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How improved governance can help achieve the biodiversity conservation goals of the Philippine National Greening Program

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ABSTRACT

The Philippine National Greening Program (NGP) is a Forest and Landscape Restoration (FLR) initiative designed to increase forest cover on degraded lands for poverty reduction, food security, biodiversity conservation, and climate change mitigation. Despite the inclusion of an explicit biodiversity objective in the NGP, the Philippine government is struggling to implement projects that explicitly address biodiversity recovery. Using a case-study methodology, we identified three constraints that obstruct achievement of the NGP's biodiversity conservation goals: 1) a focus on planting targets; 2) disregard for established community-based forestry practices; and 3) poor planning, organization, and implementation. These factors restricted establishment of diverse plantings suited to biodiversity recovery. Poor governance emerged as an overarching issue that connects each of these factors. Specific regulatory guidelines clearly need to be added to existing policy frameworks to assist planners and practitioners in the implementation of biodiversity-focused projects. Our results also indicate that these three factors and governance limitations, which impede attainment of biodiversity objectives, also affect production goals of the program. It is evident that establishing species-rich projects alone will benefit biodiversity little unless broader steps are taken to improve implementation processes across the NGP.

1. Introduction

The fundamental characteristic of Forest and Landscape Restoration (FLR) is its mosaic approach to reinstate ecosystem services, support sustainable agriculture, provide livelihood benefits, and restore ecological integrity to landscapes (McGuire, 2014; Laestadius et al., 2015; Paudyal et al., 2017). Operationalizing FLR however, requires striking a balance between ecological restoration and people-oriented forestry (Woodworth, 2017). Bringing multiple stakeholders together to accept a common vision (Brancalion et al., 2016), and building infrastructure to carry out landscape-scale restoration (Murcia et al., 2015), present complex challenges in making FLR work (Chazdon et al., 2017). These complexities can steer practitioners toward simple, previously adopted reforestation methods (Lamb, 2018). Examples of following the familiar path include establishment of monocultures and low-diversity plantations of exotics (Bauhaus et al., 2010; van Breugel et al., 2011) rather than evaluating diverse native species alternatives (Nunes et al., 2016). Applying simple planting strategies across a broad spectrum of landscape forms provides limited sets of ecological services (Lamb et al., 2005), and reduces native biodiversity (Xu, 2011; Hua et al., 2016). The complicated nature of balancing economic development with ecological integrity, overcoming issues of scale, and meeting multiple stakeholder needs often translates to a neglect of the biodiversity objectives inherent within FLR.

In 2011, the Department of Environment and Natural Resources (DENR) of the Philippine government initiated the National Greening Program (NGP), an FLR initiative aimed at restoration of 1.4 M ha of degraded lands (Department of Environment and Natural Resources (DENR)., 2016a). The program was renewed in 2015 with an ambitious goal of reforesting approximately 2.5 M ha by 2028 (DENR, unpublished data). Biodiversity conservation is a primary objective of the NGP, along with timber production, poverty reduction, and climate change mitigation (Department of Environment and Natural Resources (DENR)., 2016a). Explicit provisions within administrative orders for NGP implementation include: 1) an FLR approach to restore landscape functionality, economic productivity, and ecological integrity; 2) planning and mapping to identify production and protection zones, and match species with sites; and 3) funding to support capacity building, monitoring, and database development (Department of Environment and Natural Resources (DENR)., 2016b). The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development, a research council that assists Philippine agencies to formulate strategies to aid natural resource management, developed recommendations to optimize reforestation success (PCARRD, 2008).

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Even with this support in place, program effectiveness is questioned (Department of Environment and Natural Resources (DENR), 2014; Israel, 2016).

Philippine forests are highly fragmented, with few tracts of old-growth. These types of mosaic landscapes that are intensely managed for agriculture have limited conservation value for rainforest taxa, and can obstruct plant recruitment (Melo et al., 2010; Uriarte et al., 2010). As more FLR programs are mainstreamed, it is critical that strategic planning for biodiversity conservation becomes a core provision of program governance structures (Pinto et al., 2014). More specifically, the connections between the number of species planted and a site's biodiversity recovery remain poorly defined in regulatory frameworks (Meli et al., 2017), which reflects the debate about the need for diverse plantings to achieve biodiversity recovery (see Aronson et al., 2011). While successional development in planted forests depends on multiple factors (Brockerhoff et al., 2008), many agree that planting regime diversity is highly relevant to restoration practices aimed at reversing biodiversity decline (Aerts and Honnay, 2011; Elliott et al., 2013; Klopf et al., 2017). If planted forests are to play meaningful roles in protecting species with specialized ecological niche requirements, management guidelines designed to support this role are required (Kanowski et al., 2005). The current lack of guidelines to address diversity standards in restoration (Aronson et al., 2011; Beatty et al., 2018) may need to give way to the development of regulatory frameworks with specific protocols that include implementation strategies and guidelines for planting regime diversity.

The DENR asserts NGP success, but several authors document high seedling mortality and poor reporting, which substantially obstruct program achievements (see Commission on Audit (COA), 2013; Israel DC, Arbo MDG, 2015; Gregorio et al., 2017). Furthermore, Baynes et al. (2016) outline policy failures and power imbalances that contribute to shortcomings in the NGP. Finally, in an analysis of NGP planting summaries from three regions, von Kleist et al. (in review) reported that monocultures accounted for 39 percent of area planted in those regions, and most sites were planted with five species or less. These authors also identified that protection zones (portions of NGP reforestation projects designated for no harvesting) were most often planted with the same species and had the same limited species richness as production zones. Thus, the available evidence indicates that the NGP is suffering from a number of deficiencies.

This paper identifies and explores factors that impede biodiversity-focused planting regimes from being integrated into NGP strategies. Case study methods are employed, based on participant interviews in two regions. To mitigate the potential subjectivity associated with drawing conclusions about a national program derived from two regions, we spoke to a cross-section of stakeholders from varied backgrounds and experiences, many of whom had knowledge of the NGP at both the local and national levels, to corroborate and validate findings. Results from this study can inform reforestation practitioners who manage programs where goals include biodiversity conservation as part of multi-objective agendas with strong commercial production components.

2. Methods

We adopted a case-study methodology guided by principles described by Yin (2009) to: (1) elucidate conditions that impede current restoration practices from obtaining their biodiversity conservation objectives; and (2) gain insights into how to incorporate biodiversity-focused projects into the NGP agenda. Case-studies can provide rich descriptions that help identify the conditions that activate or cause a phenomenon (Starman, 2013).

2.1. Recruitment procedures

To identify participants with experience and a range of perspectives across the Philippine reforestation sector, we applied a purposeful sampling procedure (Miles et al., 2013). Selection criteria included elements of 'snowball,' 'heterogeneity,' and 'stratified' sampling procedures described by Patton (2002) and Suri (2011), resulted in 14 key informants (Table 1). Our respondents included project managers, nursery operators, researchers, field personnel, and leaders of people's organizations (POs) from region 1 in Luzon and in region 8 in Visayas. Among the 14 respondents, six were from the DENR, four held academic positions, two were from POs, one from a non-government organization (NGO), and one from a private company. The respondents' varied backgrounds and diverse roles played in planning, implementing, and managing reforestation projects allowed for triangulation and verification, thereby improving data quality and credibility. No identifying information is included that may jeopardize respondent anonymity.

Table 1
Respondent Descriptions.

Respondent number and affiliation	Respondent Position
R1 Private Company	Watershed Management Group (Nursery Manager)
R2 NGO	Conservation Foundation (Nursery Manager)
R3 Agency	DENR (Middle Management)
R4 People's Organization	President of People's Organization
R5 Academic	University (Director of Research Nursery)
R6 Agency	DENR (Regional Tree Propagation Center Director)
R7 Agency	DENR (Regional Nursery Manager)
R8 Agency	DENR (Administrator)
R9 Academic	University (Forestry Professor)
R10 Agency	DENR (CBFM Coordinator)
R11 People's Organization	President of People's Organization
R12 Academic	University (Clonal Nursery Director)
R13 Academic	University (Biodiversity Researcher)
R14 Agency	DENR (Senior Administrator)

2.2. Data collection and analysis

In September and October of 2016 and November of 2017, we conducted semi-structured interviews with the respondents. Each interview lasted approximately two hours. Reasons for low-diversity planting regimes extend beyond the constraints of species availability and the limits of tree nursery practices. Therefore, questions were not only designed to elucidate characteristics governing seedling diversity in forest nurseries. They also probed to understand the broader perspectives that influence planting regime composition, the integration of biodiversity-focused plantings into the landscape, and the mind-set of reforestation planners and implementers. Open-ended questions encouraged participants to provide rich descriptions of personal insights, perspectives, and ways to integrate biodiversity-focused plantings into NGP projects. Interviews were often conducted in field locations where outdoor noise from traffic and construction prevented audio recording. Interviews were therefore recorded with hand-written notes. We also reviewed agency documents and publications to reveal reasons for poor attainment of the NGP's biodiversity objectives. Thematic analysis (following Braun and Clarke, 2006) was employed to identify patterns in the textual data and group key informant responses into themes. Case study materials were reviewed between interview sessions to assign codes and start the process of identifying themes. After seven interviews the main themes were identified. These themes were well-defined after the 11th respondent, and no new codes emerged in the final three interviews. Hence, no additional interviews were conducted. This study-wise saturation point, where no new themes emerge after 14 interviews, is in line with several other studies that found 12 to 16 interviews sufficient when homogeneous groups are studied (see Guest et al., 2006; Hagaman and Wutich, 2017). Coding software was not utilized.

Rather, coding was approached manually from concept-driven and data-driven models described by Gibbs (2007) and Saldaña (2011).

3. Results and discussion

Respondents identified three main factors that directly influence the range of species produced in nurseries, the circumstances and attitudes that affect how these species are utilized, and how planting projects are implemented. All these aspects have bearing on the ability of the program to realize its biodiversity objectives. These factors were: a focus on meeting planting targets; a failure to adhere to key success drivers for community-based forestry management (CBFM) practices; and poor planning, organization, and implementation. Shortcomings in biodiversity conservation are also linked with the indirect effect of seedling mortality. Costs associated with raising and replanting additional seedlings for repeated attempts to establish plantations uses funds that could otherwise be used to improve species selection, diversify germplasm sources, and build capacities associated with establishing biodiversity-focused plantings.

3.1. A focus on meeting planting targets

The DENR's focus on planting targets was mentioned by eight of the respondents, indicating an overt emphasis on the number of seedlings planted and area reforested (Table 2). This emphasis directly affected the diversity of seedlings used in projects. Even though many species are planted at a regional scale (von Kleist et al., in review), project implementers rely on a small selection of species that can be easily produced by communities or that are readily available from local nurseries. Meeting production targets limits the time personnel can devote to improving the diversity of NGP plantings. The nursery managers we interviewed said they were willing but unable to propagate more species because their staff were preoccupied with meeting production targets. They noted there was little time to spare and no funding to hire additional staff to seek new planting materials. As a consequence, little effort was placed on evaluating additional species or accessing new sources of germplasm, which resulted in compromises in the availability of local species' seedlings and the number of mother trees per species.

Over the course of the interviews and other investigations it became apparent that the DENR lacks the technical skills to build the capacity of local nursery operators and communities to identify additional locally-occurring species, test their suitability for different site conditions, and then develop appropriate propagation techniques. The NGP is supposed to be a harmonized strategy that coordinates a range of activities to reach multiple objectives (Cagalanan, 2016). This harmonization is unlikely given that the enhanced NGP targets encompass 2.5 M ha (DENR, unpublished data), which represents eight percent of the entire Philippine land base. In attempting to meet this target, a campaign for quantity has ensued, meaning few planting strategies and low species diversity across a variety of landscape contexts. A focus on quantity has also compromised the quality and suppressed the tailoring of planting regimes for different objectives, especially biodiversity recovery. Continuing to plant with the current paradigm will likely fail to deliver the multiple outcomes intended in the NGP. Several respondents repeatedly iterated that the DENR is driven by numbers and is not concerned with species or quality; even two DENR respondents were candid about this lack of focus on quality (Table 2). In short, 'The NGP is a target-driven program' (Cagalanan, 2016; p 32). Approaching the NGP in this manner needs to change if a mind-set of quality is to be instilled in program planners and implementers. According to one interviewee, this change can be achieved by '*convincing top management of the value of quality and species diversity*' [R9].

3.2. Poor implementation of community-based forestry (CBFM) practices

Approximately 24 million people live in designated forest areas in the Philippines (Espiritu et al., 2010), making virtually all reforestation pursuits in these lands CBFM activities. Clear ownership and land-use rights, enabling regulatory environments, government support, strong leadership, and material benefits to communities have repeatedly emerged as fundamental components of successful community forestry (Beukeboom et al., 2010; Baynes et al., 2015; Gilmour, 2016). Many respondents commented that the DENR has failed to follow these established critical elements of CBFM, thus limiting overall success of the NGP. The success drivers of CBFM also shape how conservation measures and ecological restoration are approached within communities. Consequently, a failure to apply CBFM best-practice in NGP plantings has led to a lack of support from communities for restoration interventions primarily aimed at conservation and biodiversity recovery.

In the Philippines, people-oriented forestry initiatives were formalized in 1995 when community-based forest management (CBFM) was announced as a national strategy (Cagalanan, 2016). However, these initiatives were largely top-down pay-for-labor schemes with poor outcomes (Pulhin et al., 2006). Although Department Administrative Order (DAO) 2016-20 states that 'Harmonization' will occur, communities are often simply viewed as sources of contract labor (Table 3). Additionally, the DENR's ability to revoke tenure rights of CBFM leases and thereby regain control of the land undermines a community's sense of ownership of a planting (Baynes et al., 2015). As such, communities are not confident in their ability to materially benefit from trees they plant and maintain. These program shortcomings culminate in communities failing to tend plantings once the payments for maintenance cease.

Current regulations restricting the harvest of native species appears to reduce the ability of the NGP to encourage planting of native species to address biodiversity loss and decline. Academic and community-based respondents reported that strict policies govern the harvest of native trees in the Philippines. The related administrative and financial difficulties to obtain harvest permits hinders the ability of POs to realize material benefits from native species planted in NGP projects (either by direct use or through sales), which discourages the planting and maintenance of native trees. This situation also motivates illegal logging of forest remnants, with additional biodiversity losses.

Both DENR staff and PO presidents voiced frustrations with the NGP. Some DENR personnel lamented the lack of a sense of responsibility on the part of the POs, with comments such as '*POs are good only if there's money. Some POs, once the money is gone, they won't* [make the] *sacrifice for their own land*' [R3]. Several of our NGO, academic, and agency informants commented that supporting community livelihoods greatly complicated reforestation activities. Management plans required a great deal of tempering to accommodate people living in

Table 2
Respondent quotes relating to attaining planting targets.

Respondent	Quote
[R11] PO	'Time targets had to be met even if it was dry and success was unlikely'.
[R7] DENR	'Target getting means anything is put in [the ground]; it must be accomplished in a specific time period, so it must be planted'.
[R9] Academic	'Quality of the selection of mother trees is not important; again, the focus is on numbers not quality. If they lack plants even the poor ones are used'.
[R10] DENR	'There really is no concern with species and quality; the focus is on number of hectares and seedlings planted'. In short, The NGP is a target-driven program'.

Table 3
Respondent quotes relating to non-adherence to CBFM practices.

Respondent	Quote
[R12] Academic	'Often, very little [money] makes its way into the hands of the PO members who are doing the work'.
[R5] Academic	'The DENR doesn't include the communities in the right way'.
[R6] DENR	'Even on their own land they need permits, so they cut without a permit… If the community could share in the profit from the plantation, they wouldn't cut from other forested areas'.
[R3] DENR	'Our job is technical assistance; we just tell them their role. Once it's planted it's their responsibility'.

Table 4
Respondent quotes relating to poor planning, organization, and implementation.

Respondent	Quotes
[R9] Academic	'In mangrove plantings, '[There is] no attention to zoning; *Rhizophora* is planted everywhere. [The CENRO's] are not interested in *Ficus* and other miscellaneous species, when there's no commercial value'.
[R10] DENR	'Early planning, mapping, and identifying areas for production and protection is needed; on the books, this already occurs [but] in reality nothing is different'.
[R11] PO	'We [in the community] realized that we needed more information; my knowledge was not enough. [We accepted] methods from ACIAR relating to knowledge specifics and now we produce better seedlings than other POs'.
[R13] Academic	'The people implementing the NGP are classically trained foresters with extraction mentalities and mindsets'.

designated forest areas. Our interviews uncovered sentiments within the DENR that regard communities as unable to make substantial program contributions, consigning them to simply a labor force. Such views can discourage engagement and lead to POs that are unmotivated to cooperate in the DENR's program because they are not properly consulted.

One PO President noted that the DENR officer merely handed ownership of the project to them, with no information, support, or consultation. Another informant said that community members are rarely involved in the selection of species to be planted. The DENR argues that they do indeed include POs in species selection. Nevertheless, remarks like these indicate a lack of real engagement and meaningful consultation in the process of reforestation under the NGP. They also reveal the difficulties communities experience in attempting to contribute to their own development. These sentiments also expose a harboring of distrust and lack of confidence by each party toward the other. The quotes in Table 3 also indicate a lack of genuine collaboration and partnership between the DENR and communities, which is essential if the NGP is to successfully incorporate biodiversity plantings into the landscape, or moreover, have any level of success.

3.3. Inadequate planning, organization and implementation

A lack of planning is widely recognized as a barrier to scaling up reforestation in tropical landscapes (Menz et al., 2013; Murcia et al., 2015; da Silva et al., 2016; Holl, 2017; Chazdon and Guariguata, 2018). Here we add that poor planning and implementation in the NGP has limited biodiversity outcomes. Nine respondents (64%) commented on how prolific these shortcomings are within the Philippine reforestation sector. These informants expressed four concerns: (1) a failure to follow sound ecological principles; (2) no distinction between production and protection zones; (3) a need for capacity building and information sharing; and (4) tensions between administrative arms of the DENR.

Our informants remarked that sound forestry practices are often not used in NGP plantings. Examples include planting in the wrong season when success was unlikely, little care given to match species with site-specific conditions, and no regard given to the functional roles of species in the regenerating forest. In short, NGP projects are implemented without adhering to well-known best-practice planting standards. These deficiencies are linked with a 'get it planted' mentality associated with attaining planting targets.

Previous reforestation programs in the Philippines have also faltered because of inadequate planning and management in concert with pressures to reach imposing targets. For example, overambitious planting targets during the implementation of Forestry Sector Projects (1987 to 2001) meant that nursery contractors could not allocate the necessary time to raise seedlings to specified out-planting heights (Pulhin et al., 2006). Decades later, we find the same issue still prevails: poor scheduling has resulted in time constraints to produce quality seedlings. This problem continues to lead to the use of any and all planting stocks available with corresponding negative affects on program effectiveness (Gregorio et al., 2015a). One of our respondents [R-10] noted that many lessons have been learned from past reforestation programs, but few of those lessons have been incorporated into implementation strategies for the NGP.

A concern expressed by three respondents was the failure to make clear distinctions between production and protection areas planted under the NGP. While designations appear on paper, there is very little tangible difference in the implementation strategies between these management zones (Table 4). Exotic species are commonly planted in protection zones. Restrictions on harvesting in these zones make it unlikely that these trees will be harvested. On the other hand, native species with low commercial value have been planted in production zones. These trees are also unlikely to be harvested because of restrictions on harvesting native species, even if they are in designated production zones. Some of the lack of distinction between the two planting zones can be attributed to poor definitions within DAOs, Memorandum Circulars, and Technical Bulletins. The purpose of protection zones is only loosely defined in these regulatory documents, and there is no strategy for how the zones should be planted. Without clear goals, there are no means to guide planting decisions effectively (Pinto et al., 2014). A lack of specific implementation protocols for different land management units has caused protection zones to fall short of their potential role in biodiversity conservation (von Kleist et al., in review). Some respondents stated that projects solely aimed at biodiversity protection were virtually unheard of and that protection is not sufficiently accounted for in NGP plantings.

Another common thread in the poor planning, management, and implementation theme was that all parties (i.e., planners, oversight personnel, and implementers) could benefit from capacity building. Respondents identified the need for training in specific skills such as tree identification, plus broader initiatives including more demonstration plots to help instruct community members and improve awareness of environmental issues. When respondents were questioned on the differences between reforestation and ecological restoration, or how biodiversity recovery might be achieved through the NGP, their answers often indicated a lack of understanding of recent advances in restoration techniques that promote biodiversity recovery. Several of the DENR personnel we interviewed believed they adequately attend to biodiversity clauses in the NGP through the use of native species.

External organizations and Philippine-based NGOs are important providers of information and training to communities, filling in for agency shortcomings. Even though capacity building is explicit in NGP promulgating documents (i.e., Executive Orders 26 and 193), it is generally lagging nearly eight years after initiating the NGP. Such lags are especially evident in regard to the development of competencies that would support biodiversity-focused restoration activities.

3.4. Governance issues underpinning biodiversity shortcomings

Cumulatively, the factors presented above (i.e., a focus on meeting planting targets; poor implementation of established CBFM practices; poor planning, organization and implementation) have limited the ability of the DENR to attain the explicit biodiversity conservation objective of the NGP. Poor governance emerged as an underlying cause common to these three factors underpinning the lack of progress in achieving the biodiversity objective. The promulgating documents of the NGP, Executive Orders 26 and 193, outline an aim to employ an FLR approach; they include verbiage such as biodiversity conservation, site-species matching, creation of production and protection areas, and funding to build capacity. More specific guidelines on how these broad directives are to be carried out typically would be provided in documents such as DAOs and Technical Bulletins. However, we failed to locate such guidelines that direct agency personnel in how to implement biodiversity-focused restoration projects. Without these clear directives, a widespread reliance on default strategies of the past continues, which may do relatively little for biodiversity (Lamb, 2018).

Our research points to a need to rework NGP governance structures with the addition of protocols to improve on-ground practices and capacity building. Restorationists in Brazil have debated the level of detail to include in governing regulations (see Durigan et al., 2010; Aronson et al., 2011). We argue that the NGP needs management plans that reduce environmental simplification (Valduga et al., 2016) and foster implementation of planting regimes more likely to deliver biodiversity outcomes. The NGP suffers from poor program success, low planting site species richness, with a very few species accounting for most of the individuals planted. Twenty years ago, these same issues affected restoration outcomes in São Paulo State, Brazil (Barbosa et al., 2003). Resolution SMA 32/2014, which guides restoration in São Paulo today, focuses on end results: a site's ability to self-sustain. Success indicators such as density and diversity of colonizing species are monitored for up to 20-years to ensure positive site recovery trajectories (Chaves et al., 2015). Legal instruments from São Paulo State, and other successful restoration frameworks from around the globe (see Kumar et al., 2015), could serve as useful resources to re-craft NGP governance structures.

The Philippines may not need to look abroad for governance frameworks to enhance NGP implementation practices, because successful examples already exist within the archipelago. Community reforestation projects in Northern Negros Natural Park (Cagalanan, 2016), Biliran Island (Gregorio et al., 2015b), and Baybay, Leyte (Bande et al., 2016) have all performed well in attaining the multiple benefits explicit in the NGP, including positive biodiversity outcomes. Central to these initiatives has been a top-down: bottom-up collaborative processes, effective engagement of all stakeholders, and the establishment of a forum for open communication that was fostered from project inception. Under these conditions, cooperation and trust developed into a common vision that allowed development of strategic implementation plans through inputs of technical expertise, industry capabilities, and local needs (Brancalion et al., 2016). Responses from our informants indicate that these elements of effective governance are not soundly in place for the majority of NGP projects. For biodiversity-focused planting regimes to become an integral part of the NGP, this needs to be amended.

3.5. Supporting protected areas through NGP plantings

It seems the current attitude within the DENR toward biodiversity is that it can be maintained through the National Integrated Protected Areas System (NIPAS). While this system was recently enhanced through House Bill 6772, which extended protection to 94 additional protected areas (PAs). Many PAs suffer from low operating budgets, with some converted to agriculture, affected by illegal logging, and threatened by conflicting management regimes (Ong, 2002; Guiang and Braganza, 2014). These obstacles undermine the effectiveness of biodiversity protection offered by PAs (Mallari et al., 2016). Under these constraints, PAs alone are unlikely to safeguard the nation's biodiversity from further erosion, illustrating a need to augment them through restoration elsewhere (Janishevski et al., 2015; Beatty et al., 2018). A lack of quality governance, conservation planning, and a synthetic understanding of issues that influence PAs, can reduce their ability to prevent biodiversity loss (Eklund and Cabeza, 2017). The DENR may not fully grasp the important role NGP plantings could play in supporting biodiversity conservation in the Philippines. This appears especially true regarding the establishment of protection zones, which, if strategically placed, could provide connections and buffers for the nation's PAs.

4. Concluding comments and recommendations

The Philippine NGP has tremendous potential to support biodiversity protection. We identified three factors that limit biodiversity outcomes of the NGP, underpinned by an absence of specific guidelines in the program's regulatory frameworks. These shortcomings leave practitioners without the means to implement projects that fulfill the program's biodiversity objective. The DENR largely implements the NGP in the same manner as past reforestation programs, and biodiversity conservation continues to be a low priority. Except for a few limited-area 'rainforestation' projects (see Nguyen et al., 2016), where high diversity plantings were established for ecological restoration, there is little evidence that the Philippine government is engaged in reforestation activities explicitly designed to support biodiversity recovery. The above-described factors that affect biodiversity outcomes also affect the realization of other NGP objectives and reduce overall program success. The interconnectedness of biodiversity shortcomings with broader program deficiencies means that improvements to biodiversity conservation in the NGP cannot be made in isolation.

While biodiversity recovery is not the sole purpose of FLR, it is an essential component of the FLR approach (Beatty et al., 2018) and critical in attaining many ecosystem benefits such as sustained ecological productivity, resistance to change, and stability (Thompson et al., 2014). Achieving the NGP's biodiversity objective will require more than the mere inclusion of native trees in low-diversity plantations and reliance on the national PA system. Restoration practitioners have a responsibility to diversify their planting and management strategies to augment biodiversity (Beatty et al., 2018). Incorporation of biodiversity-focused plantings into the NGP needs to be done concurrently with higher-order directives that establish those plantings as part of a cohesive landscape-scale strategy with proper follow-up measures to ensure success.

We obtained interview data from only two regions, but the responses to our open-ended questions were resoundingly similar. While not part of the formal dataset, we had numerous informal conversations with reforestation professionals and community members from many areas of the Philippines, all of whom support that the problems identified in Regions 1 and 8 are indicative of other many other regions within the Philippines. Based on the uniformity of the emergent themes, we offer the following recommendations in hopes of fostering change in NGP implementation. First, improve spatial planning to link strategic planting activities with intended outcomes in different land management units. Doing this would integrate ecological restoration projects

with high biodiversity value into landscape sections where they do the most good, such as in protection zones for biological corridors and buffer zones adjacent to protected areas. Second, replicate examples of stakeholder involvement and trust-building modeled on top-down: bottom-up engagement. The number of communities located within designated forest areas in the Philippines necessitates effective stakeholder involvement. Successful platforms of stakeholder engagement have emerged when top-down: bottom-up approaches have been employed, which have made substantial contributions to high quality restoration (e.g., Brancalion et al., 2016). Third, develop specific governance structures to guide practitioners in implementing tailored planting regimes capable of attaining biodiversity outcomes. A substantial step toward implementing strategic planting activities would be the issuance of a Department Administrative Order that includes guidelines for site composition in biodiversity-aimed projects. Forth, provide specific training to field personnel and middle management on biodiversity-focused restoration approaches. An understanding of strategies like framework species models (see Goosem and Tucker, 2013; Elliott et al., 2013) and maximal diversity models (see Rodrigues et al., 2011), as well as the know-how to plan and implement such methods, could greatly improve the ability of the DENR to meet their biodiversity objective.

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