### STATE OF FORESTS IN THE BANGSAMORO AUTONOMOUS REGION IN MUSLIM MINDANAO (BARMM), PHILIPPINES: OPPORTUNITIES AND CHALLENGES

Abdul-Jalil S. Umngan

Director, Forest Management Services, Ministry of Environment, Natural Resources and Energy, Bangsamoro Autonomous Region in Muslim Mindanao

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### ABSTRACT

This comprehensive study delves into the forest conditions of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), Philippines, focusing on the historical development of forestry policies and their impacts. It critically examines the region's existing forest cover of around 669,066.89 hectares classified as forestland and addresses urgent issues like deforestation, illegal logging, and the conversion of forest areas. The paper also investigates the economic prospects in forest management, emphasizing the potential of REDD+ initiatives, where BARMM's engagement could yield profits of \$5,064,627.04 (Php 283,619,114.01), and the timber sector, which is projected to generate substantial total revenue of approximately Php 283,590,708,093 every 10 years through sustainable practices.

Employing a mix of historical research, spatial and comparative data analysis, the methodology includes a thorough review of relevant literature and policy documents. The study leverages geographic information system (GIS) tools for detailed spatial analysis, offering both visual and quantitative insights into deforestation trends and identifying potential zones for sustainable forestry within BARMM.

The findings underscore a critical need for reassessing forestry policies in BARMM, considering historical obstacles like insufficient funding, demographic pressures, and lax enforcement. The research underscores the significance of effective forest management in the face of climate change and for sustainable development goals.

Recommendations propose revitalizing and strengthening the Regional Sustainable Forest Management Act of 2003, improving forestry research, bridging data deficiencies, and assessing risks associated with diminishing forests. The study advocates a balanced approach to sustainable forest management that harmonizes community participation, environmental conservation, and the economic exploitation of forest resources.

**Keywords:** Forest Management, Forest policy reforms, forest opportunities, Forest challenges, Bangsamoro Autonomous Region in Muslim Mindanao, Philippines.

### **1. INTRODUCTION**

The enactment of the Bangsamoro Organic Law (BOL) in 2018, officially known as the Organic Law for the Bangsamoro Autonomous Region in Muslim Mindanao (OLBARMM), represents a significant milestone for the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). This legislation, a result of extensive peace negotiations between the Philippine government and the Moro Islamic Liberation Front (MILF), addresses crucial issues including ancestral land rights and historical marginalization, marking a vital step towards self-determination for the Muslim minority in the predominantly Roman Catholic Philippines (CNN, 2018).

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BARMM encompasses approximately 669,000 hectares of inalienable forestland, crucial for the region's ecological health (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023). Notably, about 4,896 hectares, or roughly two percent of this area, are protected under the National Integrated Protected Areas System (NIPAS), featuring ecologically significant areas such as the Basilan Natural Biotic Area and the Turtle Islands Wildlife Sanctuary (Strategic Programme for Agriculture, Fisheries, and Agribusiness Development in the Bangsamoro Autonomous Region in Muslim Mindanao [SPAFAD-BARMM], n.d.). Forestlands, constituting approximately 48 percent of BARMM's total area, are essential for maintaining ecological diversity and sustainability (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023). The concept of Al-Khalifah, or stewardship, is evident here, as local communities rely on these forests for sustenance, livelihood through cash crops, and as a sanctuary during conflicts. Initiatives to involve former combatants in reforestation and ecological improvement have been implemented, contributing to climate change mitigation and demonstrating the importance of forest management in sustainable development and the enactment of Al-Khalifah principles in the region (Cabico, 2023).

However, the history of forestry policies in the Philippines, characterized by challenges such as underfunding, population pressure, and weak law enforcement, has also impacted BARMM (Food and Agriculture Organization of the United Nations [FAO], 2023). With the BOL in effect, there is an urgent need to reevaluate these policies within the BARMM context, especially as the region prepares for regular governance in 2025.

Forest management in BARMM encompasses administrative, legal, economic, and social aspects, as well as scientific and technical components like silviculture, protection, and forest regulation (Natural Resources Canada, 2023). The region is focusing on conservation, sustainable utilization, and community involvement in forest management.

The evolving policy landscape in BARMM includes specific executive orders, directives, and initiatives to address these issues and explore economic opportunities in forest management, including REDD+ initiatives and the timber industry.

This study aims to: 1) enhance forestry research, address data gaps, and review historical forestry policies and their impacts on BARMM; 2) analyze forest resource utilization and management practices, evaluate risks due to declining forest cover, and estimate the economic potential of sustainable forestry; and 3) advocate for the renewal and reinforcement of the Regional Sustainable Forest Management Act of 2003.

### **Conceptual Framework**

This research explores the intricate dynamics of forestry policy development in the Philippines, with a specific focus on the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). It traces the evolution of these policies from their colonial inception to contemporary times, examining their environmental consequences, particularly in terms of forest cover reduction in the context of global climate change. The study aims to elucidate the relationship between historical policy shifts and their environmental outcomes in BARMM. It situates these changes within the framework of the Bangsamoro Organic Law of 2018, addressing the region's unique challenges, including limited funding, population growth, weak law enforcement, and the effects of prolonged, intermittent conflict. This comprehensive analysis endeavors to provide insights into the intersection of policymaking, environmental stewardship, and socio-political factors in BARMM.

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### 2. METHODOLOGY

The study employs a holistic approach, intertwining historical analysis with spatial and comparative data evaluation specific to the Philippines and BARMM. This methodology includes a thorough review of pertinent literature and policy documents, complemented by an in-depth examination of spatial and statistical data relevant to the forestry sector in the Philippines. By concentrating on the Philippines and BARMM, the study seeks to offer a nuanced understanding of the evolution of forestry policies within this distinct geopolitical and environmental context. This includes assessing the effects of these policies on forest coverage and management, especially in light of the unique challenges faced in BARMM.

#### **Analytical Framework**

At the heart of this study is a detailed analysis of forestry policies, their enactment, and effectiveness. This entails examining various forestry laws, their implementation processes, and their impacts, with a particular emphasis on BARMM. The research tackles critical challenges in the forestry sector, such as antiquated policies, issues in monitoring, and financial constraints. A comparative analysis will be conducted to juxtapose BARMM's policies and their outcomes with national trends. The ultimate goal is to provide strategic recommendations for enhancing current policies and introducing innovative, more effective forest management strategies in the region. These recommendations will be rooted in sustainable, peaceful, and culture-sensitive forestry practices, mindful of the socio-economic backdrop of BARMM and the ecological challenges discussed in the study.

This study adopts a descriptive and analytical research design to comprehensively understand the current state of forests in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) and the historical development of forestry policies in the Philippines, focusing particularly on their impacts in BARMM. The primary methodology entails an extensive review of existing literature, including academic articles, government reports, policy documents, and historical narratives pertinent to forestry policies, forest utilization, and management. This literature review is augmented by examining case studies that highlight forest management practices and their outcomes, especially in contexts analogous to BARMM.

In the domain of data analysis, the study undertakes a historical policy analysis to trace the evolution of forestry policies in the Philippines and their specific implications for forest management in BARMM. A crucial element of this analysis involves exploring how forest resources have been utilized and managed in BARMM, along with the ensuing ecological and economic consequences. The study also integrates geographic information system (GIS) tools for spatial analysis to provide a visual and statistical depiction of deforestation trends and identify areas suitable for sustainable forestry practices within the region.

An economic assessment is performed to estimate the economic potential of sustainable forestry practices in BARMM, encompassing potential income from REDD+ initiatives and the timber industry. This component includes a quantitative analysis of potential revenue streams and economic benefits, thereby offering insights into the financial viability of sustainable forest management in the region. Simultaneously, a risk assessment is conducted to evaluate the environmental, social, and economic repercussions of the current trends in forest cover reduction, identifying potential risks and threats to the region.

Lastly, the study encompasses a comprehensive review of existing forestry policies, including the Regional Sustainable Forest Management Act of 2003. This review is instrumental in identifying

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gaps or areas requiring enhancement in the current policy framework. Drawing on the findings, the study formulates policy recommendations for the BARMM government, aimed at improving sustainable forest management practices and addressing the identified challenges.

This multifaceted methodology ensures an in-depth analysis of the state of forests in BARMM, facilitating the development of informed and effective policy recommendations specific to the region's unique ecological and socio-economic circumstances.

### **3. RESULTS AND DISCUSSION**

### Land Distribution and Forest Cover in BARMM

The Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) spans a land area of 1,398,194.18 hectares, according to the Political Boundary Cadastral of 2013 (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023). Within this expanse, forestland, covering 669,066.89 hectares as delineated by the Forestland Boundary Delineation (FLBD), constitutes a significant portion of the region. This extent of forestland underscores BARMM's commitment to preserving forest ecosystems, pivotal for environmental conservation and supporting local community livelihoods. The importance of these forests is further accentuated in the context of the Philippines, a tropical country prone to severe weather events and natural hazards, such as typhoons and seismic activities. These conditions, intensified by climate change, highlight the crucial role of forests as a stabilizing and protective system for the BARMM region.

In alignment with Presidential Decree No. 705, 'forestland' in this context is defined broadly to encompass diverse landscapes, including dense forests, open woodlands, coastal mangroves, shrublands, grasslands, marshes, swamps, and agricultural areas (Republic of the Philippines, 2023). This broad definition acknowledges the varied and intricate mosaic of land use and cover in the region.

The forthcoming analysis delves into these distinct land cover categories, offering an in-depth examination of their distribution across BARMM. It also addresses the dynamics of land cover change, shedding light on current land use practices, their historical evolution, and the potential implications for regional forest management strategies and policy development.

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### Fig.1. Geographical Distribution of the BARMM Boundary in the Philippines



Fig. 2. Map of the Forestland of Mainland BARMM

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### **Provincial Forest Cover Analysis in BARMM**

The Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) boasts a diverse range of forested landscapes totaling 270,113.44 hectares, consisting of open forests (147,753.64 hectares), closed forests (87,302.08 hectares), and mangrove forests (35,057.72 hectares). Open forests, characterized by sparser canopies that allow more sunlight penetration, represent the largest portion of the forest cover in BARMM (Food and Agriculture Organization of the United Nations [FAO], 2023). Closed forests are identified by their denser canopy coverage, creating a dimmer, moisture-rich understory environment (FAO, 2023). Mangrove forests, found in coastal intertidal zones, are known for their dense root systems and their vital role in stabilizing coastlines (National Oceanic and Atmospheric Administration, 2023). Each of these forest types plays an integral role in the ecological and environmental health of BARMM.



**Fig. 3.** Forest Cover of BARMM in 2020 (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023)

Table 1 presents land area and forest cover data across various provinces within BARMM from 2010 to 2020, detailing changes in forest cover over this decade in both hectares and percentages. The data reveal varying trends across the provinces:

- Maguindanao del Norte exhibits a substantial increase in forest cover, growing by 969.08 hectares, a 2.70% rise, indicating positive reforestation efforts or natural forest regrowth.
- Maguindanao del Sur shows an increase in forest cover by 237.63 hectares, or a 3.73% increase, reflecting similar positive trends in forest management.
- Lanao del Sur experiences a slight decrease in forest cover by 616.99 hectares, a -0.38% change, possibly due to deforestation or land use changes.
- Basilan and Tawi-Tawi face declines in forest cover, with -1.44% and -3.06% changes respectively, raising concerns about deforestation or environmental degradation.

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- Sulu records a significant increase of 940.50 hectares in forest cover, a 4.71% increase, the highest among the provinces, suggesting successful forest recovery or expansion initiatives.
- Special Geographic Areas (SGAs) witness a dramatic rise in forest cover by 245.06 hectares, a notable 90.24%, indicating intensive reforestation or conservation efforts.
- Overall, BARMM shows a slight increase in forest cover of 610.55 hectares, a 0.23% rise from 2010 to 2020, reflecting a positive regional trend in forest cover.

This analysis suggests that while some areas within BARMM are experiencing deforestation, others are witnessing gains in forest recovery, leading to an overall slight positive change in forest cover during the examined period.

# Table 1. Forest Cover Change in BARMM 2010-2020 (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023)

		Forest Cove	er (Hectares)	Change in Forest Cover (2010-2020)			
BARMM Province	Land Area	2010	2020	Hectares	%		
Maguindanao del Norte	256,673.58	35,946.95	36916.02892	969.08	2.695869656		
Maguindanao del Sur	246,296.74	6,374.48	6612.111079	237.63	3.727855995		
Lanao del Sur	409,517.37	161,638.95	161021.9653	- 616.99	-0.381706871		
Basilan	119,247.13	13,695.35	13497.69179	- 197.66	-1.443251562		
Sulu	188,360.70	19,960.80	20901.29944	940.50	4.711752916		
Tawi-tawi	120,299.66	31,614.80	30647.72148	- 967.08	-3.058940969		
Special Geographic Areas (SGAs)	54,669.46	271.57	516.6238954	245.06	90.23920451		
BARMM Total	1,395,064.64	269,502.89	270,113.44	610.55	0.226547739		





**Fig. 4.** 2020 Comparative Distribution of Forest Types Across Provinces in BARMM (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023)

Figure 4 presents the 2020 comparative distribution of forest types across provinces in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). The forest composition in each province showcases distinct ecological characteristics:

- Lanao del Sur: This province leads in forest cover with a total area of 161,021.97 hectares. Closed forests, constituting 74,602.05 hectares, are pivotal for biodiversity conservation due to their dense canopy. Open forests span 86,266.92 hectares, indicative of a diverse ecosystem supporting various species. Additionally, a smaller yet crucial area of 153 hectares of mangrove forests contributes to the coastal ecological system.
- **Maguindanao del Norte**: The total forest area in this province is 36,916.03 hectares, with open forests (29,624.93 hectares) forming the majority. This landscape suggests ecological

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potential for species adapted to less dense canopy regions. Closed forests, covering 6,946.36 hectares, add to the environmental value, while mangroves, though smaller at 344.74 hectares, are significant for coastal protection and marine life support.

- Tawi-Tawi: The province has a total of 30,647.72 hectares of forest land. Open forests dominate at 20,628.08 hectares, complemented by 10,019.64 hectares of mangrove forests, essential for marine ecosystems and local livelihoods.
- Sulu: Sulu's forested area totals 20,901.30 hectares, primarily comprised of open forests (18,256.47 hectares). This indicates that the region's forests are characterized by more open spaces, beneficial for specific biodiversity and human use.
- **Basilan**: Unique in its forest composition, Basilan has a total forest area of 13,497.69 hectares. Mangrove forests are particularly prominent at 6,283.87 hectares, underscoring their role in coastal protection and marine biodiversity. Closed and open forests cover 5,578.91 and 1,634.91 hectares, respectively.
- Maguindanao del Sur: The province's forest cover is 6,612.11 hectares, predominantly open forests (6,437.35 hectares). The smaller closed forest area (174.76 hectares) suggests room for expanding forest cover to enhance ecological services.
- Special Geographic Areas (SGAs): SGAs have the least forest area at 516.62 hectares, all categorized as open forests. The limited forest cover underscores the need for specialized management and conservation strategies.

In summary, the total forest cover in BARMM, encompassing closed forests, open forests, and mangrove forests, displays a diverse distribution across provinces. Each forest type plays a crucial role in maintaining ecological balance, supporting biodiversity, and providing various ecosystem services. The breakdown of forest types and areas at the provincial level highlights the need for strategic, region-specific forest management and conservation initiatives to protect and sustain these vital forest ecosystems.



### **Trends in Land Cover Patterns**

Fig. 5. BARMM Land Cover Patterns Comparison: 2010 vs 2020 (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023)

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Figure 5 delineates the land cover changes in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) between 2010 and 2020, highlighting significant shifts across various categories (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023).

- **Brush/Shrubs Areas**: These areas experienced the most pronounced increase, expanding by 35,988 hectares, a 50.99% rise from 70,585 to 106,573 hectares.
- **Grassland Areas**: Grasslands grew by 13,999 hectares, up by 53.99% to 39,932 hectares.
- **Open Forests**: Open Forests also saw growth, though more moderate, with an 8.09% increase, adding 11,059 hectares to reach 147,754 hectares.
- **Closed Forests**: In contrast, Closed Forests witnessed the most significant decline, with a reduction of 10,468 hectares, a 10.71% decrease to 87,302 hectares, raising potential deforestation concerns.
- Annual Crops and Fishpond Areas: Annual Crops diminished by 2,005 hectares (2.80%), while Fishpond areas contracted by 53 hectares (9.39%).
- **Built-up Areas**: These areas surged by 3,861 hectares, a notable 275.47% increase to 5,262 hectares, indicative of urban expansion.
- Marshland/Swamp and Inland Water Areas: Increases were observed in Marshland/Swamp (5,796 hectares, 14.67%) and Inland Water areas (596 hectares, 8.65%).
- **Open/Barren Land**: This category increased by 575 hectares (62.45%), while Mangrove Forests remained nearly unchanged, with a modest increase of 19 hectares.
- Perennial Crop Lands: These lands showed a negligible one-hectare increase.

These shifts in land cover patterns from 2010 to 2020 underscore significant transformations potentially driven by urban development, changes in agricultural practices, and environmental conservation efforts. The expansion of urban areas coupled with the reduction in dense forest cover carries important implications for sustainability and environmental policy in the BARMM region.

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Fig. 6. Map of the changes in land use or forest density over time in mainland BARMM

Figure 6 presents a side-by-side mapping comparison to illustrate land use and forest density changes over a decade (2010 to 2020) in the mainland of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), with a particular focus on Lanao del Sur (LDS) (Ministry of Environment, Natural Resources, and Energy - Forest Management Service, 2023).

The data highlights a significant shift in the forest cover of Lanao del Sur (LDS) during this period. Closed forest areas have decreased from 84,973.37 hectares in 2010 to 74,602.05 hectares in 2020. Particularly in the northern regions of LDS, as denoted by the red-circled areas on the map, there has been notable deforestation. This reduction in dense forest areas could be attributed to human activities such as infrastructure development—including the construction of the Kapai-Tagoloan-Talakag Road and the Maguing-Talakag road—agricultural encroachment, illegal logging, or urban expansion. These factors collectively exert significant pressure on the local forest ecosystems. Empirical evidence on the ground can substantiate these observations.

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In contrast, the southern municipalities of Lanao del Sur, namely Bumbaran, Butig, and Lumba-Bayabao, have witnessed an increase in closed forest areas. This rise may be linked to reduced human disturbance due to the presence of the Moro Islamic Liberation Front (MILF). These areas have inadvertently benefited from a de facto form of conservation, as conflict and subsequent security measures have restricted human access and exploitation of these forests.

For an exhaustive breakdown of the land cover categories and their corresponding areas in hectares in Mainland BARMM for both 2010 and 2020, Annex B provides detailed tabulated data that supports the analysis illustrated in Figure 6.



Fig. 7. Map of the changes in land use or forest density over time in BaSulTa

Figure 7 displays the land cover data for the provinces of Basilan, Sulu, and Tawi-Tawi (BaSulTa) from 2010 to 2020. This period reveals a significant presence of extensive unclassified areas, highlighting the challenges in land classification. These challenges may be attributed to the limited regional presence of the National Mapping and Resource Information Authority (NAMRIA), potentially due to regional security concerns.

- **Basilan**: This province exhibits a concerning trend of decreasing closed forests and increasing open forests, suggesting notable land use changes.
- **Sulu and Tawi-Tawi**: In these areas, the prevalence of unclassified lands makes it difficult to ascertain potential ecological shifts. Tawi-Tawi, in particular, shows a tendency towards aquaculture development.

The shortfall in comprehensive land cover data underscores the necessity for detailed surveys to inform accurate environmental planning. Such data is essential for effective forest management and sustainable development in the region. Annex C provides a detailed breakdown of these land cover categories, offering further insights into the land use dynamics of BaSulTa.

### Forest Policy Evolution and Impact in the Philippines and BARMM

The evolution of forest policies and laws in the Philippines, including in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), has been profoundly influenced by historical events and changes in governance. The Spanish colonial period introduced the Regalian Doctrine, asserting state ownership over all lands, including forests. This doctrine continued and expanded under American rule, emphasizing commercialization and agriculture, leading to widespread deforestation and significant landscape changes (FAO, 2015).

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During both the American and post-independence Philippine governments, resettlement policies, notably through the National Resettlement and Rehabilitation Administration (NARRA), facilitated the migration of people from Luzon and the Visayas to Mindanao. These policies allocated land to new settlers, often displacing indigenous and Muslim populations (MindaNews, 2020). This influx resulted in further deforestation, as forest lands were converted to agricultural areas, exacerbating socio-political tensions and fueling conflicts over land rights and cultural identity (Conciliation Resources, 2023).

The post-colonial era saw significant legislative changes, marking a new approach to forest management. The Public Land Act and Presidential Decree 705, the Revised Forestry Code of 1975, established critical precedents, including the definition of protected forest lands and the introduction of the National Integrated Protected Areas System (NIPAS) law of 1992 (Republic Act No. 7586) (Republic of the Philippines, 1992). This law highlighted sustainable "multiple use" of forests, rehabilitation of degraded areas, and involvement of both private sector and local communities in forest management (Philippine Center for Investigative Journalism, 2021).

Recent initiatives like Executive Orders 23 and 26 in 2011, establishing a moratorium on timber cutting and launching the National Greening Program (NGP), respectively, have aimed to reverse deforestation trends and promote sustainable forest management (Department of Environment and Natural Resources, 2022). The NGP targets planting 1.5 billion trees over 1.5 million hectares.

In BARMM, the Muslim Mindanao Autonomy Act No. 161, or the Regional Sustainable Forest Management Act of 2003, represented a move towards regional autonomy in forest management (Autonomous Region in Muslim Mindanao, n.d.). The adaptation of Executive Order No. 23 through Regional Executive Order No. 001 in 2011 in ARMM, and its continuation in BARMM through Memorandum Circular 008 in 2019, demonstrate the region's dedication to forest conservation.

Overall, the evolution of forest policy in the Philippines and BARMM reflects a transition from colonial exploitation to a focus on sustainable management and conservation. These policies respond to environmental challenges while also addressing the socio-political dynamics of the region, influencing land use, stakeholder involvement, and shaping future forest management strategies.

# Contemporary Challenges in Forestry: Focus on the Bangsamoro Autonomous Region in Muslim Mindanao

Forestry in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), and the Philippines at large, confronts significant challenges linked to outdated policies and changing forest management dynamics. A critical issue is the reliance on the antiquated Revised Forestry Code of the Philippines of 1975 (PD 705), originally intended to promote commercial logging (Philippine Center for Investigative Journalism, 2021). This legislation requires updates to align with current socio-economic and environmental needs, particularly in establishing clear criteria for tree cutting.

The execution of initiatives like the National Greening Program (NGP) and the Muslim Mindanao Autonomy Act No. 161 often falls short due to various constraints, including insufficient funding, lack of inter-agency coordination, and inadequate enforcement. This discrepancy between policy formulation and execution undermines conservation and sustainability efforts. For instance, the NGP has faced criticisms for ineffective implementation, marked by poor monitoring and low survival rates of planted trees (Philippine Institute for Development Studies, 2016). The program's

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budget allocation further suggests a focus on forest development over protection (Vista et al., 2016).

Experts identify weak policies and governance, poverty, population pressure, market demand, economic development, and technological and biophysical factors as primary drivers of deforestation in the Philippines (Carandang et al., 2013). These challenges reflect broader global issues, as international reports underline the impact of inadequate resources, land use change, weak institutional frameworks, and socio-economic challenges like population growth and poverty (United Nations, 2021).

In BARMM, there is a notable legislative gap in prioritizing environmental laws. Republic Act 11054, governing the region, missed an opportunity to emphasize the need for a Forestry Code crucial for establishing regional patrimony and autonomy. Instead, the focus has been on administrative, local government, and civil service codes, among others. The existing Muslim Mindanao Autonomy Act No. 161, or the Regional Sustainable Forest Management Act of 2003, has not been effectively implemented due to limited budget allocation and the overshadowing of socio-political issues during the Arroyo-Ampatuan administration. This act requires an update to fit the new administrative setup of the Autonomous Region.

Moreover, both the National Government and BARMM have previously overlooked continuous national funding for the Greening Program. Article XI, Section 13 of Republic Act 11054 underscores the importance of continued national funding for various programs, supplemented by the Bangsamoro Government. Recent developments, including the inclusion of the NGP in the National General Appropriation Act for 2023 and bilateral discussions between the Department of Environment and Natural Resources (DENR) and the Ministry of Environment, Natural Resources and Energy in BARMM, indicate progress towards more effective forest management and conservation strategies in the region.

In conclusion, tackling these challenges necessitates a comprehensive approach, including updating forestry laws, enhancing program implementation and monitoring, addressing deforestation causes, and integrating forest management strategies into the broader socioeconomic and political agenda. Strengthening policy implementation and enforcement, improving data collection and analysis, and encouraging stakeholder collaboration are vital for sustainable forest management in BARMM.

### Integrated Forestry and Socio-Economic Development Initiatives in BARMM

The Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) has launched several key initiatives focusing on forest conservation, sustainable agriculture, and socio-economic development:

- 1. **Community-Based Forest Restoration and Management Program (CBFRMP)**: Implemented under Regional Executive Order 004 (Office of the Chief Minister, March 2022), the CBFRMP aims to promote sustainable forest management and environmental protection (BARMM Official Website, 2019). The program emphasizes rehabilitating denuded forests, climate change adaptation, disaster risk reduction, and encourages community and private sector participation.
- 2. **Integrated Bangsamoro Greening Program (IBGP)**: Initiated by MENRE on November 23, 2019, the IBGP focuses on ecological rehabilitation and reforestation. It includes projects like 'Kayu ka, Bangsamoro' for decommissioned MILF combatants, targeting the planting of 171.2 million trees across 159,000 hectares (MENRE, 2019).

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- 3. **Kayod ka Bangsamoro (KKB)**: Launched on April 21, 2020, by MENRE, KKB is part of the IBGP. It integrates reforestation with livelihood opportunities, particularly for decommissioned combatants and community partners, and involves multiple agencies (MENRE, 2020).
- 4. **BUFFER Project**: Launched on January 25, 2023, the Bangsamoro Urban Forest for Ecological Restoration (BUFFER) aims to cultivate urban mini-forests and enrich green spaces in urban areas (MENRE, 2023). It focuses on enhancing urban aesthetics, creating wildlife habitats, and promoting eco-friendliness.
- 5. **Community-Based Forest Management (CBFM)**: Inaugurated in November 2022 with UNDP support, CBFM seeks to transform former MILF camps into sustainable and productive forest areas, integrating forestry with peacebuilding (MENRE & UNDP, 2022).
- 6. **BARMM Forest Land Use Plan (BFLUP)**: BFLUP is a framework for sustainable forest management, emphasizing transparency, accountability, and public participation. It involves detailed analysis of forest lands, assessment of land uses, and delineation of protection and production forest lands (BARMM Government, 2023).
- 7. **Bangsamoro Green Corridor**: The proposed Bangsamoro Green Corridor aims to rehabilitate the Dimapatoy Watershed and Mt. Minandar area, involving tree planting to prevent soil erosion and landslides (MENRE-FMS, 2022).
- 8. **Interactive Monitoring System for Sustainable Forest Management**: This proposed system seeks to enhance forest monitoring using advanced technology like UAVs and the Rainforest Connection Guardian for illegal logging detection (MENRE-BARMM, 2023).

These initiatives represent BARMM's comprehensive approach to environmental conservation and community development, embodying its commitment to sustainable practices and ecological balance. They are guided by the concept of Al-Khalifah, a fundamental Islamic principle of environmental protection and management.

### **Risk Assessment and Forest Cover Dynamics in BARMM**

The decline in forest cover in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) presents significant ecological and environmental risks:

- 1. **Climate Change Amplification**: Forest loss exacerbates climate change, transforming natural carbon sinks into carbon emission sources, thereby contributing to global temperature rise and increased wildfire risks (Agduma et al., 2023).
- 2. Water Cycle and Soil Disruption: Forests play a crucial role in the water cycle and help prevent desertification. Deforestation results in reduced precipitation and river flow, affecting water availability and soil quality, which in turn leads to decreased agricultural productivity and increased land erosion (Agduma et al., 2023).
- 3. **Impact on Human Communities**: Indigenous and rural communities dependent on forests face significant impacts. The loss of forests often forces these communities to migrate, disrupting traditional lifestyles and causing socio-economic hardships (Agduma et al., 2023).
- 4. **Biodiversity Loss**: Forests are habitats for a wide array of species. Deforestation results in habitat loss, driving many species towards extinction and leading to a decline in biodiversity, which affects ecosystem stability and resilience (Agduma et al., 2023).

To counter these challenges, initiatives such as the Integrated Bangsamoro Greening Program (IBGP) and the 'BUFFER' program are being implemented (MENRE, 2019; MENRE, 2023). The

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IBGP, in collaboration with the World Food Programme and BARMM ministries, focuses on forest protection, conservation, rehabilitation, aiding decommissioned combatants in agriculture, and implementing climate change adaptation strategies (MENRE, 2019). The 'BUFFER' program emphasizes creating urban mini-forests for climate change mitigation (MENRE, 2023). Additionally, MENRE-BARMM's widespread tree planting efforts aim to enhance environmental awareness and protection, highlighting the significance of these initiatives in mitigating the impact of reduced forest cover in BARMM (MENRE-BARMM, 2023).

### Economic Analysis of Forestry Initiatives in BARMM

# Economic Advantages of Sustainable Forestry in BARMM: Lessons from Costa Rica's REDD+ Success

The 270,113.44 hectares of forest cover in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) present significant opportunities for economic growth through sustainable forestry practices. Drawing inspiration from Costa Rica's REDD+ program success, which resulted in \$16.4 million in earnings from carbon emission reductions and could potentially increase to \$60 million, BARMM has the potential to benefit economically from similar initiatives (World Bank Group, 2022). Participation in REDD+ initiatives could enable BARMM to capitalize on carbon reduction efforts, potentially earning an estimated \$5,064,627.04 (or 283,619,114.01 pesos). This approach not only promotes biodiversity and effective forest management but also contributes to climate change mitigation, aligning with global environmental objectives and potentially generating substantial revenue while bolstering local communities.

### Sustainable Timber Industry: A Pathway to Economic Growth in BARMM

The timber industry in BARMM, leveraging its extensive forest cover, can significantly benefit from adopting sustainable management practices. Allotting 30% of the forest cover for timber production strikes a balance between economic growth and environmental preservation. This measured approach to natural resource use is projected to yield approximately Php 283,590,708,093 in total revenue over a decade, underscoring the industry's economic potential when integrated with sustainable practices. Annex D provides the revenue calculation formula, incorporating market timber prices, wood volume per hectare, and tree survival rates.

Adopting responsible harvesting techniques, promoting reforestation, and adhering to certification schemes can attract international markets increasingly seeking ethically sourced wood products. Sustainable practices can yield better long-term returns and preserve biodiversity, ensuring the sustainability of timber resources. Additionally, investing in local processing can further enhance value, creating employment opportunities and stimulating the local economy. Such strategic development of the timber industry positions BARMM as a potential model for sustainable forestry, not only in the Philippines but also globally.

### Forest Management in Various Philippine Regions and Municipalities

An examination of forest management in various regions of the Philippines, alongside the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), offers a comprehensive view of diverse forest types, strategies, challenges, and initiatives, providing broader insights into forest management practices across the nation.

1. Caraga Region: Navigating Environmental and Economic Challenges

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- *Environmental Challenges*: Illegal logging and mining in Caraga pose threats to biodiversity and disrupt ecological balance, affecting local livelihoods (Domingo & Manejar, 2019).
- *Community Involvement*: Indigenous communities are crucial in forest preservation but face challenges due to resource limitations and insufficient political support.
- *Government Initiatives*: Environmental law enforcement in Caraga is hampered by issues like corruption and understaffing, while reforestation efforts show uncertain long-term efficacy.

### 2. Palawan: Sustainable Development and Ecotourism

- *Policy Implementation*: Palawan employs a Strategic Environmental Plan with controlled-use zones, balancing conservation and development.
- *Ecotourism Impact*: While economically beneficial, ecotourism in Palawan poses challenges in managing tourist influx and resource protection.
- *Community-Based Sustainable Tourism (CBST)*: CBST initiatives effectively involve local communities in conservation, promoting sustainable livelihoods while maintaining environmental integrity.

### 3. Cagayan Valley: Protecting the Sierra Madre and Tackling Illegal Logging

- *Sierra Madre Significance*: The Sierra Madre, crucial for biodiversity and climate regulation, represents the Philippines' largest remaining tropical rainforest.
- *Enforcement Challenges*: Addressing illegal logging in the Sierra Madre is challenging due to various factors, including resource constraints and geographical scale.
- *Community and Government Efforts*: While local community involvement is essential, more cohesive and sustained efforts are needed for effective conservation.

# 4. Wao, Lanao del Sur (BARMM): Progressive Forest Law Enforcement and PES Model

- *Multi-Sectoral Collaboration*: Wao's MENRC is instrumental in addressing environmental and resource conflicts.
- *Forest Protection and Law Enforcement*: Local ordinances and executive orders, supported by active forest rangers, have reduced illegal logging activities (Wao LGU, Enforcement Status).
- *Innovative Financing through PES*: The PES model for the Banga watershed offers financial incentives for protection, ensuring sustainable conservation and economic benefits (Department of Environment and Natural Resources Autonomous Region in Muslim Mindanao, 2010).

# 5. Upi, Maguindanao (BARMM): Watershed Management and Community Participation

- *Watershed Protection*: Upi's PES scheme for the Romagongrong Watershed emphasizes sustainable water management and forest conservation.
- *Community Engagement*: Community participation is central to watershed management in Upi, promoting shared responsibility and sustainable resource management. (Department of Environment and Natural Resources Autonomous Region in Muslim Mindanao, 2010).

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### **Comparative Analysis and Insights**

This analysis reveals significant regional differences and similarities in forest management. Key lessons include the importance of region-specific strategies that harmonize environmental conservation with socio-economic development. Policy implications point to the necessity of strengthening enforcement, enhancing community participation, and fostering sustainable economic opportunities (Domingo & Manejar, 2019).

The overview of forest management in the Philippines highlights the importance of contextspecific approaches, blending strong policy implementation, technological advancement, and community involvement. Sustainable forest management in the Philippines is a multifaceted endeavor, requiring strategies as dynamic as the forests themselves.

#### 4. CONCLUSION

In summary, this research provides a nuanced understanding of the current state and historical evolution of forest management in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). It highlights the critical intersection of environmental sustainability, socio-economic development, and regional governance in the unique ecological and political landscape of BARMM. The analysis underscores the diversity of forest types in BARMM, emphasizing their ecological significance and alarming trends of deforestation and forest degradation. The evolution of forest management policies, transitioning from exploitative practices to sustainable management, reflects a growing recognition of the need to balance environmental conservation with economic growth.

One key aspect of the study is the identification of contemporary challenges. These include the imperative for robust policy implementation, addressing data gaps, integrating sustainable forest management practices, adapting to climate change impacts, and reconciling the needs of local communities with conservation objectives. The research also recognizes initiatives in BARMM aimed at aligning forest conservation with socio-economic development, such as the Community-Based Forest Restoration and Management Program and the Integrated Bangsamoro Greening Program. However, there is a need for a comprehensive risk assessment, considering the adverse effects of diminishing forest cover on climate, biodiversity, and human communities.

Importantly, this research identifies economic opportunities inherent in sustainable forestry. Initiatives like REDD+ and sustainable timber industries not only offer economic benefits but also align with global environmental goals, presenting a win-win scenario for both the region and the planet.

Comparative analyses with other Philippine regions provide valuable insights, underscoring the importance of context-specific, region-specific approaches in forest management.

In conclusion, this paper advocates for a holistic approach in BARMM involving effective policy execution, enhanced data collection and analysis, adoption of sustainable forest management practices, and active community participation. It emphasizes the pivotal role of collaborative efforts among government bodies, NGOs, local communities, and international partners in achieving sustainable forestry goals. This multifaceted strategy is crucial for ecological conservation, climate change mitigation, and fostering socio-economic growth in BARMM, setting a precedent for future policy formulation and forest management initiatives.

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# Comprehensive Recommendations and Policy Proposals for Sustainable Forest Management in BARMM

### A. Comprehensive Recommendations:

### 1. Enhanced Policy Implementation and Governance:

- Develop a robust legal and institutional framework aligned with international best practices and local realities.
- Establish an independent oversight body to monitor policy implementation.
- Facilitate cross-departmental coordination to streamline governance.

### 2. Robust Data Collection and Monitoring:

- Deploy satellite imagery and remote sensing technologies for real-time forest monitoring.
- Train local staff in data analysis and interpretation.
- Collaborate with international organizations for knowledge exchange in forest data management.

### 3. Community Engagement and Empowerment:

- Create platforms for community dialogue and participation in decision-making.
- Implement incentive schemes for communities practicing sustainable forestry.
- Develop local leadership and management skills through targeted training programs.

### 4. Promotion of Sustainable Economic Opportunities:

- Provide subsidies or tax incentives for businesses adopting sustainable practices.
- Develop certification schemes for sustainably produced forest products.
- Enhance market access for products from sustainably managed forests.

### 5. Climate Change Adaptation and Mitigation Strategies:

- Incorporate predictive modeling to assess future climate impacts on forests.
- Develop a carbon credit system for forest conservation efforts.
- Engage in international climate change forums to align strategies with global efforts.

### 6. **Biodiversity Conservation Efforts:**

- Implement targeted species recovery programs.
- Establish ecological corridors to facilitate wildlife movement.
- Enhance surveillance and control measures against poaching and illegal wildlife trade.

### 7. Cross-Sector Collaboration:

- Develop joint initiatives with sectors like agriculture, water resources, and urban development.
- Establish regular multi-stakeholder meetings and workshops.
- Create a platform for knowledge sharing and best practice dissemination.

### 8. Customized Solutions and Learning from Regional Comparisons:

- Conduct comparative studies with similar ecological zones globally.
- Tailor international best practices to fit local cultural and socio-economic contexts.
- Establish pilot projects to test and adapt approaches.

### 9. Public Awareness and Environmental Education:

- Develop targeted campaigns for different demographic groups.
- Integrate traditional knowledge and cultural practices into educational materials.

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• Encourage public participation in forest conservation activities.

### 10. Long-term Strategic Planning:

- Incorporate scenario planning to address potential future risks.
- Regularly review and update strategies based on new data and emerging trends.
- Foster long-term investment in forest infrastructure and research.

### **B.** Policy Recommendations:

- 1. Legislative Reforms for Sustainable Management:
  - Review existing forestry laws to identify gaps and areas for improvement.
  - Engage stakeholders in the legislative process to ensure buy-in.
  - Incorporate international environmental agreements into local law.

### 2. Decentralized Forest Governance:

- Empower local authorities with the necessary resources and authority.
- Foster partnerships between local governments and indigenous communities.
- Implement mechanisms for transparent and accountable local governance.

### 3. Capacity Building and Resource Allocation:

- Invest in training programs for forest managers and policymakers.
- Allocate financial resources for the acquisition of modern forestry tools and equipment.
- Establish scholarships and internships in forest management and conservation.

### 4. Public-Private Partnerships (PPPs) in Forestry:

- Develop guidelines for sustainable and ethical practices in PPP agreements.
- Promote risk-sharing mechanisms between public and private entities.
- Monitor and evaluate PPP projects for environmental and social impacts.

### 5. Regulatory Framework for Logging and Land Use:

- Implement a rigorous permitting process for logging activities.
- Develop land-use plans that balance conservation with development needs.
- Enforce strict penalties for illegal logging and land encroachment.
- 6. Climate Change and Environmental Policies:
  - Integrate forest conservation into national climate action plans.
  - Develop policies for forest resilience and adaptation.
  - Promote reforestation and afforestation as climate change solutions.

### 7. Biodiversity Protection and Wildlife Conservation Laws:

- Establish new protected areas and strengthen the management of existing ones.
- Develop a national strategy for wildlife conservation.
- Increase funding for anti-poaching units and technology.

### 8. Community-Based Forest Management (CBFM) Policies:

- Provide technical and financial support to CBFM initiatives.
- Develop a legal framework to recognize and protect community forest rights.
- Facilitate access to markets for community-produced forest products.

### 9. Research and Innovation in Forestry:

- Fund research projects focusing on sustainable forest management and conservation.
- Encourage private sector investment in forestry research.
- Promote exchange programs with international research institutions.

### 10. Monitoring, Reporting, and Verification (MRV) Systems:

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- Develop a comprehensive MRV framework for forest management.
- Train local staff in MRV methodologies.
- Ensure the transparency and accessibility of MRV data to all stakeholders.

The proposed recommendations align closely with the Bangsamoro Sustainable Development Board Act of 2022, emphasizing robust governance, data-driven monitoring, and community engagement. These recommendations synergize with the Act's principles of sustainable development, ecological balance, and inclusive governance. Key areas such as advanced data collection, economic incentives for sustainable practices, and cross-sector collaboration particularly complement the Act's focus on integrated, evidence-based, and adaptive environmental management. This alignment underscores a comprehensive approach to achieving sustainable forestry within the framework of the Bangsamoro region's legislative directives.

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Annex

Annexes A. Decadal Dynamics of Forest Cover in BARMM Provinces: A Comparative Analysis of Open, Closed, and Mangrove Forests (2010-2020)

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Annex B. Land Cover Changes in Mainland BARMM: Comparative Data for 2010 and 2020



### Annex C. Land Cover Changes in BaSulTa Region: Comparative Data for 2010 and 2020

#### International Journal of Education Humanities and Social Science ISSN: 2582-0745 Vol. 8, No. 03; 2025 Value Land Cover Changes in BaSulTa Region: Comparative Data for 2010 2 43,418 and 2020 Year Province 2010 2020 Type Annual Crop 83 Basilan 2.838 Brush/Shrubs 3.259 Built-up 173 406 Closed Forest .308 5,579 291 292 771 Fishpond 312 Grassland 285 Inland Water 336 6,284 Mangrove Forest 5,867 106 1,635 Marshland/Swamp Open Forest 520 . Open/Barren 393 154 1,560 Others (no data) 2.269 L8,977 53 Perennial Crop 18,921 Wooded grassland Annual Crop 2,744 1,004 Sulu Brush/Shrubs 3,254 12,670 Built-up 485 1.713 Closed Forest 64 Fishpond 66 652 Grassland 115 Inland Water 707 1,425 Mangrove Forest 9.278 Marshland/Swamp Open Forest 683 2,645 Open/Barren 476 192 4,987 5,762 Others (no data) Perennial Crop 18,757 154 Wooded grassland Tawi-Tawi Annual Crop Brush/Shrubs 12,985 8,002 Built-up 191 403 Closed Forest 22 29 Fishpond 787 Grassland 2,799 557 Inland Water 274 Mangrove Forest 9,534 Marshland/Swam Open Forest Open/Barren 1,031 36 Others (no data) 4.650 3.987 Perennial Crop 10 638 5 283 Wooded grassland 1,386

**Annex D.** Solution to the Estimated Total Revenue of the Timber Industry in BARMM Region The following are the step-by-step solution for calculating the total revenues of timber industry in BARMM:

- 1. Forest Cover Allocation to Timber Industry: The government allows 30% of the forest cover to be used in the timber industry.
- 2. Calculation of Production Area: To find out the production area, we take 30% of the total forest cover.
  - Production Area=Forest Cover×30%
  - Production Area=270,113.4×0.30
  - Production Area=81,034.02 hectares
- 3. **Revenue Per Hectare**: The revenue per hectare is given by the volume of wood that can be produced per hectare multiplied by the market price per cubic meter. This is calculated as:
  - Revenue Per Hectare=Volume Per Hectare×Market Price Per
  - Revenue Per Hectare=777.7 m3/hectare×4,500 Php/m3
  - Revenue Per Hectare=3,499,650 Php

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- 4. **Total Revenue for the Production Area**: To get the total revenue, we multiply the revenue per hectare by the production area.
  - Total Revenue=Revenue Per Hectare×Production
  - Total Revenue=3,499,650 Php×81,034.02 hectares
  - Total Revenue=283,590,708,093 Php

This Total Revenue is the amount expected to be generated every 10 years, given that trees are harvested and sold once they reach the age of 8-10 years. This is the complete solution based on the data and constraints provided.