), to see if the figures would be acceptable. The same participant added that the project would be a game changer not only in the ComVal but in the whole country, if it would be sustained.
2. The capacity of the implementing team and the project management committee to address issues and concerns. Prospects of sustainability are measured through the ability of the stakeholders to solve problems in several critical components. Since the project is a pilot study, there were several unforeseen problems which the stakeholders needed to address; when these problems are solved and the project becomes self-sufficient/financing, the projects unattainable can be achieved.
3. The support and acceptability of the people. While the people awaited the results or the pilot plant, some believed that the project would be sustainable if it had public support. One participant rated the likelihood of sustainability of the CLINN - GEM project 10 because the local people gave their best to support the project.

Conclusions and Recommendations

The study highlighted several themes in the examination of the practices, processes, issues, and challenges of the CLINN-GEM Project.

First, the development of the CLINN-GEM project as an innovative development project shows the efforts of the government through science and technology to address the challenges of 2015) smallscale mining. And since the initiative cascades through a "top-down" management approach, the ultimate challenge is on how to share the technology to the local people for them to understand, learn, use, adapt, own, and improve it. The adoption of a multi-stakeholder structure and inclusion of various types of participatory activities in the project process suggest that while participation may cause a delay in decisions, projects could be easily implemented through collective actions. Close integration and convergence of stakeholders could result in successful projects (Lockwood et al., 2015).

Two, unlike other development projects, the utilization, adoption, and ownership of this technology are considered as the primary indicators of sustainability. Since the project is technology driven, its efficiency, costs, and resources for maintenance are crucial in sustaining its operations. Meanwhile, peace and security, and community acceptance and support are equally important dimensions to consider in maintaining the project. Moreover, equitable sharing of benefits for the workers and the community are essential while institutional problems, such as corruption and organizational incapacities, need to be addressed. Apart from all these, people consider environmental dimensions such as ecoefficiency and proper waste management as indicators of project sustainability.

Third, as an innovative development project, the prospects for sustainability of the CLINN- GEM project heavily rely on its performance. Hence, aside from ensuring efficiency, all issues and problems must be addressed. To perfectly manage the mineral processing plant, the following actions are recommended: 1) promoting and popularizing the technology by allowing the people to access and use the mineral processing plant; 2)reducing information gap by increasing information dissemination and education activities, developing IEC materials, and conducting trainings and workshops; 3) enhancing people's sense of ownership of the project by organizing and mobilizing them, thereby allowing them to

participate in and decide on future activities, recognize their capacities, and be treated as active members of the community.

Fourth, the results of the study suggest that future research on community-led projects, ownership of technology, and sustainability should be conducted. The following research questions on these topics can be explored :

- What is a community-led project? What is its nature and elements?
- What does ownership of technology mean? From this context, who owns what?
- What is the extent of sustainability of technology-based projects?
- Is its commercialization, utilization, adoption, behavioral change, sustained benefits, or social Impact (e.g., people are liberated from poverty because of the technology)?

Lastly, as we look forward to a sustainable CLINN-GEM project, we might as well want to examine whether the economic viability of the project makes the economy of mining communities better off, the people's well-being is improved, the environmental integrity is assured over the long term, and people get a fair share of resources.

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Quantifying Energy Balance across Different Biomes Using Remotely Sensed Data

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Abstract

Although there are existing remotely-sensed data that directly calculate the surface energy balance parameters, their spatial resolution is low. With this, a method called Simplified Surface Energy Balance Index was used to estimate energy balance components. From the different remotely-sensed data, downscaled maps of net radiation, latent, sensible, and ground heat fluxes were generated for the province of Laguna. The values of these parameters were measured for water, urban, forest, and agricultural areas. It was found that latent heat flux was highest for all the biomes while soil heat flux was the lowest. Comparing the components for each biome, latent heat flux was high in forest and water bodies due to the availability of water, which is a factor of evaporation. On the other hand, ground heat flux and sensible heat flux were high in urban and agricultural areas, both representing dry areas. Overall, net radiation is inversely proportional to reflectance. Water had low albedo, therefore high net radiation. The urban and agricultural areas had high albedo, which indicates low net radiation. The method employed in this study is helpful to estimate the partitioning of the surface energy balance parameters, especially in the absence of instruments that directly measure them.

Keywords: Energy Balance, Biomes, Remotely sensed data

Introduction

Surface energy balance is the partitioning of net radiation into sensible heat, latent heat, and ground heat. Caused by a change in temperature, sensible heat flux is the heat energy transferred between the surface and air when there is a temperature gradient between the surface and the air above. Meanwhile, latent heat flux is the quantity of heat absorbed or released by water undergoing phase change at constant air temperature and pressure. Lastly, ground heat flux is due to heat conduction of the soil (Odhiambo & Irmak 2015).

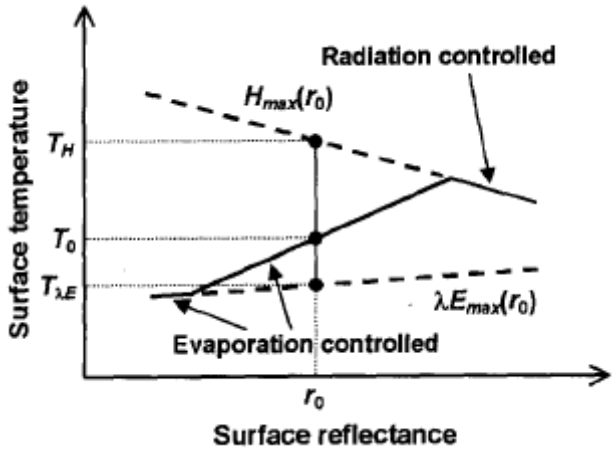
The components and partitioning of surface energy balance greatly depend on the surface covers, moisture, temperature, wind, and other micrometeorological parameters. During the daytime on a moist surface, the partition of net radiation is dominated by latent heat. There is also a moderately sensible flux and a very low and negligible soil heat flux. On the dry surface, in contrast, the partition of net radiation during daytime is dominated by sensible heat. Soil heat flux is also high in dry surface conditions but almost no or zero latent heat flux. There is an observable variation in the quantity of each component of the surface energy balance across different ecosystems. In a well-watered vegetated surface, for instance, latent heat accounts for 60% of the net radiation, while sensible heat flux constitutes 28% of the net radiation. Soil heat flux in this ecosystem is only 12% of the net radiation. In the desert, on the other hand, latent heat flux is almost zero, and sensible heat flux accounts for a huge percentage of the net radiation. Ground heat flux in this condition is also high. There are also instances or conditions where some of the partitions of the surface energy balance become higher than the net radiation. In a well-irrigated herbaceous crop on a sunny day in an oasis that is surrounded by a large expanse of desert, for example, an abundant supply of water and advection makes latent heat flux higher than the net radiation (Saludes, 2018).

Simplified Surface Energy Balance Index (S-SEBI) is a method of estimating latent and sensible heat. It is dependent on remotelysensed data specifically albedo and minimum and maximum surface temperature. Typically, the surface temperature is low at a lower reflectance level but as it enters the evaporation-

controlled portion, the temperature begins to increase with albedo. Due to heating in this state, there is a decrease in evaporation which results in a decrease in water availability. In another portion called radiation-controlled, as albedo increases, the surface temperature begins to decrease. It is where evaporation will not happen and the remaining energy is used for surface heating (Liou & Kar, 2014). Figure 1 shows the plot of surface temperature and albedo (Roelink et al., 1999).

Figure 1

Surface Reflectance vs Surface Temperature Using S-SEBI Model



Remote sensing is an innovation to analyze an area spatially and temporally using satellite images. It is widely used in urban planning, forestry, biodiversity, weather, and agriculture. Google Earth Engine (GEE) is an online GIS that stores satellite imagery in an archive accessible to its users. It uses JavaScript API so that one can analyze the data of a specific area (GEE, 2018).NDVI measuresthe greenness and photosynthetic capacity of the vegetation. NDVI algorithm takes advantage of the fact that green vegetation reflects less visible light and more NIR, while sparse or less green vegetation reflects a greater portion of the visible and less nearIR. NDVI combines these reflectance characteristics in a ratio so it is an index related to photosynthetic capacity. Plant photosynthetic activity is determined by chlorophyll content (Verhulst & Govaerts, 2010*).*

The range of values obtained is between −1 and +1. Only positive values correspond to vegetated; the higher the index, the NDVI measures the greenness and photosynthetic capacity of the vegetation. NDVI algorithm takes advantage of the fact that green vegetation reflects less visible light and more NIR, while sparse or less green vegetation reflects a greater portion of the visible and less nearIR. NDVI combines these reflectance characteristics in a ratio so it is an index related to photosynthetic capacity. Plant photosynthetic activity is determined by chlorophyll content (Verhulst and Govaerts 2010). The range of values obtained is between −1 and +1. Only positive values correspond to vegetated zones; the higher the index, the greater the chlorophyll content of an area. The time of maximum NDVI corresponds to the time of maximum photosynthesis. Seasonally integrated NDVI indicates photosynthetic activity during the growing season. The rate of change in NDVI may indicate the speed of increase or decrease of photosynthesis. Changes in vegetation cover directly impact surface water and energy budgets through plant transpiration, surface albedo, emissivity, and a roughness according to Aman et al. (1992, as cited in Jiang et al., 2006).

Laguna is a province located in the north-central part of Region IV-A or CALABARZON. It has an area of 191,785 hectares. It is situated near two dormant volcanoes namely Mount Makiling and Mount Banahaw. Also, the province encloses Laguna de Bay which is the largest freshwater lake in the country (LLDA, 2018). A number of the population in Laguna are engaged in agriculture producing rice, coconut, sugarcane, lanzones, and other citrus fruits (PhilGIS, 2018). According to climate classification based on average monthly rainfall in the Philippines, devised by Fr. J. Corona, Laguna has a Type I climate that has two pronounced seasons: dry from November to April and wet during the rest of the year (Lantican, 2001). Over the years, remote sensing methods have been utilized and improved following the advancement in satellite technology and computing power. With these innovations, fewer ground-based measurements of model parameters are required, and models can be applied more accurately over larger extents at higher spatiotemporal resolution (McShane et al., 2017).

Quantifying energy balance is useful in agriculture. Latent heat flux, for instance, is used to estimate the consumptive water use of crops (McShane et al., 2017) which can then aid farmers in irrigation management. Generally, this study aimed to determine the partitioning of energy balance components in different biomes in Laguna, Philippines utilizing only remotely-sensed data which were then analyzed using the S-SEBI model. Specifically, this study endeavored to quantify the amount of heat flux received in Laguna; generate downscaled maps of net radiation, latent heat flux, sensible heat flux, and ground heat flux; and explain the comparison of the energy balance components among various biomes.

Materials and Methods

Study Area

Laguna was chosen to be the area of this study. Figure 2 shows the map of Laguna and the coordinates for the various biomes can be seen in Table 1.

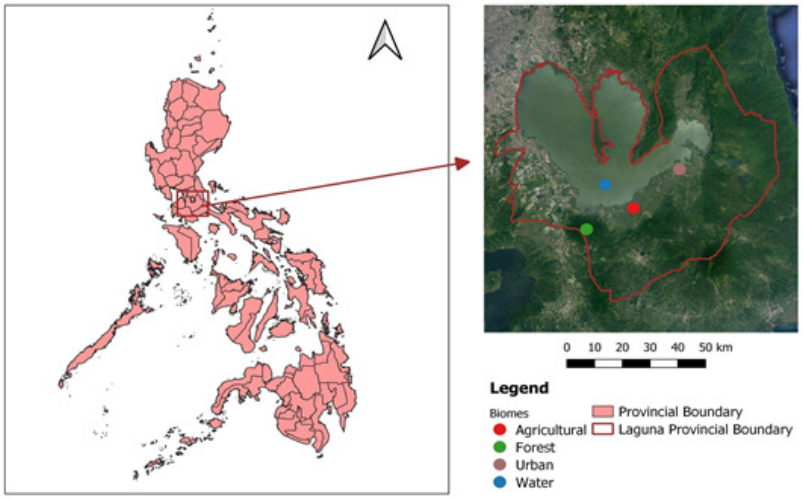


Table 1

Coordinates of Different Biomes

Biomes	Location	Coordinates
Water	Laguna de Bay	121.248120 °E, 14.243160 °N
Urban	Sta. Cruz	121.41256 °E, 14.28046 °N
Forest	Makiling Forest Reserve	121.206879 °E,14.136628 °N
Agricultural	Brgy. Bangyas, Calauan	121.310890 °E,14.187271 °N

Three Landsat 7 Enhanced Thematic Mapper Plus (ETM+) were used to determine the albedo and Normalized Difference Vegetation Index of Laguna. These data were chosen because they were clear and cloud-free. The information about the selected images can be seen in Table 1.

Table 2

Information of Landsat-7 ETM+ Images Used

Landsat-7 ETM+ Image	Date of Acquisition
LE07_116050_20011126	November 26, 2001
LE07_116050_20020403	April 3, 2002
LE07_116050_20030508	May 8, 2003

Raster calculations were made using Google Earth Engine. Albedo or surface reflectance for each image was computed using Equation 1 (Liang, 2000).

$$A=0.356r\_1+0.13r\_3+0.373r\_4+0.085\ \ r\_5+0.072r\_7-0.0018 \quad (1)$$

where A= albedo

r_(1) = reflectance of band 1
r_3 = reflectance of band 3
r_4 = reflectance of band 4
r_5 = reflectance of band 5
r_7 = reflectance of band 7

NDVI was then calculated using the reflected band and absorbed band as shown in Equation 2.

$$NDVI= (r\_4-r\_3)/(r\_4+r\_3) \quad (2)$$

where r_3 = reflectance of band 3 (red band)
r_4 = reflectance of band 4 (near infrared band)

In order to compute the surface energy balance parameters, other datasets were used. The general relationship of these parameters was given by Equation 3.

$$R_n=Q_L+Q_H+Q_G \quad (3)$$

where R_n = surface net radiation (W/m2)
Q_L = latent heat flux (W/m2)
Q_H = sensible heat flux (W/m2)
Q_G = ground heat flux (W/m2)

The surface net radiation can be derived using albedo and the components of net longwave radiation – upward longwave radiation and downward longwave radiation. It was calculated using the following equation:

$$R_n=(1-A)\ R_(g\ )+\ L_down-L_up \quad (4)$$

where R_n = surface net radiation (W/m2)
A = surface albedo
R_g = incoming global radiation (W/m2)
L_down = downward longwave radiation (W/m2)
L_up = upward longwave radiation (W/m2)

The incoming global radiation was obtained from the UPLBAgromet Station with the unit of cal/cm2 and then converted toW/m2. Table 3 shows the incoming global radiation. The other components were calculated using Equations 5, 6, and 7.

Table 3

Incoming Global Radiation at Different Periods

Date	Incoming Global Radiation (cal/cm^2)	Incoming Global Radiation (W/m^2)
November 26, 2001	259	125.571
April 3, 2002	663	321.2785
May 8, 2003	727	352.2918

The down welling longwave radiation was obtained using the air temperature obtained using Global Land Data Assimilation System 2.1 with approximately 25 km spatial resolution, vapor pressure from Terra Climate, with approximately 5 km spatial resolution and computed atmosphere emissivity. Equation 5 shows the calculation for atmosphere emissivity. ε^'=1.24

(e_a/T_a)^(1/7) (5).

where ε^' = atmosphere emissivity
e_a = vapor pressure (Pa)
T_a = air temperature (K)

Using the Stefan-Boltzman equation, the downward longwave radiation was obtained.

L_down=ε^' σT_a^4 (6)

where L_down = downward longwave radiation (W/m2)
ε^'= atmosphere emissivity
σ = Stefan-Boltzman constant (5.67 x 10^(-8))
T_a = air temperature (K)

The upward longwave radiation was also derived from the Stefan-Boltzman equation and was given by Equation 7.

L_up=εσT_0^4 (7)

where L_up= upward longwave radiation (W/m2)
ε = emissivity (1)
σ = Stefan-Boltzman constant (5.67 x 10^(-8) W/m2K4)
T_0 = surface temperature (K)

After computing the surface net radiation, the soil heat flux can be estimated using a relationship developed by Bastiaanssen (2000).

$$Q_G/R_n = T_0 (0.0038+0.0074A) \times (1-0.98NDVI^4) \quad (8)$$

where Q_G = ground heat flux (W/m2)
R_n = surface net radiation (W/m2)
T_0 = surface temperature (°C)

Latent heat flux and sensible heat flux were derived from the evaporative fraction and calculated using Equations 10 and 11.

$$Q_H=(1-\Lambda)(R_n-Q_G) \quad (10) \qquad Q_L=(1-\Lambda)(R_n-Q_G) \quad (11)$$

where Q_H = sensible heat flux (W/m2)
Q_L = latent heat flux (W/m2))
A = albedo
NDVI = normalized difference vegetation index

Using the S-SEBI model, albedo and surface temperature were plotted. The empirical coefficients for the evaporationcontrolled and radiation-controlled portions were determined. With the obtained constants, the evaporative fraction was computed.

$$\Lambda=(a_H+b_H \times A-T_0)/(a_H-a_LE+(b_H-b_LE)\times A) \quad (9)$$

where Λ = evaporative fraction
a_H,b_(H,) a_LE,b_LE = empirical coefficients
A = albedo
T_0 = surface temperature (K)
Λ= evaporative fraction
R_n= net radiation (W/m2)
Q_G = ground heat flux (W/m2)

Results and Discussion

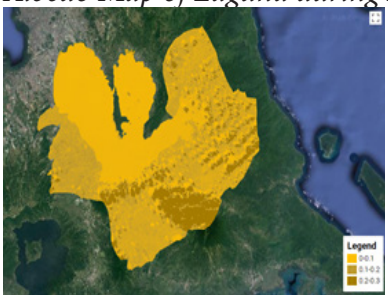
Albedo

The fraction of the incoming solar energy reflected by Earth back to space is referred to as the planetary albedo. Figure 3 presents the map depicting the albedo in different biomes in the whole

province of Laguna during specific dates from 2001 to 2003. As can be seen in Table 4, albedo differs in every biome and the range of values is 0.046 to 0.363. The highest value of 0.363 was observed in agricultural land in November 2001. This might be due to the dry surface and the absence of crops because, at this period, rice was already harvested based on the cropping season in Laguna. Water body had the lowest albedo having an average value of 0.062. Moreover, the average albedo of the urban area was 0.151. In 2001, the albedo in the forest was high, but it declined to 0.125 and 0.128 in 2002 and 2003, respectively. This could be due to the phenological cycle of the trees. From 2001-2003, no pronounced changes in the albedo were observed for urban and water surfaces.

Figure 3

Albedo Map of Laguna during Different Periods



Albedo on November 26, 2001

Albedo on April 3, 2002

Albedo on May 8, 2003

Table 4

Albedo across Four Identified Biomes during Different Periods

Biomes	Albedo		
	2001	2002	2003
Water	0.046	0.051	0.089
Urban	0.144	0.15	0.158
Forest	0.314	0.125	0.128
Agricultural	0.363	0.124	0.2

According to Dobos (2005), the mean albedo of the earth was 0.36. Meanwhile, another study by Stephens et al. (2015) revealed that the mean reflectance value was 0.29. Albedo differs across various surfaces. Oceans, lakes, and forests reflect relatively small fractions of the incident sunlight and have low albedos. Snow, sea ice, and deserts reflect relatively large fractions of the incident sunlight and have large albedos. For any surface, the albedo depends on the spectral and angular distributions of the incident light, which in turn are governed by atmospheric composition and the direction of the beam of light from the sun (Coakley, 2003). The result of our study is in agreement with the other research. Briegleb et al. (1986, as cited in Coakley, 2003) stated that forest had an albedo of 0.12, while water body had an albedo of 0.07. Forest vegetation with a multilevel canopy has a low albedo, ranging from 0.05-0.2 because the incident radiation can penetrate deeply into the forest canopy where it bounces back and forth between the branches and leaves and gets trapped by the canopy (Dobos, 2005). Nutini et al. (2014) noted that desert areas have a higher albedo (0.6), while areas with lower temperatures such as lakes and rivers have lower albedo, approximately below 0.2. Rutan and Smith (2014) said diurnal variations of albedo are caused by the changes in solar zenith angle with the time of day and by changes in the atmosphere and surface through the day.

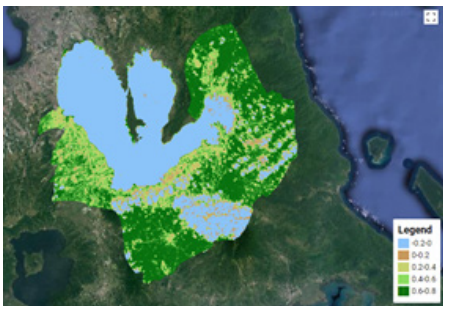
Normalized Difference Vegetation Index (NDVI)

Figure 4 shows the NDVI map in Laguna on three different dates. NDVI is higher in areas with dense vegetation and lowers in bare and water surfaces. The aforementioned statement is true to this study as forest obtained the highest NDVI among the four biomes

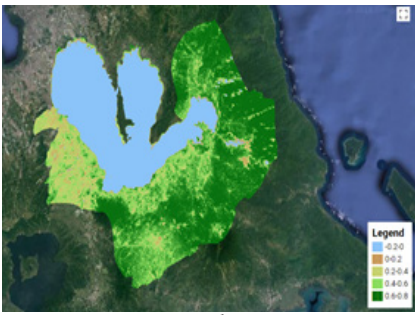
lowest values were observed in water as seen in Table 5. Urban and agricultural areas had an average of 0.423. It can be observed that the values for water and urban areas were consistent within the study period. The NDVI in forest and agricultural lands varies from year to year. In November 2001, the albedo in the forest was 0.251. This value increased to 0.847 and 0.874 in 2002 and 2003, respectively. This could be explained by the phenological cycle of the trees in the forest. The fluctuation of NDVI was pronounced in agricultural land. Its value in November 2001 was 0.101. However, it increased to 0.751 in April 2002 and decreased to 0.352 in May 2003. This high variation of NDVI in agricultural lands from time to time was mainly due to the cropping seasons and growth stages of the crop.

Figure 4

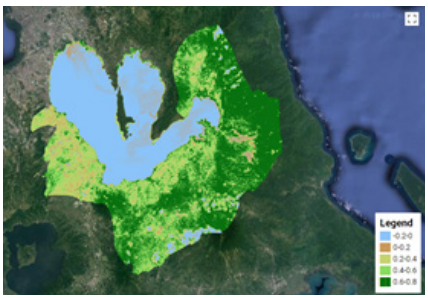
NDVI Map of Laguna during Different Periods



NDVI on November 26, 2001



NDVI on April 3, 2002



NDVI on May 8, 2003

Table 5

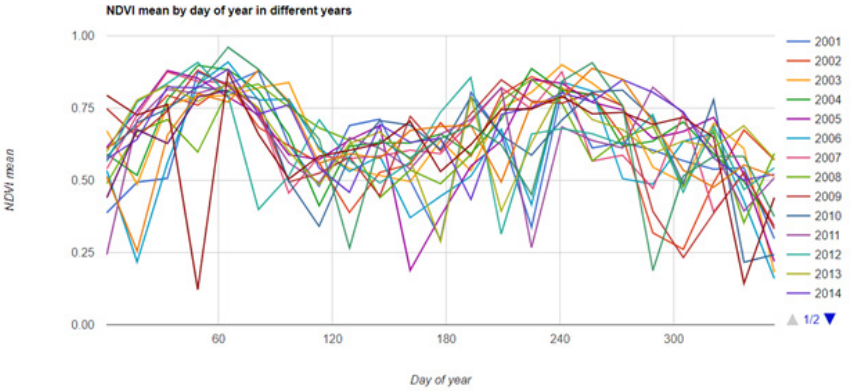
NDVI across Four Identified Biomes during Different Periods

Biomes	NDVI		
	2001	2002	2003
Water	-0.497	-0.514	-0.195
Urban	0.493	0.38	0.397
Forest	0.251	0.847	0.874
Agricultural	0.101	0.751	0.352

The two cropping seasons for rice can be seen in Figure 5. This explains the NDVI values for different periods in this study. In November, NDVI is low because the crops were already harvested. The peak value can be determined during the vegetative and early reproductive stages when the photosynthetic rate is high. For the dry season, the vegetative stage falls on April and the crop can be harvested in May.

Figure 5

Days of Year (DOY) of the Rice Area



The result of this study is in consonance with the result of other studies. Defries and Townshend (1994) noted that forests had higher NDVI ranging from 0.3 to 0.8. Cultivated land and grassland had NDVI ranging from 0.2 to 0.4 and 0.2 to 0.3, respectively. They further observed that bare ground had a very low value of 0 to 0.1. Wright (2011) also noted that NDVI in dense vegetation canopy ranged from 0.3 to 0.8. Very low values of NDVI (0.1 and below) correspond to barren areas of rock, sand, or snow.

Holben (1986, as cited in Palanisamy & Gurugnanam, 2014) said that dense vegetation such as forests had an NDVI of 0.7, while

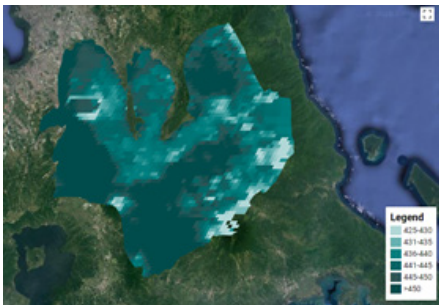
dry bare soil and water had very low NDVI with values of 0.025 and -0.257, respectively. Palanisamy and Gurugnanam (2014) further confirmed that dense forest had an NDVI value ranging from 0.45 to 0.7, while water bodies had a negative NDVI value (-0.06 to -0.35). Moreover, shrub and grassland had an NDVI value ranging from 0.078 to o.15, while barren areas and rock surfaces had an NDVI ranging from -0.35 to 0.078 (Palanisamy & Gurugnanam, 2014). Makiling forest reserve contained at least 225 families and 2,038 species of vascular plants (Combalicer et al., 2011). The entire forest reserve constantly marked high NDVI values ranging from 0.52 to 0.89. Combalicer et al. (2011) indicated the NDVI values, such as low values for lightly vegetated areas (0.1–0.2), moderate values for shrub and grassland areas (0.2–0.3), and higher values (0.4–0.7) for dense vegetation areas. Meanwhile, the negative values are represented by non-vegetative structures like water , clouds, and shadows (Combalicer et al., 2011).

Radiation

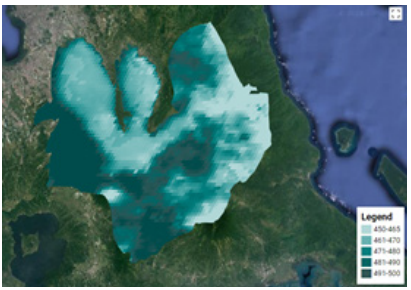
Upward and downward longwave radiations are components to estimate surface net radiation. The obtained maps for different periods can be viewed in Figures 6 and 7.

Figure 6

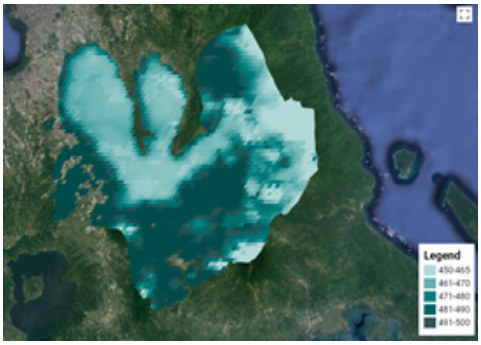
Upward Longwave Radiation Map of Laguna during Different Periods



Upward Longwave Radiation on November 25, 2001



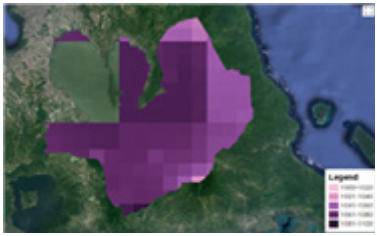
Upward Longwave Radiation on April 7, 2002



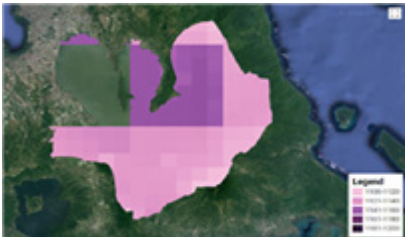
Upward Longwave Radiation on May 1, 2003

Figure 7

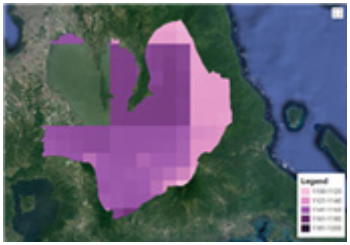
Downward Longwave Radiation Map of Laguna during Different Periods



Downward Longwave Radiation on November 26, 2001



Downward Longwave Radiation on April 3, 2002



Downward Longwave Radiation on May 8, 2003

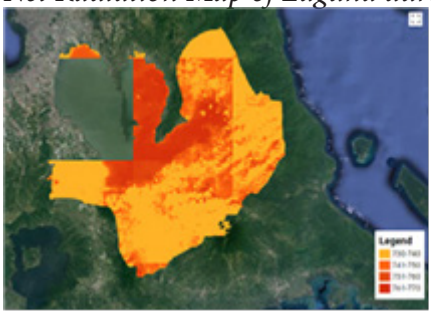
Figure 8 shows the net radiation maps of Laguna during different times. Net radiation was the dominant surface energy balance component, and its partitioning as latent heat, sensible heat, and soil heat fluxes depend on field surface and atmospheric conditions. Net radiation was high in water and forests due to the low albedo and high altitude of the forest. Santos et al. (2011) supported the idea that Rn values are higher in forested areas because they have lower albedo and reflect less shortwave radiation when compared to deforested areas like pasture. Forest, being darker, reflects less

energy and has the vertical structure of more than 30 meters on average, which pacifies the absorption of solar rays that penetrate the forest canopy and are absorbed in the inferior layers.

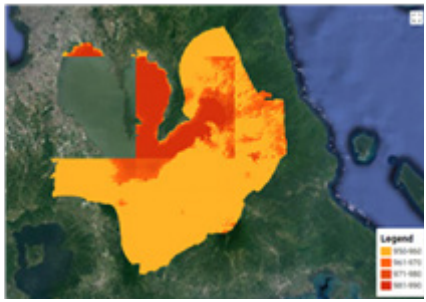
Urban, though low in albedo, has a slightly low net radiation that may be attributed to its atmospheric condition. Schönwiese (1994, as cited in Martinez & Ostos, 2004) summarizedthe alterations of climates due to urbanization, and one of these is the decrease in solar radiation due to urban atmospheric contamination. The lowest net radiation, on average, was observed in an agricultural area that has a high albedo.

Figure 8

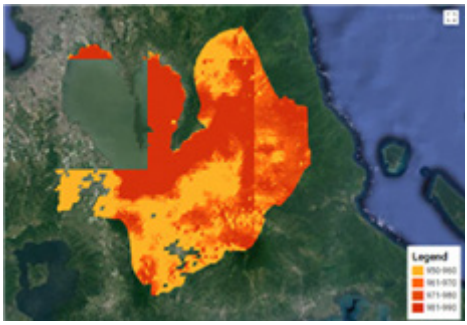
Net Radiation Map of Laguna during Different Periods



Net Radiation on November 26, 2001



Net Radiation on April 3, 2002



Net Radiation on May 8, 2003

Table 6

Net Radiation across Four Identified Biomes during Different Periods

Biomes	Net Radiation (W/m^2)			
	2001	2002	2003	Average
Water	769.496	976.944	1,023.14	923.1933
Urban	741.76	937.824	959.848	879.811
Forest	723.712	952.872	997.762	891.4489
Agricultural	691.736	921.981	957.91	857.209

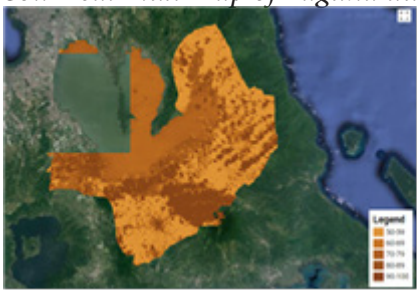
Soil Heat Flux

In terms of soil heat flux, the urban area obtained the highest average value of 170.088 W/m2 followed by the agricultural area with 121.812 W/m2. Water and forest have had very low soil heat flux with values of 96.404 W/m2 and 66.775 W/m2, respectively. The variability of soil heat flux across four biomes was highest in urban areas (57-70 W/m2), followed by agricultural areas (22-55 W/ m2) and water (18-50 W/m2). The least variation of soil heat flux was observed in forests (2-44 W/m2).

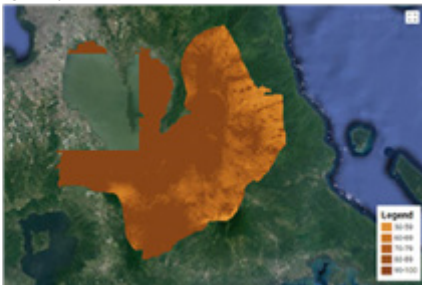
Soil heat flux was higher in surfaces with minimal water content and intense surface heating. This was the reason why soil heat flux in urban areas was high. Water bodies and forests have had low soil heat flux due to minimal surface heating, as attributed to high moisture content and attenuation of light to the forest floor.

Figure 9

Soil Heat Flux Map of Laguna during Different Periods



Soil Heat Flux on November 26, 2001



Soil Heat Flux on April 3, 2002

Soil Heat Flux on May 8, 2003

Table 7

Soil Heat Flux across Four Identified Biomes during Different Periods

Biomes	Ground Heat Flux (W/m^2)			
	2001	2002	2003	Average
Water	69.137	101.047	119.027	96.404
Urban	212.203	142.282	155.779	170.088
Forest	95.948	53.087	51.29	66.775
Agricultural	125.208	92.269	147.959	121.812

Table 8

Empirical Coefficients for Evaporative Fraction Calculation

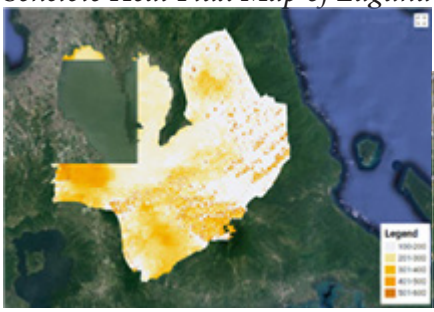
Empirical Coefficient	November 26, 2001	April 3, 2002	May 8, 2003
a_H	36.061	39.855	48.349
b_H	-19.719	-6.3415	-34.788
a_{LE}	18.696	39.307	16.243
b_{LE}	26.545	18.781	58.048

Table 9 shows the obtained values for sensible heat flux. The urban area had the highest average sensible heat followed by the agricultural area and water bodies. The lowest observed was in forests, with an average value of 94 W/m2. From 2001 to 2003, the highest variation in sensible heat was observed in an agricultural area (74 to 226 W/m2), followed by water bodies (54 to 190 W/m2). Variation of sensible heat in forests and in urban was minimal, with variation values ranging from 4 to 45 W/m2 and 2 to 57 W/m2, respectively. Sensible heat flux, just like the other components of surface energy balance, is governed by the amount of water on a given surface. In urban areas, characterized by dry surfaces, sensible

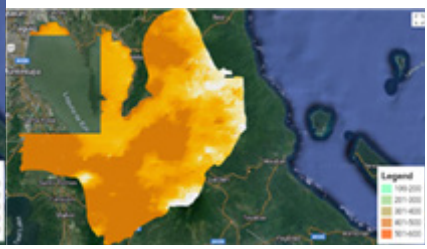
heat flux is high. In forests, sensible heat is minimal since it has a relatively high amount of water on the soil surface and in the canopy itself.

Figure 10

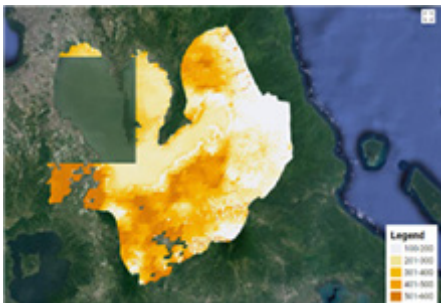
Sensible Heat Flux Map of Laguna during Different Periods



Sensible Heat Flux on November 26, 2001



Sensible Heat Flux on April 3, 2002



Sensible Heat Flux on May 8, 2003

Table 9

Sensible Heat Flux across Four Identified Biomes during Different Periods

Biomes	Sensible Heat Flux (W/m^2)			
	2001	2002	2003	Average
Water	120.792	310.435	174.813	202.013
Urban	314.939	316.418	371.362	334.240
Forest	123.00	82.508	78.993	94.834
Agricultural	183.894	335.009	109.139	209.347

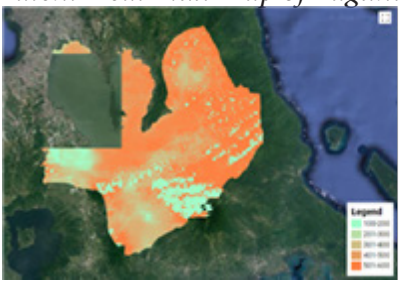
Latent Heat Flux

Across four biomes, the values of latent heat flux also varied as observed in Figure 11. Table 10 shows the latent heat flux values

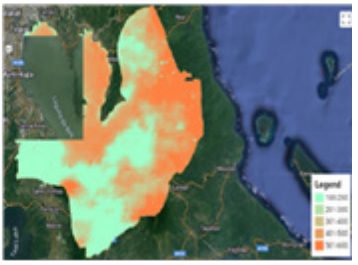
per biome. Forest had the highest amount of 729 W/m2, followed by water bodies with 624 W/m2 and agricultural land with 526 W/m2. The lowest latent heat flux of 375 W/m2 was determined in urban areas. The variations in the forest, agricultural, and urban were 50 to 362 W/m2, 111 to 317 W/m2, and 47 to 265 W m2, respectively. The lowest variation of latent heat was observed in the water bodies equal to 14 to 164 W/m2. Latent heat flux was high on wet surfaces and in densely vegetated areas. This was because latent heat flux is generally associated with evapotranspiration. With this, forest and water bodies, having high evapotranspiration, have had high latent heat flux.

Figure 11

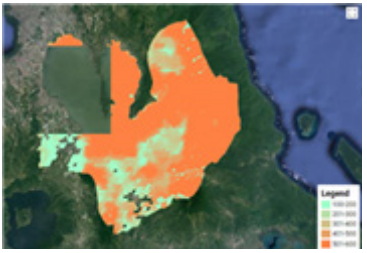
Latent Heat Flux Map of Laguna during Different Periods



Latent Heat Flux on November 26, 2001



Latent Heat Flux on April 3, 2002



Latent Heat Flux on May 8, 2003

Table 10

Latent Heat Flux across Four Identified Biomes during Different Periods

Biomes	Latent Heat Flux (W/m^2)		
	2001	**2002**	**2003**
Water	579.567	565.462	729.294
Urban	214.618	479.123	432.707
Forest	505.01	817.277	867.48
Agricultural	383.422	494.703	700.813

Table 11 summarizes the average values of the surface energybalance components. The partitioning of net radiation in various biomes was shown in Figure 12. It can be observed that for all the biomes, latent heat flux dominated. On the other hand, the least component was soil heat flux.

In water, the dominant partition of the net radiation was a latent heat flux of approximately 658 W/m2, with a minimal sensible and ground heat flux (Zahira et al., 2009). This agrees with the result of this study. A study conducted by Martinez and Ostos (2004) found that urban area surrounded by vegetation had a high latent heat ranging from 120 to 320 W/m2, while its sensible heat ranged from 46 to 50 W/m2. In highly urbanized areas closely packed with massive buildings and with the relative absence of green evaporating areas, sensible heat is the dominant partition of the net radiation. The value ranged from 1.53 to 3.40 MJ/m2. For latent heat flux in these areas, the amount ranged from 0.37 to 0.39 MJ m2 (Miao et al., 2012; Oke et al., 1999). In this study, it was observed that latent heat flux in urban areas was quite greater than the sensible heat flux. The reason might be due to the presence of vegetation and a small water body within the vicinity.

Zahira et al. (2009) identified the ranges of latent heat flux, sensible heat flux, and soil heat flux for forest as 308 to 394 W/ m2, 164 to 222 W/m2, and 92 to 105 W/m2, respectively. Jiang et al. (2014) noted that latent heat in forests is higher compared to cropland and urban area.

In cropland, surface energy partitioning greatly depends on irrigation , and latent heat is dominant, corresponding with a decrease in sensible heat. In the absence of irrigation, sensible heat is the prevailing surface energy partition, while latent heat is only about half the amount of sensible heat (Lu & Kueppers 2012).

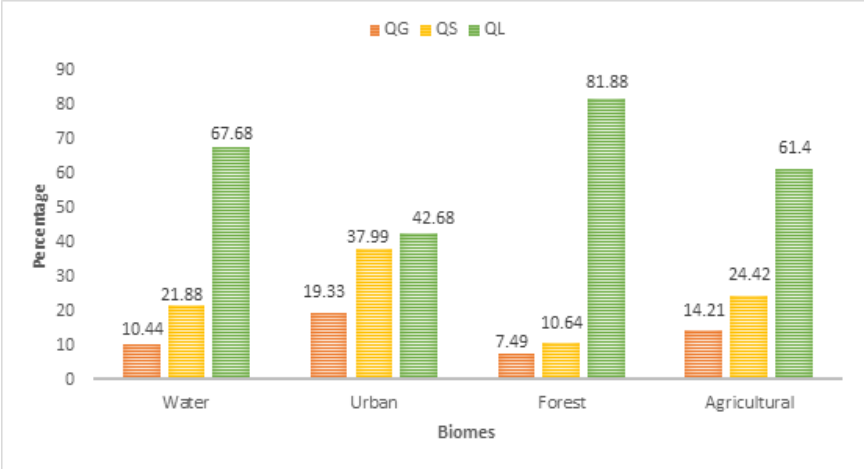
Table 11

Average Values of Surface Energy Balance Components across Different Biomes

Biomes	Surface Energy Balance Components			
	R_n (W/m²)	Q_G (W/m²)	Q_H (W/m²)	Q_L (W/m²)
Water	923.19	96.40	202.01	624.77
Urban	879.81	170.09	334.24	375.48
Forest	891.45	66.78	94.83	729.92
Agricultural	857.21	121.81	209.35	526.31

Figure 12

Partitioning of the Net Radiation across Different Biomes



Summary and Conclusion

Surface energy balance components and partitioning greatly depend on surface covers, moisture, temperature, wind, and other micrometeorological parameters. Net radiation received by a certain surface is greatly influenced by its albedo. Meanwhile, the variation of soil heat flux, latent heat flux, and sensible heat flux in every ecosystem can be attributed to the availability or abundance of water and vegetation. Parallel to that, surfaces that are abundant in water and vegetation like forests have high latent heat flux, minimal sensible heat flux, and almost negligible soil heat flux. Dry surfaces, in contrast, are characterized by high sensible heat flux with a considerable amount of soil heat flux and minimal latent heat flux.

In this study, net radiation, sensible heat flux, latent heat flux, and soil heat flux of different biomes in Laguna were estimated using the S-SEBI Method. It was found that soil heat flux was the least partitioned across all the biomes. Latent heat flux is dominated followed by sensible heat flux. Comparing the components for each biome, ground heat flux and sensible heat flux were high in urban and agricultural areas. Meanwhile, latent heat flux was high in forest and water bodies.

Based on the amount of albedo, water received the highest amount of net radiation, while agricultural areas received the least.

Also, due to high altitude and low albedo, net radiation in the forest was considerably high. Generally, the result obtained in this study is comparable to the findings of the existing studies. The method employed in this study, therefore, is costefficient and reliable in partitioning the surface energy balance components that fluctuate dynamically in each ecosystem as a consequence of surface covers, moisture, temperature, wind, and other micrometeorological parameters.

Recommendation

In order to improve this study, it is recommended to use Landsat 8 data that give the latest images. Also, for accurate values, it is highly encouraged that more than one station should be used to obtain the incoming solar radiation if this method will be replicated in another area or use the Hargreaves-Samani equation. Instruments for direct measurement of these parameters are necessary for ground validation.

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Institutional Landscape of Renewable Energy Development in Naujan, Oriental Mindoro

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Abstract

This study offers an overview of the institutional dynamics in relation to the local renewable energy development in the municipality of Naujan, Oriental Mindoro. In off-grid areas, like Naujan, renewable energy presents opportunities in meeting the required energy supply to sustain the growing demand of various economic sectors. The significant role of renewable energy further establishes the need to understand the institutional landscape pertaining to its development. The complexity of the institutional landscape is inherent in Naujan due to its social and geospatial characteristics. The presence of indigenous cultural communities and a protected area adds additional institutional layer for the implementation of different renewable energy projects within the municipality. The results of the study illustrate the different current and potential renewable energy sources in the area. The regulation of the different renewable energy projects in Naujan under different national government agencies, whose mandates are stipulated by national policies. Some of these important national policies include the Renewable Energy Act of 2008, Biofuels Act of 2006, and the

National Integrated Protected Areas System. The study likewise identified other institutional dynamics among various actors of the renewable energy sector, such as the provision of technical assistance and support to rural development.

Keywords: Off-grid, Energy Policy, Philippines, Rural Electrification

Introduction

National governments are continually striving to respond to the global concerns of climate change, pollution, and rural development (Brahim, 2014; Martinot et al., 2002). This has been the experience of countries within the Southeast Asian region (Erdiwansyah et al., 2019). The gradual shift to alternative sources of energy provides opportunities for national economies to align their economic growth with the thrusts of sustainable development. This search for a more sustainable source of energy has led countries to various renewable energy (RE) sources. The RE transition has been an integral part of national energy development plans, which puts forward an increase in the energy mix diversification (i.e., combined conventional and renewable energy) (Brahim, 2014). Policy mechanisms have been placed by national governments to institutionalize the support to the development of renewable energy. The energy development agenda of the Philippines has highlighted the importance of renewable energy development. Among the current challenges of the country is ensuring a stable and sustainable energy supply, especially in remote areas (Bertheau, 2020). RE thus offers a significant position in rural electrification in the country, especially with its vast off-grid areas. The energy statistics of the Philippines illustrates the significant share of renewable energy in the national energy supply of the country. Although the Philippines has been highly dependent on coal as its primary energy source from 2003 to 2020, renewable energy generation has also continuously increased (DOE, 2021). For almost two decades, the growth of renewable energy in terms of power generation increased by more than 20 percent and an average energy share of 28.27 percent (DOE, 2021).

Among the potential reasons for the continued growth of the renewable energy sector in the country is the favorable policy environment. Brahim (2014) mentioned that the Philippines has laid out plans and enacted different national-level policies, which could further support the development of the RE sector. An important milestone for the Philippine RE was the enactment of Republic Act 9513 or the Renewable Energy Act of 2008. This national policy established an important institutional platform for the development and promotion of RE across the country through various fiscal and technological support mechanisms. Aside from this national policy, other relevant policies were also put in place to ensure the sustainable and socially acceptable implementation of renewable energy projects. These national policies include those that ensure the conservation of natural resources and the protection of the rights of the local communities.

The implementation of these policies is grounded on several factors. The local context of RE development provides structure to how policies are implemented. Further, the dynamics and relationship of various actors can also be argued as different depending on the context where RE projects are implemented. Understanding the context and these development dynamics within a particular area offers valuable insights on how to plan or approach the development process. In this paper, an overview of the institutional landscape of renewable energy development within the context of Naujan is provided. This paper aims to describe the dynamics of different national and local development actors in relation to the implementation of various renewable energy projects in the municipality. The discussion in this paper is primarily based on the provisions of relevant national policies.

Renewable Energy Development in Naujan

The Municipality of Naujan along with the whole island province of Oriental Mindoro are being supplied through an off-grid energy system. It means that the energy system is not connected to the main or national grid, which requires them to depend primarily on local generation of the needs of its population (IRENA, 2015).

With the increase in population in the municipality and the province (i.e., 1.54 annual growth rate recorded from 2010-2020 based on PSA report for 2021), there is an increasing pressure on the local energy system to increase its production. To add further, potential increases in energy demand can also be attributed to a shift in local livelihoods such as from agriculture to a more energy demanding industry such as commercial and tourism industries.

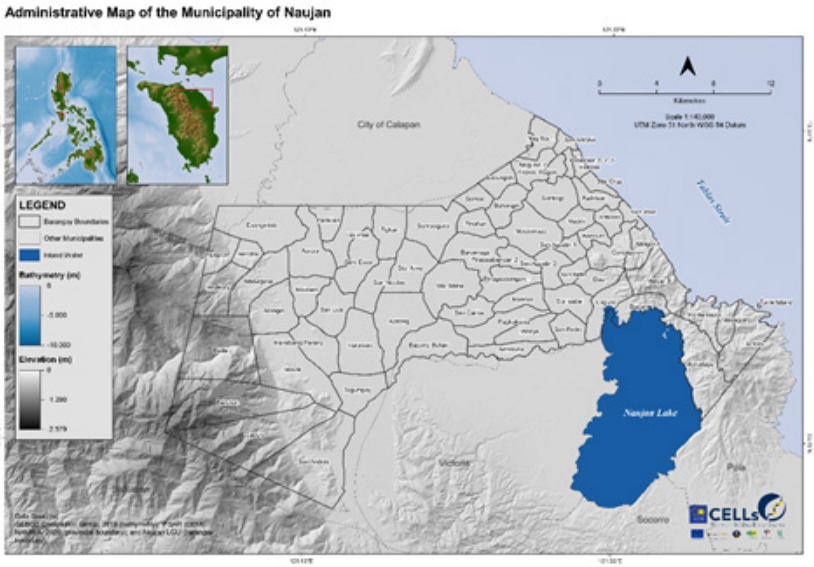
As a response to the growing energy demand, there is a need to continually explore potential energy sources, especially renewable energy sources. This contribution can be increased further through the utilization of the natural resources in the municipality, which can be used in RE production. However, it is crucial to understand the different institutional arrangements and policies that could affect the design and implementation of RE projects. In this paper, these institutional arrangements and policies are discussed in relation to the local socio-cultural and geospatial context of Naujan. This paper further highlights that RE development may take different forms due to the interlocking web of policies, which correspond to its local social, cultural, and environmental context.

Materials and Methods Locale of the Study

The Municipality of Naujan was selected as the case study area for the study. It was a first class municipality of the province of Oriental Mindoro. Naujan is politically subdivided into 70 barangays (Figure 2). In 2020, it had a total population of 109,587 (Philippine Statistics Authority, 2021). The population of the municipality is highly dependent on agriculture, having a substantial percentage of its land dedicated to the sector ("Local Government Unit of Naujan", 2001). Some of its agricultural products include rice, banana, and coconut. Aside from agriculture, tourism and commerce are also considered to be integral in the economy of Naujan.

Figure 1

The Municipality of Naujan



Naujan offers a complex case in relation to the study of RE development. Its complexity is rooted in its geospatial and social characteristics. These characteristics of the municipality affect the kind of policies that are relevant to the governance of its RE development. The presence of Naujan Lake, a declared protected area, and of the Alangan Tribe in the municipality rationalizes the importance of other institutional players in relation to the development of different RE projects. The cooperative-led energy production and distribution in Naujan likewise adds to this complexity.

Analytical Process

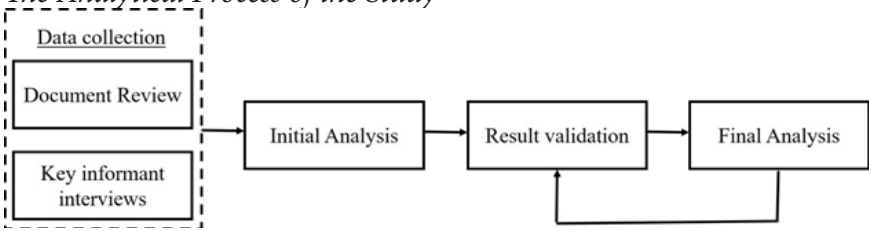
The first part of the research process involves document reviews and a series of key informant interviews (KII). The documents were collected from different national government agencies and local government offices. These pertinent documents included different national policies, Philippine energy development plans, comprehensive land-use plan (CLUP) and the comprehensive development plan (CDP), and the ecological profile of Naujan.

These documents were gathered from the official website of the Philippines' Department of Energy (DOE), the Philippine Official Gazette, and from the Local Government Unit (LGU) of Naujan. On the other hand, KII for the study includes representatives from the different local government offices, Department of Energy-Renewable Energy Management Bureau (DOE-REMB), and Department of Environment and Natural Resources (DENR). With the travel restrictions due to the COVID-19 pandemic, primary data collection was a combination of physical visits to the study area and virtual meetings. The latter was done through Zoom (i.e., a digital meeting platform) and phone calls. Prior to each interview, an informed consent form was sent and accomplished by key informants to have their consent for the data collection and the process documentation.

Data processing and analysis were done through an iterative process (Figure 1). Institutional analysis was used in understanding the dynamics of local RE development in Naujan. Institutional Analysis is an analytical technique that allows researchers to understand the rules in place (Crawford & Ostrom, 1995). These rules include the different institutional arrangements based on the policies which are being implemented by various governing entities. Within the process of understanding these rules, it is important that researchers recognize that institutional arrangements can be subjected to multiple policies (Hollingsworth, 2000). Although there are formal and informal institutional arrangements, the study only focused on the formal institutional arrangements that were based on the different national policies. The results of the initial analysis, especially the flow and relationships that were identified, were then subjected to validation. The validation process involved the presentation of results with representatives from DOST-REMB. Once the initial validation was done, necessary adjustments to the results were made and once again reviewed by representatives from DOST REMB.

Figure 2

The Analytical Process of the Study



Results and Discussion

Renewable Energy in Naujan from Production to Distribution

The position of RE sector has a significant position in the local energy consumption in Naujan and in the whole province of Oriental Mindoro. In 2015, Oriental Mindoro Electric Cooperative, Inc. (ORMECO) reported that there were at least five energy suppliers, which were generating energy from renewable energy sources. Figure 3 shows the current and potential local energy sources as well as the sectors which are utilizing the energy within Naujan. The major RE source being supplied to ORMECO is hydropower plants, which are located in different areas in the province. These include the Dulangan Mini Hydro Power Plant, which is owned and managed by ORMECO, and Lower Catuiran Hydroelectric Power Plant constructed by the Sta. Clara Power Corporation. These hydropower plants are both located in Naujan and harness the energy from its natural river system.

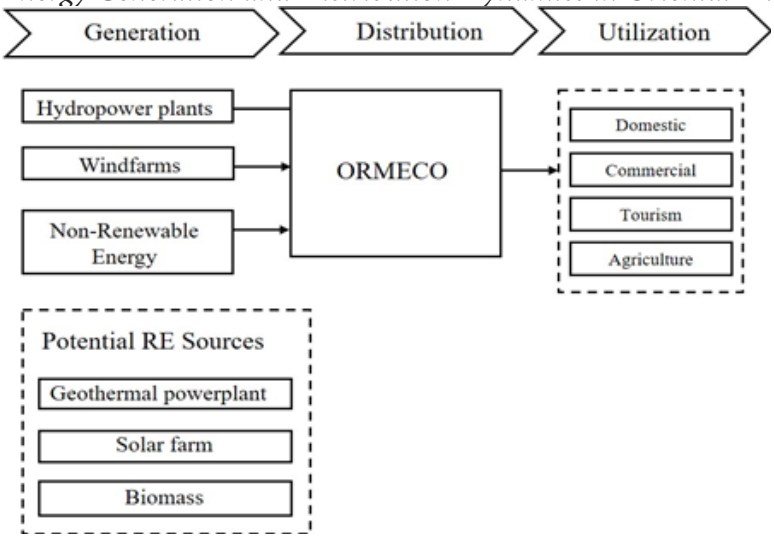
Another current local RE source is the wind farm, which is located Puerto Galera, a municipality in the northern part of Oriental Mindoro. Although not located within Naujan, the wind farm owned by the Philippine Hybrid Energy Systems, Inc. (PHESI) also generates energy that is being utilized by different sectors within the study site. Given the current energy demand of the province, conventional or non-renewable sources of energy also contribute to the local energy supply of the province. As illustrated in Figure 3, the sole energy distributor in Najuan and in the whole province of Oriental Mindoro is ORMECO. The electric cooperative was

established through the assistance of Provincial Electric Cooperative Team (PECT) and was registered in 1973 (ORMECO,1973).Although there were concerns raised by research participants in relation to the local energy supply, the importance of ORMECO in the whole island province of Oriental Mindoro is again attributed to its nature as an off-grid area.

Other potential sources of energy were also identified in the study. These were geothermal power plants, solar farms, and biomass. The geothermal power plant in Brgy. Montelago, Naujan had been built for years; however, research participants shared that it was not generating energy due to the insufficient heat being produced in the area. There were also proposals to establish floating solar farms. These were proposed to be located on Naujan Lake. According to research participants, this proposal did not push through due to concerns related to its possible detrimental effects on the ecosystem of the lake and the livelihood of the local community. Lastly, biomass was considered also as an option given the abundance of agricultural raw materials in the area. In particular, research participants mentioned that biomass could potentially be generated even at small scale using rice straws produced in numerous rice-producing barangays in Naujan.

Figure 3

Energy Generation and Distribution Dynamics in Oriental Mindoro

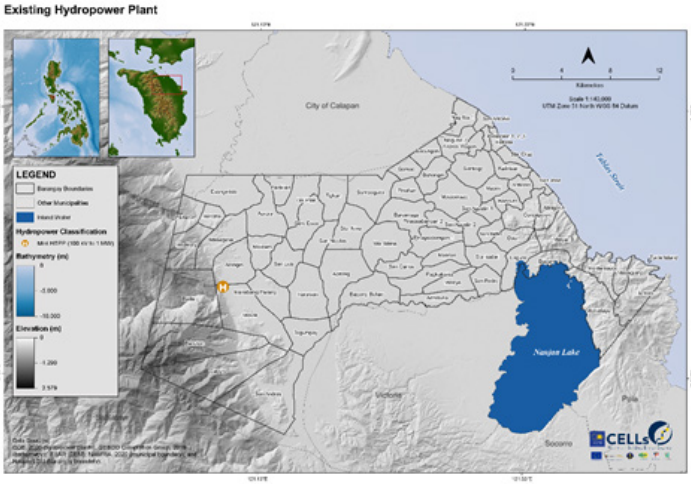


Social and Geospatial Characteristics of Naujan

The different social and geospatial characteristics of a municipality contribute to the complexity of implementing renewable energy projects. The presence of a protected area within the political jurisdiction of Naujan is one of the sources of complexity in local RE development. The Naujan Lake National Park, which is located in the southeastern portion of Naujan (Figure 4), is a declared protected area through Proclamation No. 335 series of 1968. As illustrated in Figure 3, the lake is within the political jurisdiction of three other municipalities of Oriental Mindoro, which are Polo, Socorro, and Victoria. The lake provides livelihood to a large population from the four municipalities through fishing (Pasumbal & Perez, 2001). Apart from the abundance of fish stocks on the lake, the presence of migratory birds also strengthens the significant position of Naujan Lake as a protected area (see Villamor, 2006). Research participants argued that any proposed development project within the lake should ensure that it would not have detrimental effects on the lake and its stakeholders.

Figure 4

The Location of the Existing Power Plant within Naujan



(Data source: Municipal Planning and Development Office of Naujan)

Naujan also serves as home to the Alangan Tribe, one of the eight groups of indigenous people in Mindoro Island. The eight groups of indigenous people (i.e., Alangan, Sibuyan, Hanunuo, Buhid, Tau Buid, Tadyawan, Ratagnon, Bangon, and Iraya) are more collectively and commonly known as Mangyan (Mendiola, 2013). The presence of indigenous cultural communities (ICC) within an area calls for a more careful approach in the development process. It means that prior to the implementation of any development project such as the case of any RE project, the rights of the members of the ICC should be considered and respected. Based on the discussions with research participants, the members of the ICC in Naujan raised concerns regarding potential infrastructure projects, particularly large RE projects. These concerns were grounded in the perceived negative outcomes of these projects in the local community such as an increase in flooding incidences and intensity. Most importantly, these resulted in the low acceptability of the ICC of the different infrastructure projects. Therefore, it is critical for the RE developers to have effective communication with ICCs, especially to provide assurance that their concerns will be addressed.

Finally, the municipality along with the island provinces of Oriental and Occidental Mindoro are considered off-grid areas. In these areas, electric cooperatives have been instrumental in the management and distribution of energy to the consuming public. Electric cooperatives have been established to respond to the challenges of energy supply (Bertheu et al., 2020). In the case of Naujan, ORMECO serves as the electric cooperative that caters to the energy needs of the local communities. The cooperative-led set-up of electrification in the province creates another important consideration in the implementation of RE projects. It reiterates the importance of close coordination between ORMECO and other RE developers to address specific issues, such as responding to the growing local energy demand.

Philippine National Renewable Energy Policies

The development of RE sector in the Philippines is dependent on a network of national policies. Two policies, in particular, have

been enacted as primary policy instruments to encourage the growth of the renewable energy sector in the country. Republic Act 9367 (RA 9367) or the Biofuels Act of 2006 and Republic Act 9513 (RA 9513) or the Renewable Act of 2008 can be regarded as significant measures in realizing the development goals of the country in relation to its energy sector. Moreover, these national policies are designed to support the renewable energy sector by removing critical roadblocks, which include "high upfront and technology costs, noncompetitiveness, non-viable markets, inaccessible financial packages, and social acceptability" (Brahim, 2014, p. 482).

These national policies strengthen the RE sector through the provision of several support mechanisms to current and potential industry actors. For instance, both RA 9513 and RA 9367 offer fiscal incentives to the producer of RE such as tax exemption. Other incentive schemes stipulated in either of these national policies include financial support and duty-free importation. The tax exemption and duty-free importation are not exclusive to large RE developers. They are likewise extended to farmers who are engaged in crop production for the utilization in the generation of biomass resources (RA 9513; RA 9367).

Implementing the provisions of these national RE policies are designated to the DOE. The DOE is mandated to spearhead renewable energy programs, which are designed for the development of the sector. The creation of the Renewable Energy Management Bureau (REMB), a bureau under DOE, is also a significant provision under RA 9513. Among the principal functions of REMB includes the development of plans, programs, and policies (RA 9513, Section 31a), which are critical in the advancement of the Philippine renewable sector. To support DOE and its bureaus in implementing these national policies, other government agencies are mandated by these national policies to serve specific functions. Rosellon (2017) explained that these functions and mandates provided to these government agencies can be both technical and procedural in nature. Procedural functions include the certification of RE projects prior to their implementation (Rosellon, 2017).

To further consolidate the efforts of government agencies along with the private sector, two collegial bodies were established.

The National Renewable Energy Board (NREB) and the National Biofuel Board (NBB) were created through RA 9513 and RA 9367, respectively. The composition of these collegial bodies is enumerated in Table 1. These collegial bodies monitor the overall implementation of the different provisions of the national renewable energy policies. In addition, NREB and NBB also provide policy recommendations on specific courses of action for the implementation of DOE. The multisectoral composition of these collegial bodies creates opportunities for a more integrated approach in RE development.

Table 1

Composition of Philippine RE Collegial Bodies Created under RA 9513 and RA 9367

COLLEGIAL BODY	MEMBERS
National Renewable Energy Board	Department of Energy Department of Trade and Industry Department of Finance Department of Environment and Natural Resources National Power Corporation National Transmission Commission Sectoral representatives from Renewable Energy Developers, Government Financial Institutions (GFI), private distribution utilities, electric cooperatives, electricity suppliers, and non-government organizations (NGO)
National Biofuel Board	Department of Trade and Industry Department of Science and Technology Department of Agriculture Department of Finance Department of Labor and Employment Philippine Coconut Authority Sugar Regulatory Administration

In the case of Naujan, these national policies have a critical role in the development of local renewable energy projects. As explained by research participants, these national policies served as the main foundations in approving and implementing the different RE projects in the municipality. With the current RE developments in Naujan, RA 9513 has been mainly the more relevant between the two national policies especially since biofuels production was not being focused on the local level. Research participants mentioned that the provisions under RA 9513 along with the Republic Act 9136 ensured that the host communities were able to benefit directly from

RE development. But as discussed further in the following sections, these national policies should be complemented by other national policies to create additional safeguards for the communities and environment. This is particularly important in the context of Naujan with its complex socio-cultural and environmental characteristics. Therefore, aside from DOE, other national government agencies and offices from the LGU likewise serve a critical role in striking a balance between meeting the local energy needs and conserving and protecting the environment and the rights of the local stakeholders.

Regulation of Local Renewable Energy Development

The implementation of RE projects is subjected to an interlocking web of national and local policies. Figure 5 illustrates the different governing bodies that are mandated to regulate RE projects. These governing bodies include the different relevant national government agencies and local government units. In addition, two organized bodies are also reflected in Figure 5. These organized bodies are created to assist in the policy and decisionmaking process concerning various development projects such as renewable energy projects. Figure 4 likewise shows what kind of renewable energy projects are being regulated by the different national government agencies and local government units. This further establishes that the social and geospatial characteristics of the communities in Naujan have an influence on the regulatory dynamics pertaining to renewable energy development.

Department of Energy (DOE)

DOE was established through the enactment of Republic Act 7638 or the Department of Energy Act of 1992. RA 7638 mandates DOE to serve as the primary government agency that designs programs and policies to ensure an "efficient energy supply" for the country. Upon the enactment of RA 9513, additional and more specific roles were given to DOE in line with the RE development in the RE sector from the national to the local level.

National Electrification Administration (NEA)

As an electric cooperative, ORMECO has options to either register with the Cooperative Development Authority (CDA) or with the National Electrification Administration (NEA) (RA 9520). As per ORMECO (ud), the electric cooperative has been registered with NEA since it was organized. Among the principal functions of NEA, as stipulated in Republic Act 10531 (RA 10531) or the National Electrification Administration Reform Act, are the supervision of electric cooperatives, and the provision of technical, financial, and institutional support services to electric cooperatives, which need these services. These support services being provided by NEA are aligned with their creation mandate to assist electric cooperatives along with "other public service entities engaged in supplying electric service" (Presidential Decree 269 or the National Electrification Administration Decree).

National Commission for Indigenous Peoples (NCIP)

In implementing RE projects, developers including ORMECO need to secure several permits prior to their exploration and operations. The presence of ICCs in the area establishes the need for either a certificate of precondition or a certificate of non-overlap, which are both being issued by the NCIP. Aside from securing these certificates, NCIP also secures the rights of the members of the ICCs from the different development projects (IPRA, part 2 section 1a). The aforementioned local concerns of the ICC members further strengthen the responsibility of the NCIP to ensure social acceptability of any proposed RE projects in Naujan. Specifically, the NCIP should ensure that any proposed RE projects within the designated ICCs should undergo the necessary process of acquiring the consent of the members of the ICCs.

Department of Environment and Natural Resources (DENR)

RA 9513 states that RE projects should be implemented in compliance with the different environmental policies (Section 14).

As the foremost environmental government agency of the country, DENR regulates the implementation of RE projects in the country such as those that are carried out in Naujan. Among the notable environmental regulations that cover development projects are DENR Administrative Order 30 Series of 2003 (DAO 03-30) and DENR Administrative Order 59 Series of 2004 (DAO 04-59). DAO 03-30 stipulates the necessary procedures in relation to the environmental impact assessment that a development project needs to undertake prior to its implementation. Depending on the nature of the development project and the area where it is implemented, the Environmental Management Bureau (DENR-EMB) issues a certificate if the project is allowed to proceed.

The different RE projects in Naujan underwent this process. Especially in the case of projects proposed within a protected landscape, it is emphasized in the Republic Act 11038 (RA 11038) or the Expanded National Integrated Protected Areas System Act of 2018 that RE projects should be allowed based on a set of conditions. These conditions are as follows: (1) the projects are implemented outside the strict protection zone; (2) they underwent the EIA process; (3) they use "reduced impact technologies"; and (4) enough bond was given by the renewable energy developer (RA 11038, Section 14). In addition to the EIA process, development projects that are implemented within forestlands should also secure a Forest Land Use Agreement (FLAg) as stated in DAO 04-59. In securing FLAg, the RE developer should secure several requirements from various agencies, such as those coming from EMB, NCIP, and LGUs. Although this is a long and tedious process, the research participants emphasized its importance since it acts as safeguard against potential environmental threats coming from large development projects, which include RE projects.

In 2018, Virola (2018) reported that the members of the ICCs urged the DENR to suspend the environmental compliance certificates (ECCs) of the hydropower plants in Naujan and its neighboring municipalities. This request was based on their concerns with the use of explosives during the construction (i.e., mainly during tunneling) of new hydropower plants in the area. The ICC members argued that these explosions have detrimental effects to

the environment (Virola, 2018). The concerns of the ICC members on these explosions, along with the earlier mentioned perceived contribution of the hydropower plants on flooding, were important bases to review the risks associated with large RE projects. Once the risks are thoroughly assessed, the results should be communicated by DENR, along with LGU and DOE REMB, to the local communities.

Protected Areas Management Board (PAMB)

The creation of PAMB within declared protected areas in the Philippines is provided under Republic Act 7586 (RA 7586) or the National Integrated Protected Areas System (NIPAS) Act of 1992. An initial list of members of PAMB was provided in RA 7586, but it was then amended through RA 11038. The members of the PAMB include representatives from both the public and private sectors. The public sector is represented by regional directors of relevant NGAs such as DENR and DOST, legislators from the senate and congress, and heads of LGUs from provincial all the way to barangay level (RA 11038, Section 11). PAMB also has members from other sectors such as the academe, IP communities, and non-government organizations.

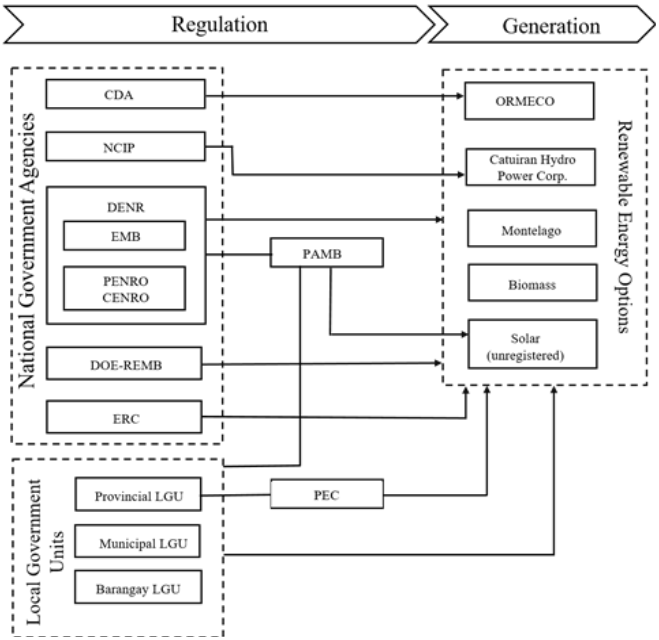
In the case of Naujan, PAMB was organized to ensure the conservation and protection of Naujan Lake. Since these are the priorities of PAMB, they will not permit any development projects that may negatively affect the ecological integrity of the lake. To cite a case, a proposed floating solar farm was denied by PAMB. This floating solar farm was planned to cover a significant area of the lake. Research participants explained that given the area coverage of the project, it might disrupt the natural flow and dynamics of its flora and fauna. To add further, research participants also mentioned the concerns of the local communities in relation to the project's potential negative effects on their livelihood. Although the RE project could provide benefits to the local community by catering to the growing local energy demand, the denial of PAMB reiterates the need for the RE developers to consider the negative environmental and socioeconomic effects of their proposed projects.

Local Government Units (LGUs)

It was earlier mentioned that in securing FLAg, RE developers need to secure endorsements from the LGU heads as among its requirements. To add further, Republic Act 7160 or the Local Government Code of 1991 states that it is the role of the LGUs to regulate and give clearances to businesses operating within their respective jurisdictions. LGUs are also mandated to regulate the utilization of land for any activities within their respective jurisdictions. Particular to energy development, RA 7160 requires that 80 percent of the income that is generated through energy operations such as geothermal plants should be utilized "solely" to reduce the electricity cost of the municipality (Section 294). These mandates establish the critical role of LGUs in RE development in Naujan. Without the permits given by the provincial government of Oriental Mindoro and the municipal government of Naujan, as well as the clearances from the different barangays, RE projects would not move forward.

Figure 5

Institutional Actors of the Local Renewable Development in Naujan



Other Local Renewable Energy Development Dynamics

The development of the RE sector within Naujan was not only dependent on the different organizations, both public and private, as illustrated in Figures 4 and 5. Policymakers, development organizations, and RE developers should also acknowledge other local institutional actors and understand how they could affect the development process. Based on the discussions with various research participants, other important institutional actors were identified. These institutional actors along with their relationships are illustrated in Figure 6. It is shown that the existing relationships and dynamics between these institutional actors could either be beneficial or otherwise.

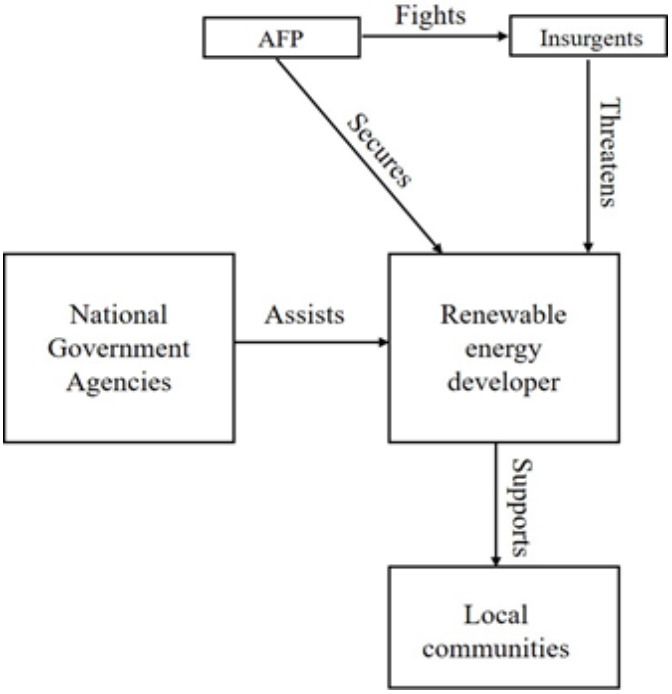
RE development in Naujan was threatened by security issues, especially those coming from local insurgents. Research participants shared that there were incidences where insurgents caused destructive activities in RE power plants. This security concern had a significant effect on the operations of the project developer. In particular, this destructive incident resulted in major delays in the operations of the powerplant. Nonetheless, the presence of the Armed Forces of the Philippines (AFP) within the area had alleviated this security concern. More importantly, this allowed the continued operations of the RE project developer. AFP personnel were stationed within the premises of the RE project, and as shared by research participants, they conducted regular security monitoring within the area.

tNon-Government Organizations (NGOs) were also among the important development actors within the context of the RE sector in Naujan. NGOs operating in Naujan had a critical position in the overall process of development projects within the locality. Depending on the positions of these NGOs, renewable projects can be delayed or even derailed. In the case of Naujan, research participants argued that NGOs had a strong position in influencing the perception of the local stakeholders on both the positive and negative effects of RE projects. Among these NGOs is Batang Naujan, a government-registered organization that conducts various initiatives to uplift the welfare of the local community. This NGO was also active in assessing the impacts of different RE projects,

particularly the hydropower plants and geothermal power plants. Development projects in the Philippines are mandated by national policies to support their host communities. Under the provisions of Energy Regulations 1-94 (ER 1-94), "one centavo per kilowatt-hour of electricity sales" of generation facilities shall be allocated for development projects for the host communities. Specifically, these funds are divided into (1) electrification funds, (2) development and livelihood funds, and (3) reforestation, watershed management, and health and/or environmental enhancement funds (ER 1-94). In addition, section 31 of RA 9513 states that members of the host communities should also benefit from RE projects through power consumption subsidies. Through these provisions, members of the host communities can realize the benefits from RE projects faster. These provisions can also increase the social acceptability of the local stakeholders towards RE projects.

Figure 6

Other Relevant Actors in Local Renewable Energy Development in Naujan



Conclusions

RE development is grounded in an interlocking network of national policies. The implementation of these policies is influenced by the context of the local community where renewable energy projects are implemented or proposed to be implemented. In Naujan, the institutional landscape of RE development illustrates complexity due to its inherent social and geospatial characteristics. Although these national policies provide institutional layers on the local renewable development, they serve as safeguards in ensuring that the overall development process will not lead to various environmental and social issues, such as those related to conservation and protection of natural resources, which are available in the area. While RE development offers benefits to the local economy, policies are in place to ensure that it would not negatively affect the rights of the local stakeholders such as in the case of indigenous cultural communities.

This study offers a crucial step in understanding the local RE in Naujan. Although it is descriptive and exploratory in nature, the results can offer energy practitioners insights into designing mechanisms to support the overall development process. Finally, this study recommends the conduct of future studies to further dissect the complexities in the local RE development, not only in Naujan but also in other off-grid areas in the country. These future studies can consider identifying both institutional opportunities and challenges that can either strengthen or impede the local RE development in their selected study areas. These studies could provide important theoretical and practical learnings on the current institutional context of local RE development in the Philippines.

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Community-Based Blood Donation Program: Sustainability and Local Capacity Building in these Changing Times of Demand in the Global Health

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Abstract

Blood's growing use in various therapies has led to new regulations governing its collection, use, and storage. Ensuring a sustainable blood supply remains a challenge especially in the Philippines. Conducted in Brgy. Poblacion, Ayungon, Negros Oriental, this study assessed how young residents' knowledge, attitudes, and practices relate to blood donation. Data was analyzed with SPSS and Excel 2010. The Chi-square Test of Independence assessed the KAP association, with $p < 0.05$ denoting statistical significance.

Out of 76 respondents, 63.16% had average knowledge, 72.37% held positive attitudes, and 86.84% were willing to donate. Actual donation rates were low (14.47%) due to lack of awareness (50%), fear of needles (28.95%), and preference to donate to family and friends (22.37%). Encouraging awareness, incentivizing donations, and rural blood donation camps can address the limited blood supply issue.

Keywords: blood, blood donation, young residents, knowledge, attitude, practice

Introduction

According to the World Health Organization (2015), 108 million blood donations are collected globally, and nearly 50% of these are collected from high-income countries that are home to less than 20% of the world's population. Moreover, an overwhelming 99% of the 500,000 women die each year during pregnancy and

childbirth worldwide due to hemorrhage which invariably requires blood transfusion. However, blood donation in the Philippines has been a constant problem as well. Blood supplies are still insufficient to provide the needs nationwide. In fact, the Philippine Red Cross (PRC) supplies 25 to 30 percent (%) only of the country's national blood requirements (Philippine Red Cross, 2013). Further, there has been a steady decline of blood donation, while the demand for transfusion continually rises (Siromani et al., 2015). To say that transfusion medicine has an increasingly important role in the life support of critically ill patients is an understatement since transfusion therapy has drastically intensified (Keener, 2013). In this respect, studies continue to be published from different countries exploring the attitude and motivations of young blood donors, yet no known studies have been published in a small-scale setting focusing on teenagers aged 18 to 22.

Thus, this study primarily aimed to establish a relationship between knowledge, attitude, and practices on blood donation through administering a self-structured survey questionnaire among selected residents in Brgy. Poblacion, Ayungon, Negros Oriental. Thus, to achieve these intentions, the study sought to answer the following questions:

1. What is the level of knowledge of the respondents regarding blood donation?
2. What is the attitude of the respondents towards blood donation?
3. What are the practices of the respondents towards blood donation?
4. What are the factors that would probably cause a low rate of blood donors?
5. Is there a significant relationship between knowledge, attitude, and practice on blood donation through a survey analysis?

Related Studies

In a study by Lakey and Cohen (2002) in a Palestinian Community, results revealed that majority (93%) of the respondents

were aware of blood donation; however, the level of knowledge resulted in below 30%. Concerning sources from where the interviewees heard about blood donation, the result showed that they knew about blood donation from relatives, friends, and mass media. In another study utilizing the Saudi population, the sample consisted of 335 males (55%), and 274 females (45%) and majority (65.84%) were categorized as non-donors (78.98%). These nondonors were between the ages of 15 and 30 years old. The 88.5% of the respondents who participated agreed that blood donation was not harmful, 20% of them stated that they would refuse blood transfusion even if they were in need because of the risk of acquiring infectious disease. Further, 84.5% preferred direct donation, 49% of the sample stated that they would accept blood donation only from relatives, and 55.1% believed that blood transfusion was safe. However, 11.6% claimed to have acquired infectious disease after blood transfusion, 58% female in addition to 11.34% male preferred to receive blood from female donors, and 69.5% did not know if the blood banks were in need of blood or not, and 17.4% believed that all surgical procedures require blood transfusion (Al-Drees, 2008).

Locally, studies were also conducted regarding voluntary blood donation. A study was conducted by the Occupational Safety and Health Center (1999) of the Department of Labor and Employment (DOLE) with the aim of determining the level of awareness on voluntary blood donation among residents and workers in the National Capital Region; and the quality of current information campaign on voluntary blood donation. Moreover, the study provided inputs on blood donation promotion for information campaigns. This study was done in cooperation with the Quezon City Science Council and the Voluntary Blood Donation Program of the Department of Health. The goal was to ensure that workers and their families in the locality could have safe blood when needed since there was a high prevalence of injuries in several work sectors including in construction and agriculture work. With 300 respondents, the study found that fifty percent (50%) of the respondents were aware of the Voluntary Blood Donation Program and got the information from radio and television, while of the 300 respondents, eighteen percent (18%) had donated blood previously. The majority of the

respondents perceived that the quality of current information on voluntary blood donation was not adequate and sufficient, albeit the respondents were found to be highly concerned with and receptive to voluntary blood donation information campaign. Moreover, another significant finding was that respondents had several misconceptions regarding the process of blood donation. Thus, a need for a continuing effort and sustaining information dissemination on voluntary blood donation is very important in order to protect Filipino workers and their families who may need safe blood in the future.

In another study by Pingoy, et al. (2004) at the University of the Philippines – Philippine General Hospital, Taft Ave., Manila, with 2,470 respondents, the leading personal positive motivating factors identified were general altruism, duty as a citizen, pressure from family, friends or peer, knowledge of one's blood type or an undisclosed illness during screening, having recipients who are family or friends, blessing from God, personal invitation from a physician, and admiration of others. Other non-personal reasons for blood donation included examples by family or friends, knowledge that general good is promoted when more people donate blood, peace of mind, influence of mass media, and results of seminars and educational campaigns. On the other hand, fear was almost the only source of donors' anxiety (i.e., the negative influencing factors) caused by awareness of an undisclosed illness, getting sick, loss of blood, needles, and sight of blood.

Lastly, according to the Visayan Daily Star (2014), an ordinance was formed and authored by Hon. Lani Ramon, a city councilor of Dumaguete City, to combat the insufficient supply of blood in the province and city. The said ordinance includes bloodletting activity conducted by the City Health Office of Dumaguete every six months. The 30 barangays of Dumaguete City identify at least one percent of its population, who are 18 years old and above, to undergo blood typing, every six months. Potential donors' information (i.e., name, blood type, location, and contact number) are entered into the databank for easy access. The city government has allotted Php 200, 000 for the program.

Theoretical Framework

Demographic statistics demonstrate that a majority of the volunteer work force was composed of women and highly educated individuals (Rokach & Wanklyn, 2009). In general, women seemed to be more inclined to engage in volunteerism. In several studies concerning gender differences in volunteer motivation, researchers have found that women scored higher on most, if not all, functions than men (Chapman & Morley, 1999). On the contrary, several researchers have found that men tend to favor instrumental motivators, such as the career function, while women tend to favor concern-related motivators, such as values (Prentice & Carlsmith, 2000; Switzer, Switzer, Stukas, & Baker, 1999). Another important demographic divide in volunteer motivation is age. Numerous researchers have demonstrated that older volunteers tend to be motivated principally by altruistic motives, otherwise known as the values function (Finkelstein, Penner & Brannick, 2005; Frisch & Gerrard, 1981; Okun, 1994; Okun et al., 1998; Omoto & Snyder, 2000). Younger volunteers, although also strongly motivated by altruistic motives, often ranked the career, social, and understanding functions higher than do older volunteers (Clary & Snyder, 1999; Finkelstein et al., 2005; Frisch & Gerrard, 1981; Omoto et al., 2000; Planalp & Trost, 2009; Roessler, Carter, Campbell, & MacLeod, 1999). These results have been widely replicated both in studies utilizing volunteers from hospices and volunteers from other nonprofit organizations.

Intrinsically motivated behavior involves engaging in an activity for the satisfaction, or enjoyment inherent in performing the activity. On the contrary, extrinsic motivation involves performing an activity to obtain a separable outcome (Finkelstien, 2009). An individual motivated by extrinsic motivators engages in an activity because it contains instrumental, instead of intrinsic, value (Ryan & Deci, 2000).

Strategies that best fit intrinsically oriented individuals de-emphasize tangible rewards and emphasize intrinsic rewards. Deci (1972) found that in a population of intrinsically motivated individuals, external rewards such as money, awards, and prizes tend

to decrease intrinsic motivation. Verbal reinforcements, on the other hand, increase intrinsic motivation (Deci, 1972). Another study by Deci et al., (1999), a meta-analysis of 128 experiments exploring the effects of extrinsic rewards on intrinsic motivation, yielded similar results. These researchers found that tangible rewards had a significant negative effect on intrinsic motivation, while verbal rewards had a significant positive effect on intrinsic motivation (Deci et al., 1999). These findings suggest that intrinsic motivation may be reduced by rewards that depend on task rather than performance. In the context of volunteerism, individuals may prefer praise when deserved rather than monetary rewards based on completion of tasks. On the contrary, extrinsically oriented individuals are not affected by extrinsic rewards or intrinsic rewards, such as verbal reinforcements. The defining factor in extrinsically motivated individuals is the possibility of achieving external goals such as career advancement and stronger social ties (Deci et al., 1999).

Although there are differences in functional motives among different genders and age groups, individuals commonly report the values function as the most salient motivating factor. Research suggests that in order to observe an increase volunteerism act regardless of age and gender, etc., proper orientation and education among individuals before conducting the said act. In addition, motivational orientation should be taken into account when rewarding existing volunteers. While counterintuitive, intrinsically motivated volunteers should not be rewarded by extrinsic rewards, such as monetary compensation or awards, as these rewards often reduce their intrinsic motivation. Extrinsically motivated volunteers, on the other hand, can be motivated to volunteer further by extrinsic rewards such as career advancement. To prevent further deterioration of the volunteer work force, organizations should seek to prevent mandatory volunteerism in schools and universities as these policies tend to decrease future intentions to volunteer (Widjaja, 2010).

Methods

Study Area

Brgy. Poblacion, Ayungon, Negros Oriental was selected as

blood donation-related awareness campaigns resulting perhaps to ignorance among the residents; (2) no authorized documentation of potential blood donors has been established at present; (3) there was poor volunteerism among the residents as blood donation mostly happened only when the need would arise; and lastly, (4) no study had been conducted regarding the diverse influences affecting individuals' decision to donate blood.

Research Design

The study is a cross sectional descriptive type which involved one-time interaction with groups of people through survey analysis.

Pre-Data Collection

A formal written letter was sent to the Ethics Committee of Silliman University or to any department/s is/are responsible for this matter. They were informed of the conduct of this study, their permission was sought and obtained, and a memorandum of agreement was formulated. Another set of letters were sent to the Local Government Unit of the Municipality of Ayungon and Brgy. Poblacion. The letters were properly addressed to the municipal mayor and barangay captain respectively, asking permission and informing their respective offices that a study would be conducted in the said places. Moreover, pilot testing was conducted prior to the conduct of the study in a neighboring barangay. Fifteen percent (15%) out of the computed respondents took the test and commented on it mechanics. The primary purpose of the pilot was to construct an initial picture of the test validity and reliability with the aid of an SPSS computer application which employed the Cronbach's α. Results from this test were excluded from the final data analysis.

Sampling Procedure for Data Collection

In the absence of available information regarding the data of inhabitants belonging to the 18-22 age bracket in Brgy. Poblacion, Ayungon, Negros Oriental, this study opted to employ total

enumeration. The researcher decided to only include such age range of individuals since (1) they were the ones who were readily available when the need for blood donation would arise, most especially if the need for donation was in Dumaguete City; (2) they were less likely to have illnesses, such as hypertension, diabetes, anemia, and the like; and (3) they were more capable and willing to perform the said action.

The respondents were required to fill out a four-part structured written questionnaire. To avoid non-esponse bias and to ensure that the respondents could easily contribute responses, the researcher designed the questionnaire in a way that is not too long or would not take too much time to complete.

Ethical Considerations

Nonetheless, the study ensured as much as possible that the respondents' privacy was maintained throughout the study. Anonymity was therefore guaranteed. The participants were informed that any data provided would be kept in strictest confidence and data gathered would be disposed after two (2) years. In addition, the respondents were provided with adequate information regarding the research and were ensured that they had the power of free choice, enabling them to consent or decline participation voluntarily. Furthermore, it was emphasized by the researcher that failure to volunteer would not result in any penalty or loss and that even after giving their consent, they still had the right to withdraw from the study and refuse to provide any specific piece of information.

Procedures for Data Analysis

1. Scoring on surveys (Knowledge, Attitude, and Practices [KAP]). Method for scoring the surveys was adapted and modified from the study of Alfouzan (2014). Firstly, for knowledge, each right response was given a score of 1 while a wrong or unsure response was scored 0. Total knowledge scores ranged between 0-10. Knowledge scores from 0 to 3 were considered as poor, while knowledge scores ranging 4 to 7 were considered average, and knowledge scores of

more than 7 were considered as excellent knowledge regarding blood donation patients was assessed using an 8-item questionnaire where attitude scores of 0 to 5 were considered as negative attitude and scores from 6 to 8 were considered as positive attitude. Thirdly, practice was evaluated using a questionnaire where respondents could possibly get a total score of 7. Practice scores from 0-3 were considered as unwillingness to donate blood and scores more than 3 indicated willingness to donate blood. An additional question (i.e., number 8) was added to the last portion of the questionnaire for respondents who had not yet experienced blood donation.

2. Test for associations. Correlation analysis, specifically the Chi-square Test of Independence, was also utilized to determine the relationship between two categorical variables. Statistically significant differences were considered at $p < 0.05$ at 95% confidence level.

Results and Discussion

Pilot Test

The researcher conducted a pre-test in the neighboring barangay, Brgy. Tampocon II, Ayungon, Negros Oriental. Total enumeration sampling was used due to the unavailability of data regarding the number of young residents aged 18 to 22 years old. The same considerations were made when choosing the respondents to participate in the pre-testing. Only minimal changes were made on the questionnaires, such as correction of typographical errors, revision of formatting and incorrect translations to the vernacular. The researcher believed that the questionnaire was functional since its Cronbach's α was over 0.651. In practice, a Cronbach's α above 0.6 is acceptable, which means that the level of reliability of the questionnaire is within the acceptable range.

Demographic Profile of the Respondents

Table 1

Demographic Characteristics of the Participants (n = 76)

CHARACTERISTICS	DISTRIBUTION (*n* = 76)	
	FREQUENCY (*f*)	PERCENTAGE (%)
Age		
18	27	35.53
19	13	17.11
20	6	7.89
21	15	19.74
22	15	19.74
Gender		
Male	35	46.05
Female	41	53.95
Civil Status		
Single	73	96.05
Married	3	3.95
Religion		
Roman Catholic	32	42.11
Born Again	2	2.63
Aglipay	39	51.32
Protestant	3	3.95
Others	0	0
Level of Education		
Elementary	0	0
High School	8	10.53
College	67	88.16
Others	1	1.32

All respondents voluntarily participated in answering the written questionnaires, and data gathered were subjected to statistical analyses. As disclosed in Table 1, majority of the participants belonged to the age group of 18 years old which were mostly female and single in terms of civil status, accounting for 35.53%, 53.95%, and 96.05%, respectively, of the overall number of study participants. In terms of religion, only 3 (3.95%) were Protestants, 2 (2.63%) were Born Again, while the rest claimed to be Roman Catholics (42.11%) and Aglipayans (51.32%). As regards the educational attainment of the participants, most of them were enrolled in college at the time of the study or have already finished college, having a percentage of 88.16%.

Table 2

Level of Knowledge, Attitude and Practices on Blood Donation

Variable	Category	Distribution (n=76)	
		Frequency *(f)*	**Percentage** *(%)*
Knowledge	Poor	8	10.53
	Average	48	63.16
	Excellent	20	26.32
Attitude	Positive	55	72.37
	Negative	21	27.63
Practices	Willingness to donate	66	86.84
	Unwilling to donate	10	13.16

Knowledge about Blood Donation

As tabulated in Table 2, majority of the participants were classified as having an average knowledge, accounting for 63.16% of the total population, while 10.53% and 26.32% were poor and excellent, respectively. The study conducted by Nigatu and Demissie (2014) yielded the same results as this present study where the study population tended to be relatively more knowledgeable about blood donation. This could also be attributed to the fact that most of the participants were in the college level or have finished tertiary education, so they wer already cognizant of these matters.

It is also noteworthy to point out that most of the participants did not know the amount of blood to be collected, minimum weight and age, and appropriate duration of blood donation as defined in Table 3. On the other hand, in the same study by Alfouzan (2014), about one third of the participants (33.2%) answered correctly about the minimum age, while 40.1% and 43.6% of them correctly recognized the minimum weight and the minimum interval between two times for blood donation, respectively. Thus, it can be deduced that due to poor knowledge in terms of the aforementioned items, participants were hesitant to volunteer; lack of knowledge in other words can be a possible factor of hindering them to donate.

Attitude towards Blood Donation

Among the 76 participants, 55 (72.31%) indicated a positive attitude, while 21 (27.63%) of them were identified as having a negative attitude towards blood donation. Correspondingly, as

described in Table 5, most of the participants believed that blood donation was good (85.53%), voluntarily blood donation was the best source of donor blood (81.58%), and blood donation was a lifesaving act (98.68%). This result was in congruence with the study conducted at University of Benin Teaching Hospital, Benin City, Nigeria by Ngowoh, Aigberadion and Nwannadi (2013) in which majority of the participants had a positive attitude and preferred voluntary blood donation. It is also important to emphasize that participants responded positively to the questions on whether relatives could be asked to donate and whether they would donate blood if a family, relative, or friend needed transfusion as tabulated in Table 5 with a percentage of both 88.16%.

Practice of Blood Donation

As shown in Table 2, 66 (86.84%) of the population were willing to donate blood once encouraged or reminded and when emergencies occur. This is a positive perception most especially to the residents of Brgy. Poblacion, Ayungon towards establishing a blood donor's list corresponding to their individual blood type and contact number for easy access in cases of emergencies and when need arises.

Table 3

History of Blood Donation among the Study Population (n = 76)

HISTORY OF BLOOD DONATION	DISTRIBUTION (*n* = 76)	
	FREQUENCY (*f*)	PERCENTAGE (%)
Yes	11	14.47
No	65	85.53

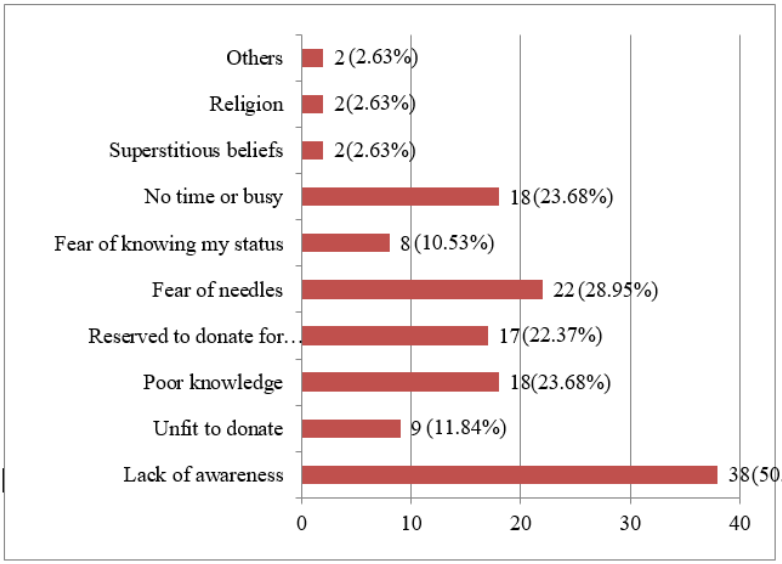
Additionally, the data presented in Table 7 reveals that only 11 (14.47%) of the total population had a history of blood donation, while the majority were classified as non-donors. This simply implies that awareness programs about blood donation must be implemented, and regular consultations must be conducted to properly follow up these participants. These results are greatly associated with the different factors preventing the participants from donating blood as illustrated in Figure 1. In the present study, lack of awareness (50.00%) ranked first as the top reason why non-donors

had not experienced blood donation. This could be due to the fact that the Philippine National Red Cross (PNRC) and other blood donation-related agency had not visited and conducted bloodletting activities and awareness campaigns in this barangay, according to the municipal nurse on duty during the interview.

Next to deficiency of awareness was fear of needles (28.95%). In another study published by Nwogoh, Aigberadion and Nwannadi (2013) and Pinngoy et al. (2004) at the University of the Philippines – Philippine General Hospital, Taft Ave., Manila, fear was almost the only source of donors' anxiety, with the emphasis on the fear of needles, sight of blood, and fear of knowing one's health status. Nonetheless, according to an article entitled "Overcoming Your Fear of Needles" (2013), constant exposure could somewhat help eliminate one's anxiety. Lastly, reserving donation for family and friends (22.37%) is another deterrent factor among non-donors.

Figure 1

Distribution of Non-donor Respondents according to the Reasons They Consider Why They Have Not Donated Before



Association of Knowledge, Attitude, and Practice (KAP) with Blood Donation

Table 4

Association between Knowledge, Attitudes, and Practices on Blood Donation

Knowledge	Practice		x^2	df	*p*-value
	Unwillingness	Willingness			
Poor	5	6			
Average	6	37	12.3	2	*0.002
Excellent	0	32			
Practice	**Attitude**				
	Positive	**Negative**			
Unwillingness	4	6	6.03	1	*0.014
Willingness	51	15			
Knowledge	**Attitude**				
	Positive	**Negative**			
Poor	5	3			
Average	37	12	0.780	2	0.677
Excellent	13	6			

Legend: (*) with significant p-value result ($p < 0.005$)

As presented in Table 4, a significant association between knowledge about and practice on blood donation was observed, where $p < 0.005$ ($p = 0.002$). In other words, an ample amount of knowledge can lead to an increase in blood donation rates or possibilities of an individual to donate blood. It can therefore be recommended that healthcare professionals and other concerned blood donation-related agencies should include programs that could enrich and augment the knowledge aspect of individuals regarding blood donation. These findings are similar to those in the study of Kowsalya et al. (2012) that led the researchers to conclude that good or sufficient knowledge may lead to a higher desire for blood donation.

On the other hand, another significant realization was that actual blood donation is suggestively dissimilar from willingness to donate. As mentioned previously, participants were mostly knowledgeable and were classified as willing to donate, yet very low blood donation act has been generated. This finding can be explained through the Theory of Planned Behavior (TBP) by Ajzen (1971) and can be further expounded by the study of Tscheulin and

Lindenmeier (2005). Based on the theory, attitude, subjective norm, self-efficacy, moral norm, anticipated regret, donation anxiety from prior blood donations, and self-identity as a blood donor predicted experienced donors' intentions; and that intentions, self-efficacy, moral norm, and anticipated regret may have an impact on people's actual blood donation behavior. In other words, actual blood donation greatly depends on the intention of an individual to donate blood; an example in this case is reservaing donation for family and friends, as discussed earlier. In other words, people tended to be more certain that their donated blood would preferably be transfused to their loved ones, as also explained in the study of Tscheulin and Lindenmeier (2005). Likewise, individuals due for blood transfusion preferred their family member or relatives as donors. The former idea could possibly explain why lack of awareness among non-donors ranked first on the list. Such awareness may refer to the existing program by the Philippine National Red Cross (PNRC) that if one contributes blood to the bank, a donor card will be given to ensure a bag of blood would be donated when the need arises. Thus, this certain program can post potential blood donors regularly, regardless who the recipient will be.

Moreover, another significant association was found between practice in and attitude towards blood donation, as indicated by the value of $p = 0.014$, as presented in Table 12. This certain result supports the findings of Kowsalya et al. (2012) that positive attitude mattered in improving practices in blood donation. Although positive attitude was similarly observed in both genders, performance in blood donation was still truncated. Thus, regular blood donation camps must be conducted to sustain an adequate supply of blood, as suggested by Amatya (2013) in her study that involved students from different colleges in Kathmandu, Nepal.

It can also be noted that no significant relationship was established between knowledge and attitude, as indicated by the value of $p = 0.677$. This result implies that even if one is highly knowledgeable about blood donation, this does not guarantee willingness to donate blood, yet educational campaigns are still encouraged in order correct the misconceptions about blood donation.

Conclusion

Summing up the results, it can be concluded that majority of the participants were classified as having an average knowledge, accounting for 63.16% of the total population, while 10.53% and 26.32% had poor and excellent knowledge, respectively. While approximately three-fourths (72.31%) of the respondents indicated a positive attitude towards blood donation a positive, 27.63% were found to have a negative attitude towards it. As for the practices, only 11 (14.47%) of the total population had a history of blood donation, whereas the majority were classified as non-donors. Factors such as lack of awareness (50.00%), fear of needles (28.95%), as well as not having the time or being busy and having poor knowledge (23.68%) ranked as the top three reasons for being non-donors. Further, significant relationships were established and observed statistically between knowledge and practice ($p = 0.002$) as well as between practice and attitude ($p = 0.014$), all of which are essential factors to be considered in order to increase the rate of blood donation. Meanwhile, no significant relationship was found between knowledge and attitude ($p = 0.677$); however, educational campaigns were highly encouraged in order to correct the misconceptions on blood donation.

Recommendations

Based on the foregoing findings and as far as the results of this study are concerned, the following recommendations are offered:

- launching of blood donation-related educational programs with the aim to enrich knowledge and to heighten awareness predominantly in rural areas;
- massive information dissemination of the existing blood donation programs by the Philippine National Red Cross (PNRC) and other blood donation-related agencies, emphasizing the incentives and benefit a donor ought to have;
- creation of more opportunities for individuals to donate blood in order to sustain the availability of all blood

products whenever necessary;

- conduct a free blood typing activity among the general public, most especially in rural places in order for the people to be aware of their blood types;
- creation of an official list of potential donors and their corresponding blood type, address, and contact number for easy access and monitoring;
- regular organization of blood donation camps to increase tblood supply and combat the demand of blood products. Moreover, the following are highly recommended for future similarly studies and investigations.
- Adequate and lengthier time should be spent on data collection. The exact time, date, and activities of the data collection must be properly scheduled to prevent attrition and delays in the conduct of the study.
- A more comprehendible self-structured questionnaire is suggested to specifically identify and gather the necessary data to meet the aims of the study. It is also highly recommended to explore other methods of collecting data.

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Antibacterial Susceptibilty of PhilNONI Juice versus *Salmonella typhi, Staphylococcus aureus,* and *Escherichia coli*

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Abstract

Juice extracted from noni fruit (*Morinda citrifolia, Linn*) is a natural dietary supplement that has been claimed to benefit human health. Limited clinical tests from medical doctors and food scientists all over the world have testified to its beneficial effects. The secret in health giving power lies in the number and variety of components found in the noni fruit. A scientific approach to understanding the phenomenon why and how it has become a popular dietary supplement, as a functional food, or as a natural health enhancer is due to the fact that *Morinda citrifolia* contains phytochemicals that own antibacterial, antiviral, antifungal, antitumor, anti-helmintic, analgesic, hypotensive, anti-inflammatory, and immune- enhancing effect (Maslog, 2014). This in-vitro study focuses on the inhibitory effect of M. citrifolia juice using the branded product,100% PhilNONI Juice, of a local company, Phil Morinda Citrifolia Inc. (PMCI), versus pathogenic microorganisms *Salmonella typhi, Staphylococcus aureus* and *Escherichia coli*. Two methods were used in determining the antimicrobial susceptibility of PhilNONI Juice: one is to find out the minimum inhibitory concentration (MIC) by the tube dilution method and the second is the determination of the juice's antibacterial activity against these pathogenic organisms assessed by the presence or absence of growth by the streak method with the pathogenic organisms by Todd, Sanford, Davidsohn (Henry, 1979). The study proved that 100% PhilNONI Juice has a potent antibacterial activity against *Salmonella typhi, Staphylococci aureus* and *Escherichia coli* based on the same pattern of antimicrobial susceptibility of standard chloramphenicol on these pathogenic organisms.

Keywords: susceptibility, inhibition of growth, antibacterial

Introduction

The increase in antibiotic resistance of microorganisms is largely due to the widespread use of antibiotics in medicine (Rivera et al., 2011). The problem is compounded by the lack of new antibiotics to attack bacteria in different ways to circumvent the resistant ones. Moreover, commercially available antibiotics are sometimes associated with adverse reactions to the hosts such as hypersensitivity, allergic reactions, and immunosuppression. These adverse effects led us to search for new antibacterial substances from local fruits. Antimicrobials of organic plant origin can have enormous therapeutic potentials. Looking for more effective antimicrobial agents from organically grown fruits, such as noni fruit, is the purpose of this in-vitro study.

This study is also inspired by Republic Act no. 8423, an act creating the Philippine Institute of Traditional and Alternative Health Care (PITAHC), otherwise known as the "Traditional and Alternative Medicine Act (TAMA) of 1997. This Act has its main objectives to encourage scientific research to develop traditional and alternative health care systems that have direct impact on public health care and promote and advocate the use of traditional, alternative, preventive and curative health care modalities that have proven safe, effective, affordable, and consistent with the Philippine government standards on medical practice. These very well conform with the mission and objectives of Phil Morinda Citrifolia, Inc. (PMCI), the manufacturer of PhilNONI products. For ages, nature has gifted us with plenty of herbs and plants which form the main source of traditional medicine. A study on the antibacterial activities of ethanol extracts of some of these medicinal plants in the Philippines against multidrug resistance bacteria had been done in 2015 (Valle et al., 2015).

Morinda citrifolia, Linn (Rubiaceae), also known as noni orapatot is a shrub or a small tree growing organically and wildly along the seashores of the Pacific Ocean. This shrub has been used widely in traditional medicine but has been used more recently as analgesics, anti-angiogenic, anti-cardiovascular diseases,

anti-inflammatory, anti-oxidants, anti-tumor/cancer, anti-gastrointestinal diseases, as well as an antimicrobial and as an immunomodulatory for immune responses (Maslog, 2014).

Specific compounds from the noni plant have been effective in laboratory studies as antibacterial agents (Lochner et al., 1995; Leach et al., 1998). In an in- vitro study, extracts of ripe noni fruit containing L-asperuloside alizarin exhibited antibacterial properties against *Pseudomonas aeruginosa*, *Micrococcus pyogenes, E. coli, Proteus spp., Staphylococcoccus aureus, Bacillus subtilis, Salmonella* , and *Shigella*. Some anthraquinones from the root, the damnacanthal, is also found effective against all the above organisms. Specifically, scopoletin component in noni fruit inhibits *E. coli and H. pylori* (Duncan, 1998). Also concentrated noni leaf extract kills 89% of *M. tuberculosis* in test tubes, compared to Rifampin, a leading antiTB drug giving 97% effectivity in the same concentration (Saludes, 2002).

Chloramphenicol, also known as chloromycetin, is used as the standard control antibiotic in this study. It is a broad spectrum antibiotic that interferes with the mitochondrial protein synthesis and is active against a variety of organisms including Salmonella and in the treatment of penicillin–allergic or penicillin-resistant patients with bacterial meningitis and infections caused by vancomycin-resistant *Enterococci*. Therapeutic range in adults is 5-20 ug/ml. (Bambecke, 2017). Chloramphenicol is also bacteriostatic for most gram-positive, like Staphylococcus aureus and many gram-negative aerobic bacteria, like *Escherichia coli,* but can be bactericidal against some very sensitive bacteria. All anaerobic bacteria are inhibited by chloramphenicol at its usual therapeutic concentrations. Chloramphenicol suppresses growth of *Rickettsia* and *Chlamydia.* Its pharmacokinetic action is well-distributed throughout the body, including CNS and the eyes.

Materials and Methods

Two Methods for Antibiotic Sensitivity Testing by Todd, and Sanford, Davidsohn (Henry, 1979) were used in this study.

1. Test tube Dilution Method. Tubes of nutrient vehicle containing serial dilutions of antibiotic are inoculated with known number of test organism. The measure of susceptibility to the antibiotic is manifested by failure of organism to grow in a given dilution. The lowest dilution without growth is the minimum inhibition concentration (MIC). This is the most accurate method. The minimum bactericidal concentration (MBC) is a confirmatory test.
2. Streak Method. Mueller Hinton agar (MHA) plates containing known amounts of antibiotic are streaked with the different number of test organism and reading in which volume and antibiotic concentration there is inhibition of growth is the MIC.

Sources of the Microorganisms Used

The microorganisms used in this study were purchased from the Philippine National Collection of Microorganism, (PNCM) at the National Institutes of Molecular Biology and Biotechnology (BIOTECH), in the University of the Philippines Los Banos (UPLB), under PNCM locator no. 18012301. These microorganisms were Salmonella typhi, BIOTECH 1756 ; *Staphylococcus aureus* , BIOTECH, 1582 and *Escherichia coli* ,BIOTECH 1634. The three (3) bacterial cultures from the NA slant were gram stained to confirm their gram stain reactions and streaked on differential media for their specific cultural and biochemical characteristics.

Methodology I

1a. Determination of the Minimum Inhibitory Concentration (MIC) by Test Tube Dilution Test

Table 1

Chloramphenicol Antibiotic (AB) Diluted to Working Concentration of 250 ug/ml Serially Diluted 1:2 in 5 mL Volume and Challenged with 1 x 10^8 Organisms: Salmonella Typhi (A) Staphylococcus Aureus (B) and Escherichia coli (C) except Tube no. 9 with Nutrient Broth Alone

Test Tube No	Dilution	AB in ug/ml	Results (Remarks)
1	undiluted	250.00	I,(S)
2	1:2	125.00	I,(S)
3	1:4	62.50	I,(S)
4	1:8	31.25	I,(S)
5	1:16	15.62	I,(S)
6	1:32	7.81	S (MIC)
7	1:64	3.90	R
8	NB+org	0	G
9	NB alone	0	NG

Legend: I= Inhibition of growth, S= Sensitive R= Resistance, G=growth NG=No growth

Table 2

100%PhilNONI Juice Diluted 1:32 and Using 1 ml Equivalent to MIC of 7.81 ug/ml and Challenged with 1 x 10^8 Test organisms: Salmonella Typhi (A) Staphylococcus aureus (B) and Escherichia coli (C)

100% PhilNONI Juice Diluted 1:32 1 ml =7.81 ug/ml compared to Chlorampenicol	MIC Results from the Chloramphenicol run	Average of 8 replicates	Positive Control No PhilNONI juice,	Negative Control Media alone, No challenge
vs. A	7.81 ug/ml	I	G	NG
vs. B	7.81 ug/ml	I	G	NG
vs. C	7.81 ug/ml	I	G	NG

Legend: I= Inhibition of growth G= growth NG= no growth
MIC=Minimum inhibition concentration

1b. Determination of Minimum Bactericidal Concentration (MBC), Confirmatory to Minimum Inhibitory Concentration (MIC)

Table 3

Culture on MHA of three (3) random results showing MICs done on Chloramphenicol (AB) from table 1 with 1 x 10^8 test organism after one day incubation at 37°C. Determination of Minimum Bactericidal Concentration (MBC)- Confirmatory test for the MIC

MIC of 7.81 ug/ml Chloramphenicol	REPLICATES			Pos. Co. 3.90 ug/ml
	1	2	3	
with *Salmonella typhi* (A)	I	I	I	G
with *Staphylococcocus aureus* (B)	I	I	I	G
with *Escherichia coli* (C)	I	I	I	G

Table 4

Culture on MHA of Three (3) Random MICs Done on 100% PhilNONI Juice from Table 2 with 1 x 10^8 Test Organism, after Incubation for a Day At 37°C. Minimum Bactericidal Concentration (MBC)

MIC of 7.81 ug/ml PhilNONI Juice	REPLICATES			Pos. Co. 3.90 ug/ml
	1	2	3	
with *Salmonella typhi* (A)	I	I	I	G
with *Staphylococcocus aureus* (B)	I	I	I	G
with *Escherichia coli* (C)	I	I	I	G

Legend: I = Inhibition of growth G= growth

Methodology II Determination of Growth Inhibition at Certain Antibiotic Concentration by Streak Method

Table 5

Chloramphenicol (AB) in different volumes and concentration plated on MHA and streaked with 1 x10^8 organisms : Salmonella typhi (A), Staphylococcus aureus (B) and Escherichia coli (C)

Petridish No.	Vol. AB mL	Conc. AB mcg/ mL	Results for 8 Replicates for each of A,B & C organisms								Remarks
			1	2	3	4	5	6	7	8	
1	1.0	7.81	I	I	I	I	I	I	I	I	S(MIC)
2	1.5	11.71	I	I	I	I	I	I	I	I	S
3	2.0	15.62	I	I	I	I	I	I	I	I	S
4	2.5	19.52	I	I	I	I	I	I	I	I	S
5	0	0	G	G	G	G	G	G	G	G	+Co.

Table 6

100% PhilNONI Juice 7.81 ug/l in different volumes and concentration plated on MHA and streaked separately with 1 x 10^8 Salmonella typi (A) and Staphylococcus aureus (B) except no. 5

Petridish No.	Vol. of 100% PhilNONIin ug/ml	Results for 8 Replicates for each of A and B								Remarks
		1	2	3	4	5	6	7	8	
1	1.0ml=7.81	I	I	I	I	I	I	I	I	S(MIC)
2	1.5ml=11.71	I	I	I	I	I	I	I	I	S
3	2.0ml=15.62	I	I	I	I	I	I	I	I	S
4	2.5ml=19.52	I	I	I	I	I	I	I	I	S
5	0	G	G	G	G	G	G	G	G	+Co.

Table 6a

PhilNONI Juice 7.81 ug/ml in Different Volumes and Concentration Plated on MHA and Streaked with 1 x 10^8 Escherichia Coli

Petridish No.	Vol. AB mL	Replicates for C								Remarks
		1	2	3	4	5	6	7	8	
1	1.0ml=7.81	G	G	G	G	G	G	G	G	R
2	1.5ml=11.71	I	I	I	I	I	I	I	I	S(MIC)
3	2.0ml=15.62	I	I	I	I	I	I	I	I	S
4	2.5ml=19.52	I	I	I	I	I	I	I	I	S
5	0	G	G	G	G	G	G	G	G	+Co.

Results and Discussion

Antimicrobial sensitivity or antimicrobial susceptibility is the susceptibility of microorganism, usually bacteria, to antibiotics. Testing for antibacterial susceptibility is often done clinically by Kirby–Bauer method, (Henry, 1979) but this method is qualitative and not very reliable for our purpose. Two other methods employed in this study were those of the broth and agar dilution methods for minimum inhibitory concentration (MIC) determination which are both quantitative and more accurate.

PhilNONI Juice exhibited exactly the same pattern of reactions shown by chloramphenicol by the test tube dilution method. Results shown in Table 2 of the in- vitro antibacterial susceptibility test was only the MIC of 100% PhilNONI Juice which was 7.81 ug/ml using the constant volume of approximately 1 x 10^8/ml test organisms S*almonella typhi, Staphylococcus aureus*, and *Escherichia coli* inhibiting the growth of the three organisms. This is even a better result than the study of Thamyris et al. (2014) in Brazil, which reported that ethanolic extract of M. citrifolia fruit had antibacterial activity inhibiting *Salmonella spp, Staphylococcus aureus* and *Eschrichia coli* with MIC ranging from 1mg/ml to 10 mg/ml. Perhaps the advantage of the present study is in the method of the noni fruit preparation. Thamyris and co-workers (2014) used the extracted oil while in the present study the whole fermented juice was used, making it more potent with more components preserved and used in the reactions.

The present study collaborates with other studies already reported regarding the potent antimicrobial activity noni may exhibit. Jian Yang et al. (2016) showed an average of 0.3 ul/cm2 MIC of noni fruit essential oil for both *E. coli* 0157:H7 and *Salmonella enteritidis*. In still another study by Indian workers (Barani, et al., 2014), the MIC values of noni extracts for *Streptococci mutans* and *Streptrococci mitis* were found to be 125ug/ml and 62.5 ug/ml respectively, using 1 x 10^7 count of the organisms from dental caries.

The factors present in noni that inhibit microbial growth may be attributed not only to the ethanol formation from natural fruit fermentation but also to the presence of phenolic compounds in the fruit like the anthraquinones, acubin, asperuloside, alizarin and scopoletin. Around 160 phytochemical had been isolated from *M. citrifolia* including the above phenolic compounds, organic acids, and alkaloids that contributed to its action of inhibiting pathogenic bacteria growth, including *Staphylococcus aureus* and *Escherichia coli* (Barani et al., 2014).Yang et al. (2016) attributed this antimicrobial characteristic of noni fruit to caprylic, acid which they isolated through the GC-MS analysis in 2014, with MIC values against *E. coli* O157:H7 and *S. enteritidis* of 3.6 and 4.33 ul/ml, respectively.

Moreover, in the presence of the helpful Lactobacilli or lactic acid bacteria (LAB), which are resident in noni fruits, another reaction called lactic acid fermentation happens in processing the PMCI 's 100% PhilNONI Juice, illustrated as follows (Arioli et al., 2013).

$C_6H_{12}O_6 \rightarrow 2\ CH_3CHOHCOOH + C_2H_5OH + CO_2$
Glucose lactic acid ethanol

In this stage, decarboxylation of L-malic to lactic acid by the action of LAB increases the acidity of the juice. This is also the stage where the juice is less susceptible to any further damage from other bacteria since LAB has used up all the substrate and has secreted bacteriocin or biocide. This antibiotic-like substance kills pathogenic bacteria and prevents growth of other microorganisms. The biocide's mode of action is to block the lipid synthesis in *E.coli* and other microbes (Arioli et al., 2013). The conversion of malic acid

to lactic acid is the height of juice fermentation that imparts flavor and aroma to the juice, which gave LAB the status of "Generally Recognized as Safe" (GRAS) through the American Food and Drug Agency (Amorr et al., 2007). As confirmatory test, Table 4 shows the almost complete inhibitory action as can be observed from the replicated MICs formed by 100% PhilNONI Juice, as compared to the standard chloramphenicol antibiotic action which indicated that 100% PhilNONI Juice eliminated the three test bacteria. In contrast, 3.90 ug/ml showed some growth on MHA in all random samples, serving as control. Table 6 and Figure 1 show that when different volumes of 100% PhilNONI Juice were plated in MHA and streaked with 1 x 10^8 test organisms, the juice behaved in the same pattern as the standard chloramphenicol antibiotic. *Salmonella typhi* and *Staphylococcus aureus* growth was inhibited by 7.81 to 19.5 ug/ml of the antibacterial substance in noni fruit, based on the exact action of chloramphenicol of the same concentrations, as shown in Table 5. *E. coli*, however, must contain 11.7-19.5 ug/ml biocide-like substance to eliminate 1 x 10^8 count of the test organisms, as can be observed in Table 6a.

The results confirm Todd, Sanford, and Davidsohn's recommendation to use MIC for chloramphenicol of 5-15 ug/ml in order for it to be considered sensitive. One hundred percent PhilNONI Juice antibacterial activity falls almost within the MIC recommendation by Todd, Sanford, Davidsohn (Henry, 1979). The results indicate that the juice has a potent antibacterial activity against *Salmonella typhi, Staphylococcus aureus* and *Escherichia coli.*

Figure 1

Determination of MIC of Chloramphenicol each vs. the 3 Organisms Salmonella typhi (A), Staphylococcus aureus (B) and Escherichia coli (C)

Neg.co,NB& Noni Juice 250ug/ml 125ug/ml 62ug/ml 31ug/ml 15.6ug/ml 7.81ugml(MIC)

NG NG NG NG NG NG NG NG

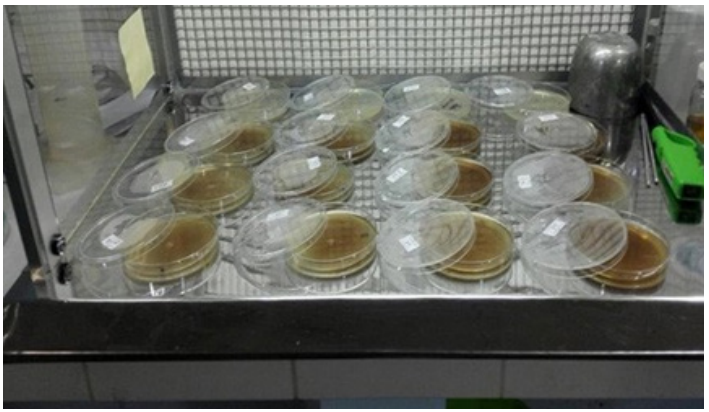
Figure 2

Test Tube Dilution Method: Tubes Containing Serial Dilution of 100% PhilNONI Juice to Check its Antibiotic Susceptibility to Constant Amount of Pathogenic Organism. The same results were seen with Salmonella typhi (A), Staphylococcus aureus (B) and Escherichia coli (C).

ug/ml	250	125	62.5	31.2	15.6	7.81	3.9	Neg co.(outside rack)
No growth		NG	NG	NG	NG	NG	G	No growth

Figure 3

Streak Method: Different amounts of 100% PhilNONI Juice and Chloramphenicol Poured and Solidified on MHA, then Streaked with the 1 x 10^8 Test Organisms. All Plates Showed no Growth



Conclusion and Recommendation

One hundred percent PhilNONI Juice has a potent antibacterial activity as shown by the test tube dilution and streak methods of Todd, Sanford, Davidsoh. The MIC result was based on exactly the same pattern as antimicrobial susceptibility of chloramphenicol antibiotic against *Salmonella typhi, Staphylococcus aureus* and *Escherichia coli*, the three pathogenic bacteria Food and Drug Administration (FDA) are concerned about in food businesses. This study indicates that noni juice not only serves as health food supplement giving many benefits but can also give protection from bacterial infections when taken. In view of the growing resistance to antibiotics, any variants of PhilNONI product may have the potentials to be used as an antibiotic against salmonellosis, food toxicity, and other skin infections and gastroenteritis.

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Negotiations of a Gay Identity Among Openly-Gay Filipino Santero Community and its Resultant Contradictions in the Culture of Pagsasanto

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Abstract

This research was conducted with the aim of looking into the curious prevalence of Filipinos who identify as gays in the Santero community and how they negotiate their gay identity with a form of devotion in a religious idea system that generally does not favor homosexuality. Through a combination of interviews with openly-gay santeros and a series of unobtrusive observations of the online Santero community in three Facebook groups, the study was able to identify three important contradictions in the aforesaid community. These are contradictions in (1) the interactions within the Santero community, (2) the meanings ascribed to the practice, and (3) the norms on the presentation of the Imahes. This paper takes inspiration from extant sociological knowledge on the management of deviant identities and argues that these contradictions are present in the Santero community due to the fact that the Philippine society merely accommodates the deviant identity of gay santeros by obscuring the "sin" of their gayness with the "divinity" of their Santero devotion.

Keywords: deviant identity, Filipino gays, homosexuality, religiosity

Introduction

The presence of religious images made of ivory or wood dressed in fine garments on top of floats adorned in different levels of grandeur is an ubiquitous part of the culture of the predominantly

Roman Catholic Filipino community. These religious images, oftentimes locally known as Imahe or Poon, take center-stage during the Lenten Week processions wherewith a large proportion of religious Filipinos take part either as mere spectators or members of the procession. The care and beautification of these Imahes are entrusted to people who are oftentimes locally called as Santeros.

Scholarly works that inquired into the Santero phenomenon such as that of Sestoso and Madula (2019) and Piamonte et al. (2020) have noted the presence of a large proportion of gay members among the Santero community. This predominance of gays among the ranks of the Filipino santeros is salient in our interactions with our previous study's participants:

Interviewer: "*Sa circle mo ba ng mga santero, mas marami ang bakla na nag-aalaga?*" (In your circle of santeros, are there many gays?)
Participant: "*Wala kang makikitang straight. Halos lahat. Siguro sa one hundred percent, may makikita kang mga three percent na straight na babae at straight na lalake. Pero ramdam mo pa rin na may bahid.*" (You will not see straight people. Almost all of them are gay. Maybe in a one hundred percent, you will only see three percent who are straight females and straight males. Even among them, you can still sense that they are not completely straight.)

This paper serves as a continuation of our exploration into the social reality of openly-gay Filipino Santeros. The previous study, "An Exploratory Study on the Practice of *Pagsasanto* by Openly-Gay Santeros", focused on the experiences and motivations of openly-gay Santeros with emphasis on how they started and why they continue the practice. The discussions from the in-depth interviews we had with our openly-gay Santero participants revealed information about the world of Pagsasanto that produced insights beyond the parameters of the earlier paper. In particular, our interviews with our participants brought to light three contradictions within the reportedly gay-dominated world of Pagsasanto. These are contradictions can be found in (1) the interactions within the Santero community, (2) the meanings ascribed to the practice, and (3) the norms on the presentation of the Imahes. These three contradictions will be discussed in detail in this paper. We further posit that the existence of these contradictions may be a result of the precarious

position of Filipino gays in the community and their collective attempt to navigate their often-viewed as deviant gender identity in a less than tolerant religious Filipino society.

Methodology

The data used in this paper were obtained from a combination of interviews and observations. The interview data were those that were obtained during our interviews with five openly-gay Santeros, each of whom has cared for at least one Imahe and has been a regular participant in Lenten processions for at least five years prior to their recruitment as participants. Many ideas emerged in the process of our *pakikipagkwentuhan* with our Santero participants which, though relevant, were not necessary to answer the research questions of the previous paper (Piamonte et al., 2020). We used those ideas in this paper instead.

Furthermore, the inputs given by our Santero participants gave us new avenues to explore about pagsasanto. In particular, we were introduced to the active community of Santeros online. We conducted online unobtrusive observations on these online Santero communities which yielded rich insights, especially in terms of social control and norms on presentation of Imahes – particularly the concept of *playtime*. Due to the limitations on opportunity and mobility brought about by the COVID-19 pandemic, physical observations and interactions with Santeros were deemed impractical to pursue. Ethical conduct of research was observed. All interview participants were briefed regarding the study and their consent to participate was obtained prior to data collection. The participation of the Santeros for interviews was voluntary. Data were treated with utmost confidentiality and identifying information about the interview participants were removed in this paper.

Results and Discussion

The flow of the discussion is guided by the three kinds of contradictions that we observed in the Openly-gay Santero community. These are the contradictions in (1) the interactions

within the Santero community, (2) the meanings ascribed to the practice, and (3) the presentation of the Imahes.

(1) Contradictions in the Interactions within the Santero Community: The Santero World as Religious and Transformative on one Hand and Chaotic on the Other

We asked our participants to describe the Santero world in the Philippines. One participant attempted to capture the Santero world in a description:

> *Magulo in a sense na every little thing is a big issue. Tapos sila-sila rin nagpapatulan. Kumbaga, sila-sila rin naman yung magboboyfriend, mag-e-ex, tapos pagdating sa Imahe-related na mga bagay, ang bitter nila, hindi sila nagpapansinan. Tapos you always have to be perfect. Kailangan lagi kang perfect kasi one little mistake can turn into a big issue na talagang kailangang mabalitaan nito, mabalitaan ni ganiyan. Ikaw ang magmumukhang masama. Kahit yung issue ay maliit lang that can be settled between the two people involved, maraming nakikisawsaw. Tapos there are cases of blackmailing pa. There were threats. There were threats sa family ko, sa partner ko, ilalabas daw nila yung baho ko, sisirain daw ako. So those are bad things talaga, and they are really happening in the Imahe world. And with the involvement of social media, lalo siyang lumalaki, lalong lumalawak, lalong gumugulo.* (It's chaotic in the sense that every little thing is a big issue. Like, they engage in relationships but when they break up, they will become bitter and will not talk to each other when it comes to Imahe-related things. Then, you have to be perfect. You need to be perfect because one mistake can turn into a big issue that will be known others. You will appear bad. Even though the issue is small and can be settled between the two people involved, others will come in. Then, there are cases of blackmailing and threats. There were threats in my family and my partner where they will destroy my image. So those are bad things and they are really happening in the Imahe

world. And with the involvement of social media, these issues become larger.)

These sentiments run parallel to the sentiments of another participant who opined that the Santero world is fun because you get to meet other individuals yet it is chaotic because of issues such as conflicts in carroza slot reservation, envy in each other's imahe, and encounter with arrogant Santeros:

> *Masaya kasi marami kang makikilala, marami kang matututunan, at marami kang makakasalamuha na mga tao na hindi mo aakalain na ganun pala sila ka-down-to-earth. Pero magulo rin kasi andyan yung mga issues inggitan, andun yung mga taong pa-high-profile na hindi ka tinitignan na, kumbaga, hindi ka kinikilalang magsasanto na ka-level nila... Maraming issues like inggit sa Imahe, inggit sa gayak, sulutan ng slot ng karosa, yung mga ganun.* (It's fun because you get to know other persons, you will learn a lot, and you will encounter people that you don't know that they are down-to-earth. But it's also chaotic because there are issues, envy, wannabes who will not see you as a fellow santero. There are issues like envy in the image, design, and carrozas.)

In order to cope with this kind of contradicting community, some of our participants believed that the solution was on the individual and emphasized the need to rise above the pettiness and become more mature:

> *Uhm, mundo ng magsasanto, magulo na maayos, depende sa kung paano mo titignan. At pati kung paano ka makikisalamuha sa iba. Kasi magigiging magulo kung ikaw mismo ay parang nakikipagpatalbugan, nakikipaglaban sa mga gayak, sa pagandahan ng poon, ganun ganun. Pero kung titignan naman sa kabilang side, madami kang magiging friends, marami kang matututunan sa ibang magpopoon rin – paanong tamang pag-aalaga, paano ang tamang pag-aayos, ganun.* (The world of santeros is chaotic and proper

depending how will you look at it and if you will interact with other santeros. It will become chaotic if you yourself will compete with others in terms of the design of the carroza and the image itself. But if you will look at the other side, you will have many friends. You will learn from other santeros like how to properly take care of the image and how to properly design.)

Another participant echoed this opinion and recognized that he was once one of the competitive members of the community. He said, however, that he had gotten past that over time and matured:

Nagpapatalbugan. Hindi mo talaga maiiwasan na magkakabugan 'yan. Before, talagang kapag malapit na yung Holy Week, post ako nang post na ganito ang bihis, ito ang mga tela ko, ito ang gagamitin ko, ito ang gayak ko, ito ang budget ko, lahat pinagmamalaki ko kasi para maipakita na I am the most capable, I am the richest, I am the youngest. Pero ngayon, I know I am capable, I know na kumbaga ako ang nakikita – sa sinasabi ng iba na sa akin ang pinakamaganda. Pero hindi na ako nagsasalita kasi I let the people speak for me kasi mamaya kapag ako ang nagsalita hindi ko naman matupad. (They compete with each other. You will not avoid that. Before, when the Holy Week approaches, I post online the vestment of my image, the clothing I use, the carroza design, and my budget. I proudly tell them to show that I am the most capable. I am the richest. I am the youngest. But now that know I am capable, I no longer talk about those things because I let the people speak for me because I might not be able to fulfill what I tell.)

Another participant had this to say on the matter:

*Ang santero world, magulo kasi madaming echoserang baklitang bata. *laughs* Andaming echosera na pine-playtime, bina-barbie, kanyakanyang pabonggahan, pasabog-pasabog, wala namang ganun noong araw. Ayun, magulo.*

Jusko, parang showbiz. Kasi hindi naman nila alam kung ano talaga ang meaning ng ginagawa nila. Hindi nila alam na for devotional saka spiritual purposes lahat iyon. Hindi naman yun competition; hindi naman yun pageant. 'Yung ibang ganun ang motibo, nakikipagpatalbugan, kabugan, kabugin si ganito, sapawan si ganiyan. Hindi dapat ganun. (The santero world is chaotic. There are young gays who do *playtime* – they treat the image as a Barbie. They compete with each other and it was not like that before. It's chaotic like showbusiness. They do not know the meaning of what they do. They do not know that it's for devotional and spiritual purposes. It's not a competition nor a pageant. It should not be like that for those with such motives.)

Interviewer: *Bakit kaya ganun ang motibo ng karamihan?* (Why do many santeros have such motivations?)
Bakla eh. (Because they are gay.)

What we can observe from the sentiments expressed by our participants is that the prevailing theme of their answers painted a picture of the Santero world as a community that is both enjoyable and stressful, spiritually rewarding yet possibly petty, friendly and supportive but also snobbish and bogged down by unnecessary competitions. When we asked them to try and give an explanation as to why the Santero world is like this, the answer seems to center on two elements: youth and gayness.

As part of our efforts to dig deeper into this line of inquiry engaged in unobtrusive observations of the online community of Santeros situated at Facebook.com. This is after our participants explained to us that santeros had an active online community. We became witnesses to these contradicting self-presentations and interactions among santeros. The first thing that we tried to confirm during our unobtrusive observations is the claim that the santero community is indeed predominantly comprised of gay Filipinos. This proved to be a difficult endeavor and we adjourned our observations without the capability to confirm this claim with absolute certainty. This was due to the limitations in ascertaining the identity of the

persons behind the Facebook accounts. Some accounts were locked to private which limited our capability to gain any information about them. We also noticed that some of the member Santeros seemed to be using dummy accounts, thereby making them anonymous. What we can confirm from our online observations, however, are the following:

1. There is a notable frequency in the utilization of words associated with gay lingo among the interactions in the online Santero community. This may suggest that many, or even most, of the active members are indeed gay just like what was claimed by our participants.
2. There is indeed a combination of a supportive and hostile atmosphere in the online Santero community. While there are efforts to give praise to fellow santeros, the online community is also filled with many engagements that can best be described as either passiveaggressive or aggressive mudslinging. The online Santero community seems to be able to juggle these opposing natures of interaction by having more than one Facebook group wherewith one group has a more formal and supportive atmosphere while the other has a more informal atmosphere that serves as a possible venue for conflicts among member santeros.
3. The most active members engaged in the mudslinging among members that produce a conflict-rich environment in the online community are gays. At least one of these aforesaid members also serve as group administrator of one of the Facebook groups of the online community. This was confirmed through videos posted in the Facebook group where they showed themselves. The frequent use of words often associated with the aforesaid gay lingo was observable.

(2) Contradictions in the Meanings Ascribed to the Practice: Pagsasantero as Both Sacrificial Devotion and Self-Expression

Our interviews and observations provided us with deeper

insights into the world of gay Santeros and the importance of pagsasanto in their lives. The most poignant of our findings is the treatment of the Imahes as a doll (or commonly referred in the Philippines as a "Barbie") in a bid to express a form of creativity oftentimes associated with gays. Our participants explained:

> Ay *Diyos ko po! Walang nagsasantong straight. Siguro kasi deprived sila na maglaro ng mga Barbie. *laughs*. Siguro na-deprive kasi nga siyempre pag bata ka, pag lalaki ka kailangan robot ang nilalaro mo. Siguro yun nga, parang na-deprive.* (Oh my God! There are no straight people who own religious images. Probaby, gays are deprived to play Barbie. *laughs* They seem to be deprived.) *Aminin na natin na halos lahat ng mga santero, ginagawang Barbie* (ang Imahe) *kasi gusto nilang i-express yung pagigiging bakla nila, dahil hindi sila makapagsuot ng pambabae, sa imahe nalang ine-express yung gusto nila. Pero sa pag-eexpress ng art na gusto nila sa imahe, mayroon pa rin namang debosyon.* (Let us face it. Almost all of the santeros make their images Barbie dolls because they want to express their gayness and not wear feminine clothes. They express what they want through the images but in that expression comes devotion.)

Pagsasantero, therefore, is a way to embrace their "gayness" in a manner tolerated by the patriarchal and heteronormative religious community. This was particularly the case for some of our participants who grew up in Catholic households and studied in Catholic schools where the only activity that involves dressing up that will be tolerated is this one that is veiled as a devotion. At the same time, however, our participants claimed that their pagsasantero is an act of contrition for the said gayness:

> *Maraming bakla ang nagigiging santero kasi siguro doon nila nakikita yung ano… kasi makasalanan ka na nga eh, di ba? Kaya madami, kasi siguro makasalanan ka na nga, yung katauhan mo, gagawa ka pa ng another kasalanan, itutok mo na lang sa pagsasanto, parang ganun. Parang way nila (ang*

> *pagsasanto) ng paghingi ng tawad, parang ganun.* (A lot of gay men become santero because they are sinful. You can focus on pagsasanto as a way to ask for forgiveness of sins.)

The devotion, therefore, is both an act of sin and repentance – two sides of the metaphorical coin. The contradiction is made more nuanced by the description of pagsasantero as a sacrifice by our participants. This pagsasanto as a form of sacrifice is often contextualized in the season of Lent in the Philippines wherein it has become the practice of many Filipinos to take the Lenten holidays as an opportunity to go to beaches and other tourist destinations for some rest and relaxation (Uy, 2011). For some participants, pagsasantero is a sacrificial devotion because the Santero foregoes earthly leisure during the Lenten week in order to make the Imahe presentable during the Lenten processions. Interestingly, however, the same sacrificial act is something that the santeros enjoy as a form of their creative self-expression. It is, in a way, something that appears to be an enjoyable sacrifice.

(3) Contradictions in the presentation of the Imahes: "Patalbugan" amidst standards revolving around beautiful simplicity: The "Playtime" Phenomenon

One very interesting finding that we derived from our interviews with our participants is the concept of *playtime*. In the Santero community, the term refers to a particular way of dressing up the Imahe. When we asked our participants to explain to us what Playtime specifically meant, they gave the following comments:

> *Yung playtime na ginagawa nila, masyado nilang ino-OA-yan 'yung mga gamit, 'yung mga vestment, dinadagdagan nila ng kung anuanong burloloy na hindi naman kailangan talaga. Ganun din sa mga gayak na parang hindi naman kailangan para dun sa karo dun sa poon. Ganun din sa mga accessories.* (With *playtime*, they exaggerate the clothing of the religious image. They put a lot of unnecessary accessories to the vestment and design of carrozas.)

> *Haynako, yung ngayon, hindi nila alam yung ginagawa nila. Sugod nang sugod, gawa nang gawa, experiment nang experiment. Minsan disaster yung outcome. Pinaglalaruan nila. Sinusuotan ng koronang pangtao. Exaggerated na damit, accessories, halos magmukha nang manika.* (Oh my! They do not know what they are doing. They experiment on the image which yields bad outcomes. They play with the image. They dress it with crowns supposedly for people. The vestments and accessories are exaggerated making the image seem to resemble a doll.)

According to our participants, discussions between santeros about the presentation of the Imahes are often done in their online community. The online Santero community we observed was situated at the popular social networking site, Facebook. There are several Facebook pages related to pagsasanto. Their Facebook names range from the more formal ones such as "Esculturas PH" to the more informal such as "*Ang Chaka! Kabugera*!" The self-styled description of these pages also reflect their formal-informal divide. Esculturas PH (n.d.), which has a membership of fourteen thousand users as of August 2023, fashioned its group description as "an advocacy group that highlights the essence of religious images and church traditions." Meanwhile, "*Ang Chaka! Kabugera!*" (n.d.), which has a membership of nine thousand users as of August 2023, fashioned itself as a group where one can critique santeros who do *playtime* as well as their religious Imahes that are deemed by other santeros to be presented in an undesirable or unacceptable manner.

It is worth noting that this second Facebook group for santeros appears to function as a successor to another Facebook group that ceased activities in 2020. This inactive Facebook group, "Anyare?!" (n.d.), had almost seven thousand users as of January 2022.

In our observations of these online communities, we took note of the usual content of the posts made in these two Facebook groups. True to its self-description, the first Facebook group - Esculturas PH – is comprised of four different kinds of content.

a. Posts Related to the Celebration of Religious Occasions

Often at the initiative of the group administrator, a thread were made in the group signaling the start of the celebration of religious occasions. The members are then prompted to comment in the thread the pictures of their Imahes which are dressed up in accordance with the occasion. It is also worth noting that due to the restrictions on public religious activities because of the COVID-19 pandemic, the community also engaged in "online processions" wherein the Imahes of the member santeros were showcased in the

b. Posts Related to the Showcase of Imahes and the Accessories Related to Their Presentation

Aside from the showcase of Imahes in threads commemorating certain religious occasions, the online community also served as a space for member santeros to post pictures of Imahes which they either owned or were owned by others. This kind of activity is done even during days when there are no religious occasions to celebrate. In such posts, the focus is often on the presentation of the Imahe instead of any occasion or the santero that takes care of the Imahe. Featured Imahes are posted either because a member has claimed that the Imahe is their favorite, or because the Imahe is historical, or simply because the members have found the Imahe's presentation to be praiseworthy. In some cases, members also post pictures of accessories like veils and crowns which they believe others might be interested in, as part of the presentation of their Imahes.

c. Posts Related to the Featured Santeros

Another notable kind of content in the online community were posts featuring praiseworthy member santeros. These posts usually included the name and picture of the santero as well as pictures of the Imahes that were currently or previously under their care. The post also contained discussions about their accomplishments in relation to their being santeros. This kind of post served as a space

for other santeros to give compliments their fellow santero.

d. Posts Related to Consultations on Standards in the Presentation of Imahes

The final kind of content that can be found in the Facebook group were posts by members seeking input from fellow member santeros regarding the standards in the presentation of the Imahes. These would usually come along the lines of asking whether certain Imahes should be included in specific religious occasions or whether certain accessories were allowed or required to be included in the presentation of the Imahe during processions.

Meanwhile, the second page – Ang Chaka! Kabugera! – and its predecessor – Anyare?! - had been observed to be generally comprised of the following kinds of content.

e. Posts Related to the Showcase of Imahes

Similar to the kind of posts found in Esculturas Ph, this Facebook group also contain posts that give praise to noteworthy presentations of imahes.

f. Posts Related to Activities and Content they find Undesirable

The Facebook group also contained memes and other content from social networking sites, like Youtube and Tiktok. These shared content come in the form of humor that pokes fun at religion. These were shared in the Facebook group to give the members a space to voice their collective displeasure.

g. Posts Related to the Critique of Presentations of Imahes

This kind of content forms the bulk of the posts in the Facebook group. These posts involved pictures of Imahes which they considered as presented in a wrong, undesirable, or even offensive manner. The approach of the captions of these posts may vary from (a) very passive wherein the member santero would merely post the

pictures of the Imahe with a caption asking for the opinion of others (e.g. "*Ano pong masasabi ninyo sa itsura ng santo?*") with the hope that the other members of the group would collectively express displeasure over the pictures of the Imahe, to (b) passive-aggressive wherein the member santero will ask a leading question that will make a flaw in the Imahe's presentation salient to the other members of the group (e.g. "*Tama bang ganiyan ang korona ni Maria?*"), and (c) blatantly aggressive where the member santero would post pictures of the Imahe with a caption of overt condemnation and/or displeasure over the perceived deviation.

It is in this kind of posts that we encountered what our participants and the other members of the online santero community as *playtime*. The label, as we have observed, is used to identify presentations of Imahes that the santero community label as a deviation from what they considered as the proper way to dress up the religious icons. We dug through the interactions and posts in the Facebook group and we were able to obtain some samples of presentations of the Imahes which the santeros gave the deviant *playtime* label to. These samples are found in Figure 1.

Our participants connected this *playtime* phenomenon with the fact that the Santero world is predominantly comprised of gays and the aforementioned treatment of Imahes as Barbie dolls:

> *May iba kasi na binabakla eh. *laughs* 'Yun 'yung term eh, 'yung binabakla na. Na ang damit ay patong-patong. Kumbaga, may kapa na, nilagyan pa ulit ng kapa. May kapa na, may belo pa, nilagyan pa ng sobre belo. Sobrang over!*(Others tend to exaggerate (lose interpretation of binabakla). That's the term "*binabakla.*" The image already has a cape, a veil. It's too much!)

Figure 1

Sample Images of Imahes Considered by Many Santeros as Deviant

"Sa damit, kailangang maganda, may dignidad. Kapag lumalabas yung poon, dapat makikita siya ng mga tao na may dignidad, hindi yung nagdadamit ka ng patung-patong na tela, na na gagawin mong Barbie. Kailangan maipakita sa damit yung kabanalan kasi merong ibang magsasanto na ginagawang manyika talaga ang poon. Nawawala na yung essence nung holiness nung image. 'Yung playtime, hindi maganda. Walang divinity, walang holiness. Hindi mo nakikita yung – hindi naman kasi basta nag-gagayak ka ng Imahe, nakita mong maganda ay nangangahulugan na appropriate na doon sa Imahe. Maganda nga sa paningin niya, pero sa paningin ng iba, at sa liturgical aspect niya, unliturgical." (The vestment should be beautiful and should give dignity. When the image comes out, people shall see it as having dignity, not having too much clothing like a Barbie. The vestment shall reveal the image's holiness because there are other santeros who treat the image like a doll. The holiness disappears with that. Doing a *playtime* is not good because it does not have

> divinity and holiness. Beautiful vestments do not translate to appropriateness to the attire of the image. They may be pleasing to the santero's eye but for some, in terms of its liturgical aspect, it's not liturgical.)

From these sentiments, we can deduce that to practice *playtime* in pagsasantero is to dress up the Imahes in an exaggerated manner or in a manner that deviates from what is expected from the Santo represented by that Imahe in the religious narrative. This practice was generally viewed negatively by the Santero community, and many posts online were made with the purpose of condemning the act. Furthermore, this practice of *playtime* was allegedly a consequence of the predominance of gays in the Santero community who wished to make use of the Imahes as Barbie dolls through which their creativity could be expressed freely – unopposed by the patriarchal heteronormative community. This is probably why one participant opined that Santeros must make it a point to consult priests or the scriptures in order to avoid making their Imahe a manifestation of *playtime*: "*Para sa akin, dapat aralin muna nilang mabuti yung pagsasanto. Kumunsulta muna sila sa pari, or sa liturgies. 'Yun lang.*' (For me, they should really study the act of pagsasanto. They should consult with priests, or liturgies. That's all). In a world filled with competitive "patalbugan" based on the presentation of their respective Imahes, what, then, is the Santero community's concept of a beautiful presentation? Our participants gave the following opinions – traditional and simple dress, maintenance of holiness, appropriate jewelry:

> *Kasi meron kaming tinatawag na traditional na pagdadamit. Traditional na maganda. Simple na hindi mo matatabunan yung Imahe. Sa damit, hindi naman kailangang elaborate ng damit. Minsan mas maganda pa nga yung simple, walang burda, basta mapapadasal ka talaga.* (There's this so-called traditional vestments. Traditionally beautiful. It's simple and will not overpower the image. You do not need elaborate clothing. Sometimes, simple vestments without embroidery is better. As long as you will feel its holiness.)

Nasa tao kung anong mabibigay niyang best para doon sa Poon niya. Pero burdado man yan o kahit tela-tela, masasabi mong namemaintain yug holiness nung poon. Kasi yung iba, nagigiging OA, ino-OA-yan nila, masyadong accessories, parang nawawala na yung holiness. Nagiging, parang sabi nga nila, nagigiging mannequin 'yung poon. (It's up to the person what best he can offer to the Image. Whether the clothing is embroidered or plain, one must retain the Image's holiness. Others exaggerate the image by putting unnecessary accessories which seem to alleviate the holiness of the image.)

Appropriate na alahas. Kasi usually may mga iba na talagang yung mga dangling, talagang mahahaba, ang dami dito may nasa leeg, may nasa tainga, may singsing, may bracelet, talagang parang tunay na tao. Pero ano dapat eh, sa perspective ko, dapat hikaw lang, kasi the focus is the face ng Imahe, kasi paano nga naman mapapapnsin kung marami masyadong mga burloloy 'yun? (Appropriate jewelry. Usually, others put dangling and long accessories whether it is on the neck or ear, has a ring, bracelet, as if it's a real person. But for me, earrings suffice because the focus is the image's face. How can you notice the face of the image if it has so many accessories?)

Kasi may kanya-kanya tayong expression ng art eh. May kanya-kanya tayong gusto. Ako, gusto ko ay simple lang. Ayoko ng may kapa, ayoko ng masyadong maburloloy. Sa gayak naman ng karo, ayoko ng sobra. Para sa akin, mas kaiga-igaya siguro sa mga Imahe kung makikita natin silang simple kasi namuhay silang simple. (We have different expressions of art. We have different wants. I want it simple. I don't like capes and unnecessary accessories. In terms of carroza design, I don't like putting too much on the carroza. For me, it's better for the images if we will see them as simple, since they lived a simple life.)

The above-quoted sentiments speak of the maxim of

"simplicity is beauty" – one wherein the sanctity of the saint represented in the that the new, more extravagant, manners of presentation that are called *playtime* are in contrast to the tradition of pagsasanto. One member santero posted in the online community:

> *Tama naman na sa kasalukuyang panahon, wala tayong mababasa na naka-detalye ng bawal na ganito or ganiyan sa mga Santa for the simple reason na ang basic rule is you dress them according to their role or station. We call that common sense and propriety and decency.* (It's right that in the current times, we don't have rules on how to design your saint for the simple reason is the basic rule that you dress them according to their role in Jesus' life.)
>
> *Tingnan ninyo ang mga lumang retrato, 'noong mga panahon na iilan ang nakapag-aral o noong wala pang internet or Google, alam mo kaagad ang pagkakaiba ng Virgen sa isang Santa. Mula sa tindig, sa bihis, sa mga gamit, maging sa gayak ng karo, etc. because ang lahat ng mga Camarera sumusunod sa unwritten custom handed down through the centuries. Ngayon lang nagkalabu-labo ang "rules" kasi naging avenue for creativity or talent o "pasabog" ang paglabas ng mga imahen.*" (Look at old photos during the time when only a few had education or when there was no internet nor Google. You can really differentiate the difference between the Virgin and another female saint – from their posture, vestments, accessories, carroza design, etc. because Camareras really follow the unwritten custom handed down through the centuries. It is only today where we don't have an established rule because processions became avenues for creativity or talent, or "pasabog.")

The above-quoted sentiments were supported by several others who made claims that the tradition on how to properly present the Imahes should be respected and preserved. It appears that despite the fact that Santeros would tend to treat the Imahes as Barbie dolls which acted as venues of their free expression of their

creativity, the normative expectations on how to treat the divine and their worldly representations was still enforced in the Santero community. Deviation from these norms of how to present the saints were met with disapproval by many members of the Santero community, and many of the older Santeros dismissed this tendency for a *playtime* approach to presentation as a product of undesirable youthful competitiveness that was ignorant of the essence of pagsasantero. In spite of this collective efforts by the community to establish norms on the presentation of Imahes and social control mechanisms to enforce these norms (e.g. online praises and social ridicule), we were able to observe that there are incidences of backlashes to these critiques. While some santeros accept the criticisms posted against them and respond with a message of gratitude and a pledge to rectify the supposed mistakes in presentation, not all santeros whose Imahes were posted in the online community and branded as deviant remain silent; some responded to defend themselves from the attempts at social ridicule. As we observed the interactions that emanated from these situations, we were able to note two kinds of reasoning that are used by those who were subjected to ridicule.

a. *There is no right to critique because there is nothing wrong with the presentation of the imahe.* Some santeros claim that the social ridicule is unfounded because there is nothing inherently wrong in the manner by which the Imahe is presented. Such sentiments also point out that the objective of the online community is to correct wrongs, but that this is being corrupted and abused by those who wish to attack the character and work of other santeros. A sample of this sentiment obtained from the interactions in the online community is provided below:

Ano kaya ang mali sa gayak? Wala naman akong nakikitang mali? Ang nakikita ko lang ang mga mapanghusgang nilalang na kung makapang lait eh akala mo ubod ng linis at walang bahid ang pagkatao at siguradong makakarating sa langit dahil ubod ng mga banal." (What's wrong with the design? I

don't see anything wrong. I only see judgmental humans as if they are free of sins and will be able to reach heaven due to their holiness.*)*

b. There is no right to critique because there are different standards among parishes on the presentation of imahes. Some santeros who had become the object of social ridicule had also pointed out the narrow-mindedness of fellow santeros who criticized their manner of presentation for the Imahes. According to these santeros, what the critics failed to realize was that there were differences among parishes when it came to traditions on how to present the Imahes. This sentiment was adequately captured by the response of one santero in the online community quoted below:

*Respeto lang hindi puro kuda makasalanan din naman! Pumunta kayo sa parokya namin dun kayo mag reklamo hindi yang pinagpipyestahan 'nyong mga bakla kayo. Kausapin niyo ang kura. Doon niyo ilabas ang tapang nyo hindi dito. Mas nakaka-offend ang ginagawa nyong pagkritiko. Pumunta kayo sa parokya dun niyo ipaabot ang saloobin niyo hindi dito kayo kuda ng kuda. Idepensa nyo yang mga nalalaman niyo. Humarap kayo sa PPC meeting sa parokya. (*Just respect and don't be a hypocrite. Go to our parish and tell your complains there instead of making ridicules. Talk to the parish head and show your confidence there and not here. Your form of criticism is offensive. Go to the parish and express your sentiments there. Defend your thoughts especially during PPC meetings.)

Discussion

How can we make sense of all of these findings about the Gay Santero Community? In a 2014 publication by the United States Development Programme (UNDP) and the United States Agency for International Development (USAID) entitled, *Being*

LGBT in Asia: The Philippines Country Report, it was observed through research, consultation, and the National LGBT Community Dialogue that the lived experiences of LGBTs in the country are still marred by challenges related to prejudice and discrimination. This is despite survey results which indicate that the Philippines has high acceptance of homosexuality (Pew Research Center, 2013). Claims by local LGBTs captured this dissonance aptly – they are "tolerated, but not accepted" (Magsambol, 2019).

The aforesaid experience suggests that LGBT life in the Philippines is one where gays actively manage a deviant identity in their struggle to integrate themselves in society. Conversely, the greater Philippine society, while not being completely accepting of LGBTS, accommodates or "tolerates" the LGBTs. In the extant literature of the Sociology of Deviance, it is said that when society encounters a deviation, it tends to adopt one of following strategies: (1) optimize, (2) neutralize, (3) normalize, or (4) pessimize. Rubington and Weinberg (1969) explains these four strategies succinctly in this manner:

> To optimize is to hope that the deviance will pass away, that the problematic behavior is no more than a transitory episode. To neutralize is to accommodate to the deviance in a way that obscures it. To normalize is to regard deviance as but a special case of normal behavior. And finally, to pessimize is to accept the worst – thus the deviance may be defined as basically irreversible. (p. 30)

We argue that Philippine society accommodates gays by obscuring homosexuality – a neutralization strategy. This obscuration of homosexuality in the Philippines is manifested by giving gays "niche roles" in everyday life. The most iconic, perhaps, of these niche roles is the local parlor or salon and comedy bars where openly-gay men abound. Beside these elements of everyday life, certain events or occasions done at least once a year have also been created for openly-gay men. An example of these events are the various Ms. Gay pageants held in various localities, oftentimes during town fiestas. The existence of these social spaces is often

taken as proof of the acceptance afforded to gays in the Philippines. An argument can be made, however, that these social spaces are anything but indicators of acceptance.

First, the very existence of these niches can be taken as proof that there is a line that divides gays and the greater Filipino society. Second, the prevalence of a heteronormative patriarchal culture is still very evident in the treatment of gays in these niche roles. Gays in parlors/salons are often made the subject of jokes such as, "*basta macho at gwapo, libre!*" or how it is easy to convince gays to give their service for free as long as the male customer is good-looking or physically fit. In the same vein, gay pageants are often received with deprecating laughter and ridicule. In fact, in the town fiestas where gay pageants are often featured, it has also been traditional for men to cross-dress – though not as a form of recognition for other genders, but as another manifestation of deprecatory humor. Despite all these criticisms of these niche roles and their inefficacy as indicators of acceptance, it remains true that these niche roles provide gay Filipinos with more freedom to express themselves than in other social spaces.

We propose that the same attitude of "tolerance through neutralization, but none of acceptance" can be said of Pagsasanto especially during the Lenten Week where the Lenten religious processions of Imahes take center-stage. In his study of bathhouses in the Philippines, Evangelista (2014) described bathhouses in the following manner:

> …bathhouses are spaces where gay identities are both liberated from and shaped by the dominant heteronormative discourse. Bathhouses can create fortresses against dominant heterosexual practices by providing stealthy spaces where heterosexual discourses are reconfigured to fit homosexual practices.

In the practice of *Pagsasanto*, Filipino gays are accommodated by allowing them to project their creative spirit in an activity that is deemed to be socially acceptable. In the context of the Lenten season and *Santeros*, men dressing up large "dolls" is a praise-worthy

devotion rather than a violation of gender norms. In this sense, the devotion of pagsasanto, despite being a practice of a heteronormative religious idea system, becomes a safe space.

The safe space of *Pagsasanto* is indeed a "fortress" - a niche space where gays are tolerated but they are unlikely to find similar accommodations or tolerance in many other spaces of Philippine society. This isolated space, being one of the few spaces where they can thrive, breeds competition. This fortress-esque nature of *pagsasanto,* therefore, is the reason why it is safe and supportive on one hand, and toxic and competitive on the other.

It was also salient in the study that *pagsasanto* - especially the act of dressing up the Imahes like dolls - is used as an opportunity for creative self-expression by gay santeros. In spite of this, it is the very same gay santero community that actively monitors its ranks and chastises what they perceive as undesirable or unacceptable presentations of the Imahe. What is very noteworthy about this situation is that what is considered undesirable by the santero community are methods of presentation that are considered as "too homosexual" or "*binakla*." We argue that this aversion towards methods of Imahe presentation that are considered as "binakla" is likely because of the recognition among gay santeros that the aforesaid devotion is originally a heterosexual activity that has been – to use the term of other scholars – "colonized" or "reterritorialized" by homosexuals with the accommodation of the greater heterosexual community. Once again, this accommodation – one that is characterized by tolerance but not acceptance – requires from the gay santero community to tread carefully and toe the line. Gay self-expression is only tolerated as long as the presentations of the Imahes are still within the bounds deemed acceptable by the Catholic community. To go beyond those bounds is to make it harder for the larger community to obscure the deviance of the gay santeros and see the "sin" beyond the "devotion." It is for this reason that the gay santero community actively polices its ranks. In doing so, they internalize, and perhaps even become more loyal believers of, the standards of the greater Catholic, heteronormative community. Indeed, this is perhaps captured by the fact that the term "*Bakla*" is used both as the label for a part of their identity but also as the label

to capture attitudes and behaviors that they find undesirable. This presents a scenario wherein the prejudicial sentiment of the heteronormative majority is also subscribed to and internalized by the object of the prejudice – the Bakla themselves.

Notes

The description of Esculturas PH (Esculturas Religiosas en las Filipinas) states that it is "an advocacy group that highlights the essence of religious images and church traditions. It is composed of Camareros or stewards of holy images; Santo enthusiasts; and advocates of church traditions. The group was founded by Christian Layug on December 29, 2007 originally on Flickr then it was transferred to Facebook Groups on July 27, 2013." Its rationale is as follows:

1. One of the leading proponents in promoting the essence of holy images in the Church. It also advocates proper veneration and presentation. 2. A defender of church traditions to emphasize the maintenance and keepsake of a piety that nurtures devotion and faith. 3. Inspire people to be witnesses of Christ and to live in the word of God." Meanwhile, its core values are: "1. Caritas - Helping People in Need 2. Pietas - Sincere Devotion and of Being Religious 3. Fraternitas - Comradeship Within the Group"

The description of the Facebook group Ang Chaka! Kabugera! reads: "Dito ninyo masasaksihan ang mga kapangitan at ka chakahan ng mga camarero ng mga poon. Mga binakla, pinaglaruan, binaboy na banal na imahe bawal dito ang oei mg react at banal banalan. Pangising sa matitigas na ulo at mapaglarong mga bakla."

The group Anyare?! has the following as group description: ""BATO BATO SA LANGIT... ANG TAMAAN, HUWAG MAGAGALIT... ANG PIKON AY LAGING TALO... ITINATAMA LANG PO NAMIN KAYO.... Let this be our guide: DIRECTORY ON POPULAR PIETY AND THE LITURGY: PRINCIPLES AND GUIDELINES""

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NOTES SECTION

Translation, Code Switching, and Code Mixing in the Bilingual or Multilingual Classroom

Juliet V. Padernal

I went there bayâ, but you were not there man, so I went home na lang.
(Kolehiyala English: Commonly overheard among college students, usually female)

Introduction

To explore the use of translation, code-switching, and codemixing in the bilingual/multilingual ESL classroom is the primary aim of this paper. Specifically, it will explore how translation, code switching, and/or code mixing contribute to not only comprehension of L2 text but also to the development of learners' understanding of and participation in both L1 and L2 knowledge systems. Furthermore, this paper suggests that these processes of understanding and participation are manifested in the bilingual's creativity relating to contact literatures.

Translation, Code Switching, Code Mixing: Some Definitions and Descriptions

Briefly these concepts will be defined or described to situate the succeeding discussion. David Crystal (1998) states that translation is "the neutral term used for all tasks where the meaning of expressions in one language—the source language (SL)—is turned into the meaning of another, the target language (TL), whether the medium is spoken, written, or signed."

Faltis (1996) observed that much of the literature distinguishes translation from interpretation: the former referring to written text, the latter to spoken language. However, he noted that in ESL classrooms, translation typically refers to saying something in English (L2) and then repeating it in the learners' mother tongue (L1), keeping the meaning intact as much as possible. Here lies the necessary distinction between translation taught as a vocational skill

and L1 use in the language teaching-learning situation, given the TESOL nature of this paper.

Not withstanding this simplistic distinction, BassnettMcGuire's (1980) claim—in the context of specific problems of literary translation—is worth noting that the argument that the translator merely translates and not interpret is a foolish one:

> It is . . . foolish to argue that the task of the translator is only to translate and not to interpret. The interlingual translation is bound to reflect the translator's creative interpretation (italics mine) of the SL [source language] text. Moreover, the degree to which the translator reproduces the form, metre, rhythm, tone, register, etc. of the SL text will be as much determined by the TL [target language] system as by the SL system and will also depend on the function of the translation. (p. 80)

On the other hand, Bassnett-McGuire (1980) also emphasized that the central issue in any type of translation is the function of the text to be translated (p. 132)—whether it is literary or non-literary, fiction or non-fiction. In other words, both function of the translation and function of the text to be translated need equal attention. Therefore, considering these points that BassnettMcGuire has made, we can say that when the classroom teacher and/ or the learners attempt to translate, they are actually interpreting as well. The teacher employs his/her knowledge and skill in both the learners' L1 and the target language, which, in the ESL classroom context, is often the source language that is translated. The learners likewise use their interlanguage or learner language knowledge and skills for the same purpose.

In fact, along with the other four basic skills (listening, speaking, reading, writing), translation is sometimes referred to as the fifth language skill. According to Ross (2000) translation is especially important at an intermediate and advanced level: in the advanced or final stage of language teaching, "translation from L1 to L2 and L2 to L1 is recognized as the fifth skill and the most important social skill since it promotes communication and understanding between strangers" (p. 63).

Furthermore, the translator's (i.e., teacher's or learner's) 'creative interpretation' of the SL text reflected in the interlingual can be considered part of the bilingual's 'code repertoire'— alternately 'linguistic repertoire' or 'verbal repertoire' or 'communicative repertoire'—referring to the "total range of codes" available to members of a speech community or to bilinguals including their vernacular (or L1) for their linguistic interaction (Kachru, 1990, p. 57, p. 58).

In the chapter on "English in the Bilingual's Code Repertoire," Kachru (1990) described and illustrated the distinctions between code-switching and code-mixing. Of the total code repertoire, code-switching and code-mixing are two types of code alterations bilinguals are apt to make. "In switching, . . . the units from another code are essentially sentences which are preserved with a clear function in the discourse . . . indicating the bilingual's facility with several codes, and their use in appropriate contexts with relation to the participants, setting, and for specific effect . . ." (p. 63). On the other hand, code-mixing "entails transfer of the [linguistic] units of code a into code b at intersentential and intrasentential levels, and thus '. . . developing a new restricted code—or not-so restricted—code of linguistic interaction (p. 64). Expanding this definition, Kachru briefly explained the linguistic situation:

> . . . It seems that a user of such a code functions . . . in a disystem. The resultant code . . . has formal cohesion and functional expectancy with reference to a context.

In such a situation there is an 'absorbing' code and an 'absorbed' code. The absorbed code is assimilated in the system of the 'absorbing' code. There is rarely a situation in which the user of such a mixed code cannot identify the 'absorbing' and 'absorbed' codes. The transferred units may be morphemes, words, phrases, clauses, sentences, and what are traditionally called 'idioms' (p. 64). Moreover, Kachru emphasizes that the interlocutors in a speech event in which code-switching occurs need not have common code repertoires: the code-switcher may be bilingual and the listener a monolingual. Furthermore, code-switching is usually used as a bond

of identity or as an aside to explain or to establish communicative 'intimacy.' In code-mixing, however, the interlocutors share both the codes and the attitudinal reactions to these codes.

Given Kachru's definitions and descriptions, it would seem the Philippines, code-mixing is used more frequently and largely than code-switching whether in academic or non-academic environment. A very typical example of this observation is the following utterance labeled "kolehiyala English"—which approximately means English used by college girls:

I went there bayâ but you were not there man so I went home na lang.

The Cebuano pragmatic fillers bayâ, man, and na lang are inserted in strategic places in the English sentence—I went there, but you were not there, so I went home—resulting in an utterance that is formally cohesive and functionally expected in the context implied, indicating as well that the speaker is functioning in a disystem, that of Cebuano and that of English.

Furthermore, in the Philippines the term code-switching seems to be used more commonly than the term code-mixing to encompass both switching and mixing. This is seen, for example, in titles of studies such as the one by Chona Quiteves in Silliman University and another by Borlongan in Dela Salle University. In this synthesis paper, however, Kachru's distinctions of the terms as well as the way code-switching is used in the Philippines are considered. Before proceeding, this question must be asked: Why do students use their mother tongue in class? According to Harmer (2001, in Kavaliauskien, 2009), a principal cause of this L1 use is provoked by the activity, i.e., if students are linguistically incapable of activating vocabulary for a chosen task. Another reason is that translation is a natural thing to do in learning a language, and code-switching between L1 and L2 is regarded as naturally developmental. There are other reasons, which are beneficial, to be presented and discussed below.

Code-switching, Code-Mixing, Translation: A Bilingual Learner's Language Learning Tools

I posit that code-switching, code-mixing, and translation are a bilingual's language learning tools that can be employed to comprehend and use the target language, and to understand and participate in both L1 and L2 knowledge systems. I have observed that in the process of language reception and production, bilinguals translate, and when they do, they usually code-swtich or code mix. Additionaly, when billinguals code-switch or code-mix, they also actually traslate to a large extent. For example: to translate the clause—"when bilinguals translate, they usually use code-switching and/or -mixing"—I might say

> *Ug magtranslate ang mga bilinguals, kalagmitan mogamit sila ug code-switching o di ba code-mixing.*

This way of translating to show comprehension is more common and natural than the all-Bisaya translation which entails a much longer translation sentence that does not sound natural in the context of every-day speech such as

> *Ug maghubad ngadto sa laing pinulongan o sinultihan ang mga tawo nga kahibalo ug duha o tulo ka pinulongan, pwede nilang sagul-sagulon ang duha ka pinulongan sa paghimo niini.*

Crystal (1998) stated that translators should work to ensure a result that sounds as natural as possible. So, while code-switching and/or code-mixing is different from translation, translation may employ some code-switching and/or -mixing in the process to create a more natural result.

Conversely, when bilingual speakers code-switch or codemix as a result of code contact or convergence (Kachru, 1990, p. 73), some of the resulting utterances may have some elements of translation. Let us examine a few examples of code-switching data lifted from Borlongan's (2009) study, "Tagalog-English Code Switching in

English Language Classes: Frequency and Forms."

Box 1

Original utterance	Closest translation
1. Make it fast! Bilisan mo!	Make it fast! You make it fast!
2. Why is this with correction already? We haven't checked. Ba't may mga check na to? Hindi pa tayo nagtse-scheck eh.	Why is this with correction already? We haven't checked. Why does this already have corrections? We haven't checked [it].

In the first example, Bilisan mo! is actually a possible translation of **Make it fast!** Similarly, the second example Ba't may mga check na to? Hindi pa tayo nagtse-scheck eh. is a possible translation of **Why is this with correction already? We haven't checked.** Noticeably the word check inserted in Ba't may mga check na to? is a code mixed vocabulary item which serves as possible translation equivalent of the word correction. In the second clause, **check** is assimilated into the L1 by accommodating it into the L1 structure in the code-mixed utterance, *Hindi pa tayo nagtse-scheck eh.* In the L1 morphological structure (in this case Tagalog), nag- is a verb prefix, *–tse-* is an infix (of the mixed base *nagcheck*; also a partial reduplication of the syllable onset in the word check), and s- in *scheck* is a phonological item of accommodation from the L1 attached to the syllable onset of check—these elements make up the assimilation and accommodation processes involved in code-mixing which expresses a present perfect meaning in the English translation, **We haven't checked.** The present perfect meaning is further conveyed by the pragmatic element, eh.

The second clause also illustrates the first point that when translating, code-switching and/or -mixing is actually employed.

Using Poplack and Sankoff's (1988, as cited in Borlongan, 2009) typology, Borlongan categorized this type of code-switching as smooth switches in the form of repetitions. In Poplack and Sankoff's definition, smooth code-switches involve 'changing the language of the sentence only at syntactic boundaries which occur in both languages' (as cited in Borlongan, 2009, p. 34). Switches of this type include switches between a main clause and a noun clause, an adverbial clause, a relative clause, and coordinate clauses, switches to

a prepositional phrase in the other language, and switches between a verb (in the L1) and an English subject. The preceding examples are by Crystal's (1998) definition, the preceding examples look more like categorized as smooth code-switches.

However, by Kachru's definition of code-switching, the preceding examples cannot be strictly described as such because they do not convey a distinct discourse function, and there is no clear indication that the switch is an aside for explaining or for establishing communicative intimacy, or as a bond of identity. In fact translations.

In the Philippines, as well as in other ESL and EFL contexts, there seems to be a prevailing negative attitude toward the use of L1 ESL classrooms, whether in the form of translation, codeswitching, or code-mixing to negotiate meaning (i.e., interpreting and expressing) particularly in the tertiary level. Learners are discouraged from using their first language in group and pair work activities. A range of practical reasons for avoiding the use of the first language in the classroom has been proposed: "Teachers wish to encourage the use of the second language and want learners to begin to think in the second language, and not to rely on their first language. This presupposes the idea . . . that if the first language is not actively encouraged in the classroom it will not be used at all" (Wigglesworth, 2005, p. 3). In other words, teachers want classroom activities to maximize learners' use of the target language in order to enhance learners' opportunities for interaction in their second language and to encourage learning of the target language. In reality, however, this is quite unlikely and, as commonly observed, the learners often use their first language actively to help other learners in their classroom (e.g., the case of Korean or Persian learners helping each other using their own language in English Orientation class in Silliman University). It is quite likely that allowing, or even enabling, some limited use of the first language in the classroom may mean that its use becomes "overt rather than covert," according to Weschler (1997, as cited in Wigglesworth, 2005).

Therefore, teachers need to acknowledge and accept students' use of L1 as a learning tool because whatever teachers say or do there is no doubt students will use their vernacular, as Kachru (1990)

referred to the L1. Mehta (2010) recognized this fact stating that majority of students, even though their reading and listening comprehension levels are well advanced, keep on mentally translating from L2 into L1 and vice versa. Teachers should be conscious of the positive significance of L1 use in the classroom even as they should also be wary of the possible reliance on L1 that may result if L1 use in the classroom is not properly monitored or supervised.

Indeed, according to Borlongan (2009), more progressive ideas as regards the use of code-switching in Philippine education have recently been espoused by some scholars and educators, more prominently by Professor Allan B. I. Bernardo of De La Salle University and Dr. Isabel Pefianco Martin of the Ateneo de Manila University. Bernardo (as cited in Borlongan, 2009) proposed:

> 'codeswitching [encompassing code-mixing] can be a legitimate and potent resource for learning and teaching for bilingual students students and teachers, and that we should relax our language prescription in formal school environments to allow students and teachers to benefit from the use of this efficacious resource of developing knowledge and understanding.' (p. 163)

Pefianco-Martin (2006a; 2006b as cited in Borlongan, 2009) provided empirical support for Bernardo's (2005) proposal through an examination of tertiary-level classroom discourse. She audio- and video-taped two classes of first year general education science in two private, non-sectarian universities in Manila. The analysis of classroom discourse transcriptions revealed that code-switching does not hinder facilitating learning in Science and achieving proficiency in English. In fact, Pefianco-Martin's data suggested that codeswitching is useful in teaching and learning, as it motivates student response and action, ensures rapport and solidarity, promotes shared meaning, checks student understanding, and maintains teacher narrative.

More Benefits of Using L1 in the ESL Classroom

In the past two decades, the monolingual approach (English only policy) has been questioned and re-examined, in consideration of the fact that it is more based on political grounds than on methodological ones (see Kachru, 1990; Auerbach, 1993; Cole, 1998; Lucas & Katz, 1994; Murray & Wigglesworth, 2005). Since then, there has been a movement to promote the use of the mother tongue (L1) in the language classroom. Scholars have expressed several justifications for its use in the language classroom of adult EFL/ESL learners.

Firstly, the mother tongue is the learners' linguistic schemata (Manara, 2007). The mother tongue is a resource from which learners draw their existing knowledge and through which they perceive the new language. L2 learners refer to their knowledge of L1 in order to help them learn the L2. Their L1 is the resource in understanding the target language. Auerbach (1993) asserted that students' linguistic resources can be beneficial for learners at all levels of proficiency. She emphasized that allowing the use of the L1 in early second language acquisition facilitates the transition to to English. Nation (2001) also supported this argument concerning L2 vocabulary acquisition through translation to be a very effective strategy for speeding up vocabulary growth.

Secondly, L1 use is a preferred learning strategy. Atkinson (1987, p. 42) stated that the mother tongue use in the form of translation technique is a preferred learning strategy for most learners. This idea had been expressed earlier by Danchev (1982, as cited in Harbord, 1992) who stated that "translation is a natural phenomenon and an inevitable part of second language acquisition even where no formal classroom learning occurs" (p. 351). Hence, the learners' activity of correlating any L2 structure or lexical item with the ones in their L1 is unavoidable. They will spontaneously do this activity with or without the teachers' permission, such as what is highly noticeable in a group work.

Thirdly, L1 can be used as a tool for thought. Vygotsky (1986) in his book *Thought and Language* (as translated) asserted that thought and language (originally "speech") are inter-functionally

related; therefore, the mother tongue would quite naturally serve as a tool to help students think about and make sense of (i.e., mediate their thinking about) the structures, content and meaning of the target language texts they read. Upton and Lee-Thompson's (2001) study found that L1 use to mediate L2 reading comprehension is not only a reading strategy (i.e., translation as a strategy) but also a tool for creating a cognitive space in which the readers can facilitate their own understanding of the text. Anton and DiCamilla (1998) pointed out that collaborative learning using the L1, as seen from the perspective of individual and social constructivism, enables the learners to complete the meaning-based language tasks assigned to them by performing three important functions: construction of scaffolded help, establishment of intersubjectivity (students'attempt to mutually define various elements of their task), and use of inner speech. They stated that "language is the principal semiotic system that mediates our thinking, both within individuals and between individuals" (p. 18). Swain and Lapkin (2000, as cited in Wigglesworth, 2005), investigating the role of the first language in the task-based interactions of second language learners in immersion classrooms, found that while approximately 25 percent of the language learners used to conduct the task was in their first language, only about 12 per cent of these occurrences were off task. As such, it can be surmised that learners were using their first language in positive ways that were helpful in their second language learning, providing them with a tool which allows them to

> make sense of the requirements and content of the task; to focus attention on language form, vocabulary use, and overall organization; and to establish the tone and nature of the collaboration. … Judicious use of the L1 can indeed support L2 learning and use. To insist that no use be made of the L1 in carrying out tasks that are both linguistically and cognitively complex is to deny the use of an important cognitive tool. (p. 7)

Therefore, banning the use of L1 in the classrooms removes two important and powerful tools for learning, i.e., the L1 as a tool

to mediate the learners' thinking about a subject and to facilitate effective collaboration among the learners.

Furthermore, the weblog devoted to some plenary sessions of the IATEFL Conference in Aberdeen on April 18-20, 2007, has summarized the major ideas presented by a well-known British linguist, G. Cook (Cook, 2007 online):

> . . . English teachers tend to take a monolingual approach thus neglecting the importance of translation in the process of teaching English. The ESL classroom cannot follow the motto 'One nation, one people, one language,' a somewhat overrated statement since it implies that a classroom is a state. Quite contrary to that, the L1, i.e., the mother tongue of the students, should by all means be acknowledged. The importance is highlighted even more by the fact that the students' culture is part of their language and by neglecting their language, the teacher, in a monolingual classroom, neglectstheir culture which leads to the danger of neglecting their identity as well. What is more, there is no valid database that could confirm the standpoint that the monolingual approach in teaching is the best one. The disregard of the students' mother tongue can in fact de-motivate the students and be counterproductive. Therefore, there is neither a scientific nor a pedagogic reason to exclude L1 from the teaching process. There are probably more reasons, utilitarian and political, to make the use of L1 quite valuable in the process of teaching English.The former reason implies that the students would be motivated to think more about appropriate equivalents in their own languages and the latter one, of course, emphasizes the importance of cultural diversities and tolerance among nations.

In other words, as Mattioli (2004) opined, "rigidly eliminating or limiting the native language does not appear to guarantee better acquisition, nor does it foster the humanistic approach that recognizes learners' identities" (p. 24).

As teaching-learning tools, translation, code-switching, and code-mixing need to take into account a number of different aspects,

such as grammar, syntax, collocation and connotation. Uncritical use of these tools may give learners insufficient, confusing, or even inaccurate information about the target language. It becomes really useful in English classes if these are exploited in comparing grammar, vocabulary, word order, and other language points in English (L2) and the student's mother tongue (L1). According to Ross (2000), if students are aware of the differences, language interference (i.e., negative transfer) and intervention from their own language are likely to be reduced.

I will use a very common and simple verse to illustrate this point. Boxes 2 and 3 below show a few linguistic differences between Bisaya (Cebuano: Negrense, the L1) and English, the L2, in the song "I Have Two Hands."

Box 2

English and Bisaya versions of the song "I have two hands" (as sung in my speech community)

English Version	Bisaya/Cebuano (Negrense) Version
I have two hands, the left and the right	May duha ko ka kamot, wala og tuo
Hold them up high, so clean and bright	I-isa's taas, limpyo kaayo
Clap them softly, one, two, three	Ipak-pak, usa, duha, tulo
Clean little hands are good to see	Limpyo'ng kamot tan-awa ninyo

In Box 2, the following items can be observed, among others:
Line 1: 1) the difference in word order between L1 (Bisaya: v-s-o) and L2 (English: s-v-o); 2) the collocation of a number word (e.g., *usa, duha, tulo*, etc.) and the particle ka followed by a noun word (e.g., *tawo, lugar, butang*) as in *duha ka kamot* (other examples: *usa ka kamot; tulo ka buok; upat ka adlaw*).
Line 2: 1) the word order of adj-adv intensifier in L1 (*limpyo ayo*) vs. adv intensifier-adj order in L2 (so clean and bright).
Lines 3 and 4: 1) the absence of sila, the Bisaya equivalent of the objective case pronoun them (referring to hands) as complement of the verbs hold and clap, in the Bisaya version.

Line 4: 1) the absence of the Be Copula equivalent (e.g., are) in Bisaya.

Box 3

"I Have Two Hands" with literal Bisaya translation

Line 1	I	have	two	hands,	The	left	and	the	right
	Ako	*may/ aduna*	*duha*	*kamot*	*Ang*	*wala*	*og*	*ang*	*tuo*
2	Hold	them	up	high	so	clean	and	bright	
	Guniti	*sila*	*pataas*	*taas*	*Kaayo*	*limpyo*	*og*	*hayag*	
3	Clap	them	softly,	one	two	three			
	Ipal-akpak/ idapo	*sila*	*hinay-hinay*	*usa*	*duha*	*tulo*			
4	Clean	little	hands	are	good	to	see		
	Limpyo	*gagmay*	*kamot*	---	*Maayo*	*mo*	*tan-aw tan-awon*		

Box 3, on the other hand, shows that literal, word-for-word translation is not appropriate because it does not exemplify a natural utterance in Bisaya (It should be noted that the musical notes or the melody is also a factor in translating this piece, thus resulting in the Bisaya version presented above). Nevertheless, pointing out or highlighting relevant L1 and L2 differences is deemed to facilitate L2 learning and acquisition as this will raise students' consciousness of the non-parallel or non-equivalence nature of language , i.e., the L1 and the target language. This state of consciousness will likely

One important question is how much L1 use is enough or should be allowed for effective L2 teaching and learning? For instance, in the communicative approach to language teaching, there is provision for the "judicious use" of the L1. What is judicious use and how much L1 is judicious? Harmer (2001) suggested that four factors should be considered, namely: 1) the students' previous experience, 2) the students' level, 3) the stage of the course, and 4) the stage of the individual lesson. Harmer's suggestions imply that the teacher has to exercise his/her own judgment on the matter. For example, the teacher may use L1 to ensure that learners understand task directions or instructions. In a multilingual and multilevel class, the teacher

may conscript higher level students to translate for those who do not clearly understand directions given in the target language.

Translation, Code-switching, Code-mixing—and Culture in the Language Classroom

This exploratory paper will not be complete without a discussion of the use of L1 in the L2 classroom in relation to the cultural goal embedded in a language program. In this paper, I suggest or hypothesize that the bilingual speaker's creativity in relation to contact literatures is a manifestation of a learner's understanding of and participation in both L1 and L2 knowledge systems, which definitely include the context of culture. I would like to explore this thought and attempt to trace the connections between L1 use in the L2 classroom (i.e., translating, code-switching, code-mixing) and the bilingual's creativity.

Kachru (1990) underscored his point that a bilingual's creativity as a result of language convergence or code contact is not limited to literary texts; rather it applies to "all linguistic interactions in which multilinguals [identically used with bilinguals] participate" (pp. 169-170). In the Philippine context, this creativity is part of being a Filipino. To understand the bilingual's (or multilingual's) creativity, Kachru hypothesized on what is referred to as 'bilingual's grammar' referring to the "productive linguistic processes at different linguistic levels (including that of discourse and style) which a bilingual uses for various linguistic functions" (p. 164). Kachru explained that sociolinguistically speaking, this is the code repertoire of a given speech community with its range of languages/dialects formally and functionally determined, comprising a speech community member's linguistic competence. Such competence enables a bilingual to mix, switch—as well as translate—and adopt stylistic and discoursal strategies from the code repertoire available to him/her.

Further, these linguistic interactions, literary or non-literary, spoken or written, need to be understood. Kachru pointed out that to do so entails pulling down "barriers to intelligibility" at two levels minimally:

1) at the surface level of structural relationships which

provide culture-specific text-design or cohesion to the text, e.g., collocational, lexical, or grammatical, and
2) in the reinterpretation of a text within the extended (or altered) sociosemantic or pragmatic system. (p. 170)

Three aspects need to be considered in examining a bilingual's grammar or code repertoire:

- how the formal features blend;
- what assumptions are derived from various cultural norms; and
- how these norms blend into a new linguistic configuration with a culture-specific meaning system. (p. 164)

Based on these concepts, it can be deduced that code-switching, code-mixing, as well as translation—functional utterances, they may be called—are a part of a bilingual's creative use of language which is largely influenced by culture, language being an expression of culture. It is part of being Filipino: a Bisaya, an Ilonggo, or an Ilocano, or a Mindanawon, for example. Therefore, these functional utterances are significantly valuable not only as language learning tools but also as specimens for cultural study in the language classroom. The cultural and sub-cultural nuances of such utterances will emerge as teachers and students examine the blending of formal features phonologically, morphologically, syntactically, semantically, and even pragmatically. This exercise will also heighten students' awareness of the structural or formal differences between their mother tongue and the target language.

In this paper, I have attempted to show that translation, code-switching, and code-mixing— functional utterances, showing how English becomes part of a bilingual's repertoire, as language learning tools—can contribute not only to comprehension of L2 text but also to the development of learne+rs' understanding of and participation in both L1 and L2 knowledge systems, by presenting studies and benefits of L1 use in the L2 classroom. As well, drawing mainly from Kachru's ideas about a bilingual's creativity in relation to contact literatures, I have explored briefly the possible connection

between a bilingual's creativity and translation, code-switching, and code-mixing, suggesting that these are manifestations of a learner's understanding of and participation in both L1 and L2 knowledge systems.

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