

**PEOPLE'S KNOWLEDGE ON INVASIVE SPECIES:  
THE SPREAD OF BUYO-BUYO (*PIPER ADUNCUM*) IN MARILOG  
DISTRICT, DAVAO CITY, SOUTHERN PHILIPPINES**

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## ABSTRACT

This article focuses on the people's knowledge/perception of *Piper aduncum* (*buyo-buyo*), an invasive plant species, that continue to spread in Marilog District, Davao City, Southern Philippines. To capture this data, we utilized a descriptive research design through qualitative methods such as in-depth interviews, focus-group discussions, and field visits to areas which are heavily infested by *Piper aduncum*. Our findings reveal that participants' knowledge of *buyo-buyo* (*Piper aduncum*) comes from their grassroots accounts or personal exposure with *buyo-buyo*. Through constant interaction with *buyo-buyo*, majority of the respondents have observed the detrimental effects of *buyo-buyo* on their farms. But there is still a lack of relevant information regarding the management of invasive species in the area. There were also no control mechanisms on invasive alien plants species (IAPS) in the local communities. Overall, the findings reveal that there is a gap between the local and scientific knowledge on invasive species in general which plays a crucial implication on the biodiversity conservation. Therefore, this article pushes forward on facilitating public awareness in the district and cultivate active participation in the community to achieve a well-informed and sustained biodiversity conservation efforts.

**Keywords:** *Community Involvement, Control mechanisms, Flowering plant, social factors*



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## INTRODUCTION

In the global scale, invasive species are widely documented. According to Richardson & Pysek (2004), significant problems with invasive alien species (IAS) are viewed as somewhat pressing and recent phenomenon. However, these studies are saturated with documentation and exploration of its ill-effects to the natural ecology. And there is still sparse material in relation to management of IAS as well as the community's perceptions or understanding regarding invasive plants. As in the Philippine context, Pysek et al., 2008 contends that the management of invasive species still remains to be one of the most understudied particularly on stakeholder's knowledge or perception towards invasive species. It is for this reason that this study was conducted to investigate how the local community respond to invasive species.

What has led us to focus on this issue? While we were doing research on the socio-economic aspects of biodiversity conservation in Marilog district, we found out that invasive species like *Piper aduncum* or fondly known by the residents as *buyo-buyo* has been invading the mountain slopes of the Marilog District, Davao City. As part of conservation effort, it is vital to protect endemic species and manage invasive species so as not to compromise the natural ecosystem. Putting in context, we focus on the spread of *Piper aduncum* as one of the invasive alien species (IAS) that continue to create ecological problems to the Philippine Forest. We also explore the social factors or human dimensions of invasive species which can be helpful in the management process. Thus, this study was conducted in three barangays of Baganihan, Salumay and Marahan of Marilog District, Davao City, Philippines which have been observed to be infested by *Piper aduncum*.

But what is *Piper aduncum*? *Piper aduncum* or spiked pepper is considered as an invasive alien species (IAS) and is mostly found in Central and South American countries. In Asia and the Pacific, *Piper aduncum* occurs in Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Micronesia,

American Samoa, Niue, the Marianas, Tonga, Samoa, the Cook Islands, Palau and Hawaii (Hartemink, 2010). To describe, *Piper aduncum* is a shrub or small tree with alternate leaves and flowers and fruits arranged in a spike. Occasionally, it reaches 7 to 8 meters with small fruits. As to its spread activities, it mostly dispersed by the wind, fruit bats and birds, but also by movements of people, logging equipment and changing of landscapes.

The Convention on Biological Diversity defines invasive alien species (IAS) as those species that are non-endemic, not indigenous or alien to the natural ecosystem which can cause harms to the economic, environmental, and human health (CBD, 2004, 2002). Over the past few decades, a considerable magnitude of the IAS problem has increased. And only few control mechanisms are executed to combat these invasive species in different parts of the globe. This is because as Le Maitre, Versfeld and Chapman (2002) elaborate, the IAS control programs are justified after a cost-benefit analysis of their management. Thus, there is need to study appropriate measures in the implementation of control mechanisms to invasive species. Through this, a wider understanding of their costs and benefits can be both beneficial to people and environment.

For this article, following Kidake et.al (2015), we contend that key informants and stakeholders are also important sources of information and knowledge to better understand perceptions on the invasive plants and its costs and benefits. Similar to the study of Ekanayake et.al, (2020), we aim to provide sociological factors and in-depth understanding how management of invasive species is done through the community's knowledge and perception. Moreover, we situate the research problem to environmental justice framework that incorporates environmental issues into the broader intellectual and institutional framework of human rights and democratic accountability (Bowen and Haynes, 2000). Since it is anthropocentric in orientation, we argue that placing people's experiences at the center of a complex web of social, economic, political, and environmental relationships is key to understanding the

current conditions of the community which are or not affected directly by invasive alien species.

## REVIEW OF LITERATURE

In the last 50 years in most parts of the world, invasive alien species have caused problems to the natural ecology of a particular place. Their invasions are viewed as one of the largest threats to the global diversity, natural ecosystems of the earth and to the entire humanity's resources (Japitana & Macandog 2019; Kaiser, 1999; Glowka et al. 1994, 1995; Williamson, 1998; Parker et al. 1999). And if these invasive species continue to reproduce and spread and if not manage well, Van Wilgen & Van Wyk (1999) contend that this can cause detrimental effects on the growth of natural or native tree species which may further create management problems. In the same way that Glowka et al. (1994 & 1995) found that the biological invasions by non-indigenous species pose for an environmental dilemma affecting aquatic and terrestrial environments. Accordingly, invasive alien species are can pose risks or threats and negative impacts to the environmental, socio-economic as well as to forest biodiversity (Obiri, 2011).

As an illustration, the invasion by invasive shrubs has been cited as one of the major causes of range deterioration particularly in the case of Southern rangelands (Macharia, 2004). Similarly, in Kajiado County, an invasive species has become a problem as this affects the natural and established pastures. Invasive species has been perceived to be one of the most abhorrent or ravaging species (Lusigi et al., 1984). Overall, Hartemink (2010) stresses that invasive species interfere with environment as well as agricultural activities of the community. However, there are also contrasting findings that shed light on the perceived positive and negative benefits of IAS. One of which shows that IAS can promote the effective functioning of local social and ecological systems. For example, Pasiecznik et al. 2001 found that the invasive *Prosopis juliflora* is perceived to be one of the most valued tree species in the drylands of India for many reasons. One of the reasons point to the mundane

uses of the invasive species in the form of construction material. This also resonates with how our participants looked at the utilization of *Piper aduncum*. However, scientific studies still points to the negative effects of invasive alien species to the natural landscape or geographic locations (see Obiri, 2011; Hartemink, 2010).

Central to combatting these invasive alien species (IAS) delves on recognizing the human interaction as a vital step for the efficient control of invasive species (Oxley, 2014; Meyer & Fourdrigniez, 2017; Shrestha et al., 2019)". However, there are challenges that permeate in the management of IAS. The study of Mungatana and Ahimbisibwe (2010) indicates that the most challenging ways of managing biodiversity can be confronted with IAS threats. According to their findings, this can be solved using empirical data for proper and effective management of invasive alien species. Similar to their contention, we also put forward on the significance of both the ecological and local knowledge on controlling invasive species which must come from the perspectives of different stakeholders. This is significant because this leads to the necessary understanding of the invasive species as well as the anthropogenic impacts to the bio-cultural landscapes and natural ecosystems. Viewed this way, this pushes for a more advantageous and effective species management and conservation policy for IAS.

In the Philippines, it has been documented that within the past 400 years, many alien or invasive plant species have flourishingly permeated the natural environment. The human-altered ecology through deliberate and accidental introductions in the country seemed to be one of the causes for the invasive species dominance. Some exotic trees have been utilized for reforestation projects even pre-war periods. These are translated into projects such as the Projects of the Reforestation Administration used exotic or non-endemic species. Some of these projects can be found in Cebu, Cagayan de Oro, Ilocos Norte, Negros, and in Bukidnon province. These reforestation projects are well spread throughout the Philippine archipelago. One of the more visible trees plants is mahogany which can be found in national and local parks across the country. But because of the alarming or invasive impacts of these

species, the Department of Environment and Natural Resources (DENR) has forbidden the planting of exotic plant species in the country. They have observed that the rate or impact of bio-invasion of these nature reserves and parks may potentially harm the natural ecology. However, there is still no concrete policies created in relation to the control of the various bio-invasive activities (Joshi,2006).

So in 2013, the Biodiversity Management Bureau (BMB) of the Department of Environment and Natural Resources in the Philippines was set to implement a project that would address environmental problems brought about by invasive alien species. The Executive Director of BMB explains that invasive alien species or IAS can be both animals and plants that are deliberately or accidentally placed in environments where they are not naturally grown. They enumerated that some these alien species are golden snail (*kuhol*), giant tilapia, janitor fish, Gmelina, and spiked pepper (*buyo-buyo*). The BMB stresses that these invasive species are viewed as harmful and can bring socio-ecological changes in the community. Although there are awareness campaign programs conducted, only few people have access to this information. While interventions are in placed, challenges affect the concretizing of policy and mechanisms to eradicate invasive alien species in different parts of the country.

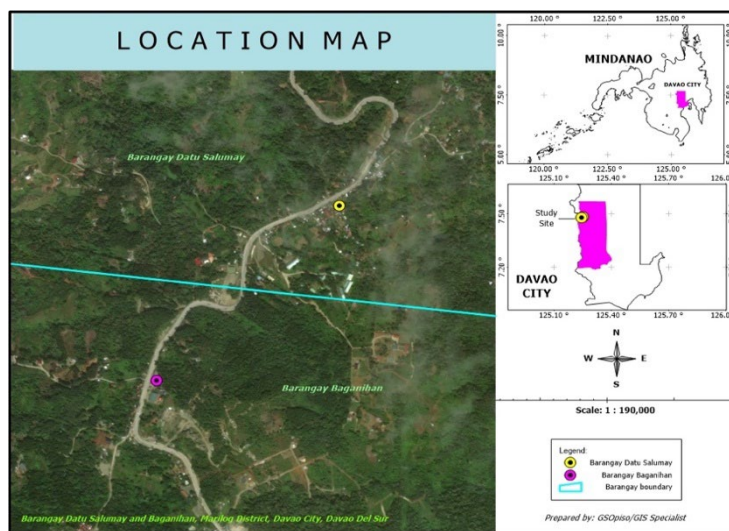
## **METHODOLOGY**

We conducted the study in Marilog District, Davao City, Philippines. With a total land area of 63, 800 hectares, Marilog district is situated between Davao City and Bukidnon. Surrounded by forest fragments that occupy a total area of 11,102 hectares with a cool and breezy ambience which is almost comparable to Baguio of Luzon, blessed with evenly distributed rainfall and it is virtually typhoon free area and protected by its mountainous borders with forests fragments and teeming with rich biodiversity (Davao City Comprehensive Land Use Plan, 2013; Amoroso et al., 2018). The varied topographic and climate features play significant part on indigenous cultures as well as the vegetation patterns of the area. Originally,

Manobo-Matigsalug indigenous cultural communities are the earliest inhabitants of the land which is considered to be an ancestral domain managed by the Federation of the Manobo-Matigsalug Tribal Council (FEMMATRICS) and the Manobo-Matigsalug Tribal Council of Davao City (MAMATRICEDI) (Celeste et al., 2020; see Amorso et al., 2018)

**Figure 1.**

*Map showing the research site of Marilog District, Davao City, Philippines (Prepared by Guiller Opiso- a GIS Specialist)*



This study utilized a descriptive research design through mixed methods of in-depth interviews, focus group discussions, and survey questionnaire. To do this, some officials of the selected local barangays and the Matigsalug-Manobo Tribal Council of Elders, Inc. (MAMATREPCEDI) were consulted. The three barangays were purposively selected because of the fast and enormous spread of the *Piper aduncum* within the areas. There were 45 respondents chosen through purposive sampling on the basis of their knowledge and direct exposure to areas infested by *buyo-buyo* (*Piper aduncum*). These are the farmers, flower and vegetable vendors and caretakers of mountain resorts (see Table 1).



**Table 1.***Socio-demographic of the Respondents*

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
15-25	4	8.89%
26-35	10	22.22%
36-45	5	11.11%
46-55	16	35.56%
56 and above	10	22.22%
<b>Sex</b>		
Male	20	44.44%
Female	25	55.56%
<b>Civil Status</b>		
Single	1	2.22%
Married	34	75.56%
Widowed	7	15.55%
Live-in	3	6.67%
<b>Occupation</b>		
Farmer	38	84.44%
Flower Vendor	1	2.22%
Caretaker	3	6.67%
Others	3	6.67%
<b>Monthly Income</b>		
₱1,000.00 - 3,000.00	17	37.78%
₱3,001.00 - 6,000.00	12	26.67%
₱6,001.00 - 10,000.00	5	11.11%
₱10,001.00 and above	5	11.11%
No data	6	13.33%

The data in Table 1 shows that some of the respondents are farmers who are in their mid-forties. They have a monthly income of ₱3,000.00 - 10,000.00 from their farming while others also engaged in menial jobs for extra income. They also work as caretakers and staff in the local barangays. To augment their income some of them

sell handicrafts. As to educational attainment, majority of the respondents have attended primary schooling while few obtained a secondary education level.

As a form of triangulation, the information obtained from key informants and the locals, focus group discussions (FGD) were also conducted in three barangays: Baganihan, Salumay and Marahan. Furthermore, community visits to some of the infested areas were done with guidance of the local community. The data was analyzed by looking at the emerging themes through thematic analysis. Since this only focuses on the knowledge or perception on invasive species among the locals of Marilog District, we have not provided the *Species Occurrence Points* (SOP) but we took photographs of the identified three areas infested by *Buyo-buyo* (*Piper aduncum*). After the data gathering, the results of the study were presented to the community for validation.

### **Research Ethics**

The research was conducted observing research ethics. The project was granted a Gratuitous Permit by the Department of Environment and Natural Resources, and a Memorandum of Agreement was signed between Central Mindanao University, Matigsalug-Manobo Tribal Council Incorporated and the Local Government Units (LGUs) of Datu Salumay, Baganihan, and Marahan Proper, Marilog District. A prior informed consent (PIC) and an Institutional Ethics Review Committee (IERC) from Central Mindanao University as clearance were sought before the conduct of the study.

## **RESULTS AND DISCUSSIONS**

This part is presented into three components: First, is the timeline and history of how buyo-buyo (*Piper aduncum*) spread in the area. Second, the paper discusses their knowledge or perception on the impacts of *Piper aduncum* as invasive alien species as well as the extent of its spread. Third, we also discuss possible approaches

or mechanisms in the elimination of an Invasive Alien Species (IAS) from the respondents experiences and knowledge.

### **Tracing the origin of Buyo-buyo (*Piper aduncum*) in Marilog District, Davao City**

**Figure 2.**

*Piper aduncum* or locally known as *Buyo-buyo*



As to the origin of the invasive spiked-pepper or *buyo-buyo* (*Piper aduncum*), there has been no sufficient material to support on how and why *buyo-buyo* (*piper aduncum*) spread in Marilog District. Most of the stories point to the “sudden appearance” of *Buyo-buyo* in the area. But rumors had it that the spraying of seeds from an airplane sometime in 1980-1990 in some parts of the mountain was observed. However, this has not been verified whether the spraying of seedlings contributed to the spread. But in this paper, we present our data into three key points: First, the spread of *buyo-buyo* may have started during the 1970s. It was reported that there was a pervasive concession of illegal logging in the different parts of Marilog Forest Reserve. The illegal activity had denuded some parts of the forest which eventually led to biodiversity loss (Amoroso, et al., 2020; Celeste, et al.,

2020). This had caused an alarming situation, our respondents stressed that the Marcos administration started the reforestation as a recovery program. One of the plant species in the reforestation included *buyo-buyo* (*Piper aduncum*). Second, the changing of landscapes caused by series of transformations have contributed to the spread of *buyo-buyo* in the place. In the process of transforming some of these lands into residentials and mountain resort using bulldozers and backhoe had also contributed to the spread of *buyo-buyo*. Third, the extent and spread of an invasive species are perceived to influenced by its exposure and tolerance to dry seasons such as in the case of Marilog Districky. Moreover, its ability to compete other existing plants and was also mentioned and noted by the respondents. Table 2 shows the timeline on the spread of *buyo-buyo* in the area.

**Table 2.**

*Timeline Regarding the Spread of Buyo-buyo in Marilog*

Year	Significant event
1970s	The spread of <i>Buyo-buyo</i> may have started through the reforestation program under Marcos regime.
1980s-1900s	Illegal logging, conversion of some areas into residential, and road construction led to the spread of <i>Buyo-buyo</i> .
Early 2000	Establishment of some mountain resorts using bulldozers and backhoe may have contributed to the spread of <i>Buyo-buyo</i> .
At present	The series of transformations have disturbed the natural landscapes which allowed <i>Buyo-buyo</i> to spread in a rapid rate.

Overall, the key points presented above shows that the introduction of potential invasive non-indigenous species is primarily influenced by environmental changes that permeates the widespread of invasive species as a consequence of capitalism and global economic activities foreshadowing the concept of development. Furthermore, the subsequent transformation of the areas into roads also used to traffic of goods causes the risks and possibilities of biodiversity loss (Levine et al.,

2003; Dogra et al., 2010) as in the case of Marilog District. Figures 2, 3, and 4 show the areas infested by *buyo-buyo*.

**Figure 3.**

*The spread of Piper aduncum in Barangay Baganihan, Marilog District*



### **Stakeholders' knowledge on Buyo-buyo (*Piper aduncum*)**

While it is true that there has no sufficient material regarding the origin of buyo-buyo in the area, our findings reveal that through constant interaction with the environment, most of our respondents all are familiar with the local name of *Piper aduncum*. They call it *buyo-buyo*- a Cebuano name for *Piper aduncum*. To verify this, the research team showed photo(s) of *Piper aduncum* and the respondents were quick to identify the plant species as *buyo-buyo*.

**Table 3.**

*Responses to questions regarding knowledge on Piper aduncum*

Knowledge on <i>Piper aduncum</i>	Percentage	
	Yes	No
Knowledge on the local name of <i>Piper aduncum</i> as <i>Buyo-buyo</i>	100%	0%
Knowledge on the origin of <i>Piper aduncum</i>	40%	60%
Knowledge on <i>Piper aduncum</i> as endemic or native species	37.78%	62.22%
Knowledge on the benefits of <i>Piper aduncum</i>	100%	0%
Knowledge on the negative effects of <i>Piper aduncum</i>	40%	60%

Table 3 shows the frequency counts on the familiarity and knowledge about *buyo-buyo*. As mentioned, majority of them knew its local name but only 40% of shows knowledge regarding the origin and the increasing spread of the invasive species. But 62.22% of them believed that *buyo-buyo* (*Piper aduncum*) is not endemic or indigenous plant in the area. Through the years of exposure on *Buyo-buyo* (*Piper aduncum*), some of our participants especially the farmers discovered that *Buyo-buyo* can pose detrimental effects to the soil and environment in general. In a focus group discussion, respondents lamented that when the concession ended leaving the mountains barren, they have observed that *buyo-buyo* (*Piper aduncum*) started to spread.

**Figure 4.**

*The spread of Piper aduncum in Barangay Marahan, Marilog District*



This draws parallelism to Hartemink's findings that respondents believed that human and animal activities are contributors to the wide spread and invasion of plants in new environments with particular reference to tropical environments (Hartemink, 2010). Thus, the spread of Invasive alien species (IASs) by human action implicates a significant negative impacts to the environment affecting the overall biodiversity values and ecosystem services (Jeschke *et al.* 2014; Russell & Blackburn 2017). This finding also resonated with Rai and Singh (2019) that these invasive alien plants species (IAPS) are one of the major causes of biodiversity loss. The overall ecological disturbances caused by species invasion have contributed to the immense threat to food security and environmental sustainability. However, they also put emphasis that various mechanisms can be applied to the altered ecosystem services and socio-economic conditions.

As some of the respondents recognized the ill-effects of *Buyo-buyo* to the soil and to their respective farms, through time, they have also come to observe that *Buyo-buyo* is invading and competing with other endemic plants or indigenous trees like *lawaan* in the area. In one of our focus group discussions, the respondents are



consensus that the infestation of *Buyo-buyo* affects the quality or richness of the soil which is not good for farming. This is because they have observed that *Buyo-buyo* (*Piper aduncum*) competes for nutrients and water from soil leading to its aggressive growth. Thus, the farmers of the Marilog District, perceived that *buyo-buyo* poses a serious detrimental effect to their overall farming and livelihood. This experience shares the same phenomenon with the rural people in Papua New Guinea emphasizing that the extent of invasion of *P. aduncum* has also affected the farming activities and livelihood system (Hartmemink, 2010).

**Figure 5.**

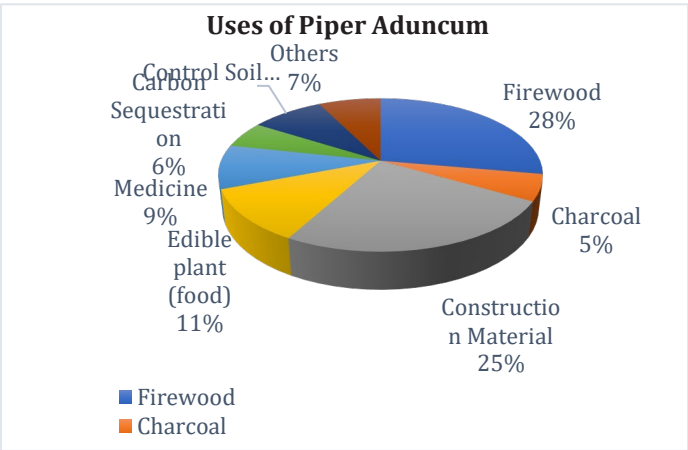
*The spread of Piper aduncum in Barangay Salumay, Marilog District*



Similar to the work of Dogra et al., (2010), through the experiences of our respondents, we contend that invasive species like buyo-buyo alter the natural biodiversity impact the overall productivity of the ecosystem. Bardsley and Edward-Jones (2006) also found that stakeholder's perception does not necessarily connote negative perceptions towards invasive species. In their findings, they discovered some locals that the branches of invasive species are utilized as firewood and construction materials for housing. This finding is also observed in Marilog District. Figure 6 shows the knowledge on the uses of buyo-buyo in their community.



**Figure 6.**  
*Perceived utilization of Buyo-buyo (Piper aduncum)*



**Figure 7.**  
*Locals on the use of Buyo-buyo (Piper Aduncum). A. Construction material; B. Firewood*



Most of the respondents utilize *buyo-buyo* (*Piper aduncum*) as their source of firewood. Next, is that the some of the respondents utilized the invasive species for construction material. Although this invasive plant does not have economic value, it is still considered beneficial because it can still help them in their mundane activities like firewood for cooking and construction material for their houses and gardens.

This parallels to the case study of Mungatana and Ahimbisibwe (2012) that locals use the invasive *S. spectabilis* as firewood as well as boundary marking. Other respondents in our study perceived *Piper Aduncum* as an edible plant and can be used for medicinal purposes to treat wounds. During our community visits, one of the respondents showed us how to eat the *buyo-buyo* seeds. She picked up the fruit which can be found on top of the stalk and ate it. Accordingly, it tasted sweet and delicious. However, invasive species can damage food production and may cause diseases which could affect people (Engeman et al., 2010).

**Figure 8.**

*A respondent showing the way to eat the Buyo-buyo seeds.*



Although invasive plants are edible, there is no guarantee that it can be used as food source. Thus, this entails more scientific research and experimentation when it comes to treating invasive species as food source. On the one hand, there are those who believed that the dried leaves of the buyo-buyo can be used as fertilizer. One respondent said, "*Kung mag galas puros buyo-buyo, perting tamboka sa among tanom, abono siya sa upland rice, saging, gulay, abaca, ug lubi.*" (Buyo-buyo can be used as fertilizer to upland rice, banana, vegetables, abaca and coconut). Other respondents perceived that this can help in the prevention soil erosion. Based on

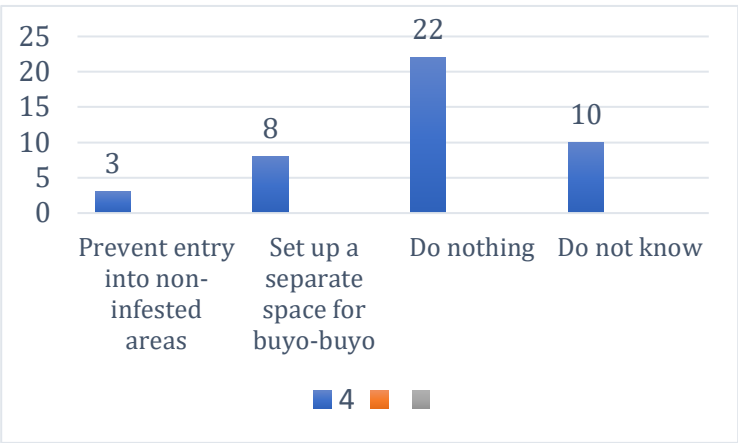
their responses, the perceived benefits of *Piper aduncum* are basically attributed to the mundane value which are found to be beneficial in some ways.

Therefore, people’s knowledge and experiences of invasive species depend on whether and how their economic and community needs are met by the invasive species. (Pasiecznik et al., 2001; also see Veitch & Clout, 2001). This includes for example the extent of damage it can cause to their property or natural environment or whether the species brings aesthetic, cultural and economic appeals towards the community. And most importantly, the cost and benefits of managing the invasive species shall also be taken into consideration.

**Perceived control mechanisms for *Piper aduncum***

Following Davies et al., (2009), we believe that distribution of invasive species plays a crucial role for the management strategies. In this section, we present the perceived mechanisms identified by the locals themselves. The dominant themes focus on following questions: a. what control mechanism should be used to eliminate invasive plants, and b. who should be involved in the process of managing the invasive species in the area.

**Figure 9.**  
*Perceived control mechanisms of Piper aduncum*



The data in Figure 9 shows that most of the local participants would “do nothing” on the *buyo-buyo*. Most of the respondents do not have the idea that *buyo-buyo* is listed as invasive species by the Department of Environmental and Natural Resources (DENR). Given the context, it may seem that the locals still lack relevant information when it comes to the mechanisms of controlling invasive alien plant species. However the figure also shows variations of local’s knowledge on managing invasive species. As Novoa et al., 2018 point out, there are variations among stakeholders regarding the perceptions of invasive species, levels of awareness, and priority species for management. In so doing, this puts forward to a careful assessment of stakeholders’ perceptions as part invasive species management in a conservation context (Di, 2017).

Hart and Larson (2014) push for the idea that the active participation, social engagement and support of local communities are necessary steps in the management of invasive species. This active participation shall be supported by relevant information and knowledge in the process of eliminating invasive species. Shackleton et al. (2015) stress that active participation of community members is queentessential in managing and controlling invasive species. Following Boudjelas (2009), too, the researchers believe that creating more public awareness and trust with regards to the ecological and economic impacts of IAPs is a vital step towards community participation. This is done by learning biosecurity measures, prevent the spread or early eradication of IAS and show sense of urgency through adaptive management and effective control strategies (Russell et al., 2017).

While there is a lack of information regarding control mechanisms of invasive species in the 3 barangays, the majority of the respondents show their interest as well as participation in eliminating *Buyo-buyo*. From the environmental justice framework, community’s interest and participation are seen as significant steps in relation to management of IAS. This, too, articulates framework of accountability and a broader intellectual discussion from the locals and institutions involved in the process of solving environmental concerns (Bowen and Haynes, 2000). Ekanayake

et. al. (2020) argue, the efficient management of invasive species stems from stakeholder's understanding, knowledge, and experiences as significant factors for an integrated approach in policy-making.

## CONCLUSION AND RECOMMENDATIONS

While studies on invasive alien plant species (IAPS) are saturated with ecological dimensions such as its negative impact to the natural or physical landscape, there is still a sparse material that focuses on human factor such as the knowledge and perceptions of individuals and groups task in addressing Invasive Alien Plant Species (IAPS). Putting emphasis on the social dimensions of IAPS is key to combatting the spread of invasive species. The case of Marilog Forest Reserve serves as eye-opener in relation to the rapid spread of *Piper aduncum* (buyo-buyo). If this is left unresolved, this may lead to more ecological threats in the natural habitats of indigenous or endemic species. The prevailing factors on the rapid spread of *buyo-buyo* or *Piper aduncum* point to no control mechanisms from the local agencies and community's participation is seen as challenge.

The data presented in this paper also shows that knowledge on an invasive alien species depends on the peoples' experiences. While it is a fact that an invasive alien species is detrimental to the natural ecological set-up, some of our respondents still see potential benefits of *buyo-buyo* (*Piper aduncum*). For example, Cock (2003) found out that when their elimination is not possible, there are some invasive trees that are useful and offer services to society. The management options should be identified in order to bring balance on the positive and negative aspects of IAS. This paper does not undermine people's knowledge and experiences towards invasive species; however, this scenario shows a gap between local and scientific knowledge on the ill-effects of invasive species in the natural ecology which may affect the overall conservation of biodiversity richness in Marilog District.

Thus, this research puts forward on more campaigns and public awareness on the effects and control mechanisms of invasive species in the area. Through the coordination between the local agencies in Marilog District, the Department of Natural Resources and Environment, Central Mindanao University and other academic institutions, we push for the facilitation of relevant trainings and workshops on how to control or eliminate some invasive species and institutionalization of control mechanisms to effectively combat invasive alien plant species (IAPS) in Marilog District. Finally, as researchers and biodiversity advocates, we aim for a more inclusive decision-making, active participation, and functional conservation through the concerted efforts of the different stakeholders in the community.

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