10

Environment and Natural Resources

10 Environment and Natural Resources

A. Context: Rich but Fragile Natural Resources and Ecological Heritage

Equitable and sustainable development is at the heart of the BBL. Recognizing the rich environmental heritage of the Bangsamoro, the BBL commits the Bangsamoro Government to planning development "taking into consideration the natural resources that are available for its use and for the use of future generations."[102] In this regard, the Bangsamoro Government "shall develop a comprehensive framework for sustainable development through the proper conservation, utilization and development of natural resources."[103] The success of this framework will be determined largely by such factors as an enabling environment, availability of capable and responsive institutions, a competent bureaucracy manned by efficient and effective personnel, and an enlightened and proactive constituency.

To manage the competing dynamics of social justice, environmental conservation and economic development, an intergovernmental Bangsamoro Sustainable Development Board (BSDB) will be established to ensure harmonization of environment and development and formulate common environmental objectives between the Central Government and the Bangsamoro Government.

This chapter sets out the current context, strategic goal, programs, and interventions to achieve this vision and translate the potential of the Bangsamoro's physical assets and natural capital into wealth for the wellbeing of its people, while forestalling recurrent costs from external threats like natural hazards and climate change.

The environment is at the center of both the economy and the cultural heritage of the Bangsamoro. Many of its peoples identify deeply with their environment and are named after aspects of it—the Maranaw are the "people of the lake," the Tausug are the"people of the current," the Yakan are the "people of the hill," and Maguindanaoans are the "people of the flooded plain." The Bangsamoro's environment is also characterized by its rich assemblage of varied species and ecosystems. It is home to 10 of the 128 Key Biodiversity Areas in the Philippines, including areas of global ecological significance, whose conservation is essential for the very survival of the Bangsamoro people. With AFF accounting for 63.5% of output (2009–2012 average) in the ARMM, achieving sustainable development and growth is intrinsically linked to having a vibrant and sustainable environment.

However, such activities as deforestation, conversion of forest lands to agricultural areas, illegal fishing, and irresponsible mining and extraction are rapidly undermining the potential for sustainable development. Poor planning and weak governance are adding to this critical situation, as is climate change, which is threatening to render the Bangsamoro people more vulnerable.

A.1. Forests and Watersheds

Approximately 665,000 hectares, about half of the total BCT land area, is legally classified as forestland and inalienable. Of this, 35% is under the National Integrated

Protected Areas System (NIPAS), 24% is under some form of management agreement, and the rest is open access. Data from the 2012 Philippine Forestry Statistics show 45% of BCT forestlands have forest cover.

While this reflects a net increase in forest cover from 2003 to 2010 because of an increase in open canopy forests and mangrove areas, the data also reveal a significant decrease in closed canopy forests for the same period. As forest cover is depleted, biodiversity is also decimated. Although poorly documented, deforestation and degradation of forests—not only in the BCT but across Mindanao—is attributed to various factors, such as direct damages caused by armed conflict, illegal logging, encroachment by IDPs seeking temporary shelter, and land conversion. Other factors include weak enforcement of laws and limited capacity to monitor sustainable use of forestlands due to manpower constraints (i.e., there is only one ranger for every 1,820 ha).[104]

The Bangsamoro forests are home to many indigenous species of fauna and flora. The reduction in primary forests puts a severe stress on preserving them as part of a balanced ecology. It also has a significant impact on watershed areas and their ability to provide water for local communities and to regulate water levels. Forest cover data (see **Table 24**) may seem to negate the forest cover observation but the Forest Management Bureau (FMB) confirms that the annual rate of deforestation in the period from 2003 to 2010 was still 46,900 hectares,[105] which was also considered true for the BCT. The national reforestation average rate for the said period increased significantly from 30,000 ha/year to around 250,000 ha/year, which was assumed to extend also to the BCT.

As shown in **Table 25**, the BCT has four proclaimed watersheds: (a) Lake Lanao (180,460 ha) is a source of hydroelectric power and domestic water for Lanao del Sur and adjacent towns; (b) Kabulnan (4,726 ha) provides irrigation and domestic water supply; (c) South Upi (1,894 ha) provides domestic water supply; and (d) Dimapatoy (3,765 ha) provides potable water for Cotabato City and adjacent municipalities.[106]

These watersheds face increasing incidence of drought and clogging of waterways and irrigation canals due to siltation and water hyacinth infestation. Another issue is water pollution from agriculture and industry. Further pressures come from resettlement in watershed areas, poor and uncoordinated administration of watersheds by national and local government agencies, lack of employment opportunities in the lowlands, and improper waste disposal.

A.2. Aquatic Resources

The Bangsamoro has rich and significant marine and freshwater resources that are closely linked to the sustenance of its people and the economic development

Table 24: Forest Cover Change in ARMM in Hectares (2003–2010)

Province	Land Area	Total Forestland	Forest Cover		Change in Forest Cover (2003–2010)	
			2003	2010	Ha	%
Basilan	132,723	47,149	16,505	21,320	4,815	29.2
Lanao del Sur	387,289	254,154	174,745	150,151	(24,594)	(14.1)
Maguindanao	504,760	198,138	16,354	52,351	35,997	220.1
Sulu	160,040	112,353	24,701	30,839	6,138	24.8
Tawi-Tawi	108,740	53,357	18,041	47,233	29,192	161.8
ARMM Total	1,293,552	665,151	250,346	301,894	51,548	20.6

Source: DENR-FMB and Philippine Forestry Statistics (2011 and 2012)

Table 25: Proclaimed Watersheds in ARMM (2012)

Watershed	Legal Basis	Location	Land Area (ha.)	Major Use
Lake Lanao	Proclamation No. 871 (1992)	All municipalities and city within Lake Lanao watershed	18,460	Hydroelectric power, domestic water source for Lanao del Sur and adjacent towns
Kabulnan	Proclamation No. 06 (1992)	Salman and Saniag, Municipality of Ampatuan, Maguindanao	4,726	Irrigation under the KIADP program and domestic water supply source for the province
South Upi	Proclamation No. 65 (1987)	Municipality of Upi, Maguindanao	1,894	Domestic water supply source
Dimapatoy	Proclamation No. 18 (2001)	Municipalities of Datu Odin Sinsuat and North Upi, Maguindanao	3,765	Potable water supply source for Cotabato City and adjacent municipalities

Source: DENR-ARMM (2012)

of the region and the Philippines as a whole. Environmental degradation is significantly affecting the productive capacities of these aquatic resources with a disproportionate impact on the poorest segments of society who rely on them for survival.

A.2.1. Freshwater Resources

The Lake Lanao, the largest freshwater lake in the country, and the only ancient lake in Southeast Asia, is the biggest protected area in the Bangsamoro. It is a biodiversity site of global significance, being home to 18 endemic species of freshwater fish and supporting a large number of bird species.

It is also critical to hydroelectric power production, supplying 65% of total energy in Mindanao.[107] Ironically, the host province of Lanao del Sur has the highest poverty incidence in the Philippines.[108] This indicates that the benefits of the BCT's natural resources have not extended to its people.

The Ligawasan Marsh, fed by the Mindanao River Basin, has a combined area of 285,000 ha, close to 20% of the total land area of the Bangsamoro region. It is the major source of livelihood in 20 municipalities and one city, and it straddles Maguindanao, North Cotabato, and Sultan Kudarat. It is cultivated during the dry season and fished during the wet season. It supports threatened endemic species such as the Philippine eagle, the Philippine duck, and the Philippine crocodile. In view of this, 43,900 ha of Ligawasan Marsh has been declared a Game Refuge and Bird Sanctuary and is globally recognized as an Important Bird Area.

These water bodies are suffering from increasing siltation caused by soil erosion and from pollution and declining biodiversity. Deforestation and large-scale forestland conversion in the upper watersheds; regulated river flow because of dams constructed primarily for irrigation and hydropower plants; conversion of marsh areas to agriculture and fishponds; resettlement along the coastal areas; and charcoal-making have led to degradation of the BCT's aquatic resources, threatening their continued capability to sustain the Bangsamoro.

Although water demand is projected to remain within the supply capacity of the Mindanao River, environmental degradation may affect the recharge potential of the region's groundwater reservoirs and watersheds, which will seriously threaten water availability in the near term.

A.2.2. Marine Resources

The BCT has 3,232 km of coastline and 18,426,613 hectares of territorial ocean waters, including a portion of the Sulu-Sulawesi Sea, which is one of the richest fishing grounds in the country and the epicenter of global marine

biodiversity. This large marine ecosystem is one of the most diverse and productive in the world, recognized for the variety of habitats it supports, from reefs to mangroves and the second highest seagrass diversity in the world.[109]

It hosts the Turtle Islands Wildlife Sanctuary in Tawi-Tawi, one of the first trans-boundary marine protected areas involving the Philippines and Malaysia. It is one of only 10 turtle nesting areas in the world and the only one in the ASEAN region. This marine ecosystem is also considered a biodiversity hotspot. The participation of the Bangsamoro in the trans-boundary management of these marine resources remains minimal and insignificant.

Fishing and seaweed production are the major livelihoods, particularly in Sulu, Basilan, and Tawi-Tawi, contributing to 18% of the national fisheries and 72% of the national seaweed production.[110]

There are increasing threats to coastal and marine resources and their biodiversity from inappropriate fishing and overfishing, pollution, illegal trade of endangered species, and haphazard foreshore land use caused by policies that do not respond to the needs of the growing population.[111] A splintered governance framework among the ARG, the Central Government, and LGUs complicates the management of marine resources.

A.3. Land Governance

While land is an environmental resource, it has widespread cross-sector implications, as briefly discussed in **Chapters 7 and 12.**

Given the complex issues surrounding land rights in the Bangsamoro, the CAB and the BBL provide for administrative powers on land administration and management to the Bangsamoro Government. Related exclusive powers granted to the Bangsamoro Government include: (a) management of ancestral domain, in recognition of IDPs' right to *pusaka inged* (native titles); (b) adoption and implementation of a comprehensive urban land reform program and land use program; and (c) as a function of transitional justice, restoration or reparations arising from any unjust dispossession of territorial and property rights, the quality, quantity and status thereof to be determined mutually by both the Bangsamoro Government and the Central Government.

The various problems in land administration at the national level are magnified in the Bangsamoro region. These include: (a) multiple agencies with duplicating and overlapping functions and complex processes; (b) multiple applicable laws, causing inconsistencies, especially on agency functions and mandates; (c) multiple land titling processes, with the emphasis on a judicial mode of titling (in contrast to the rest of Southeast Asia which uses an administrative mode of titling); (d) multiple forms of ownership; (e) multiple standards for land valuation; and (f) multiple agencies undertaking valuation.[112]

The situation is further exacerbated by (a) inefficient land record management (thus, the limited formal data on land ownership and usage in the Bangsamoro); (b) incomplete and deficient cadastral survey; (c) large number of untitled parcels; (d) weak monitoring of land policy; (e) limited public participation in land use planning processes; (f) lengthy and expensive appeal processes; and (g) weak framework for large scale land investments, resulting in land conflicts, uneven sharing of benefits, and increased investor risks and costs.

For example, the Comprehensive Agrarian Reform Program in the ARMM covers about 340,000 ha,[113] of which 70% had been accomplished by 2011, benefitting 83,000 beneficiaries. Based on Commission on Audit reports, evasion and plunder under Voluntary Land Transfers (VLT) and Voluntary Offers to Sell (VOS) is worse in the ARMM than in the rest of the Philippines.[114]

A.4. Mineral Resources and Other Extractives

Little geological assessment work has been conducted in ARMM to date, resulting in a dearth of reliable and current geologic information to assess the region's

mineral and other extractives potential. The potential for mineralization is deduced from the presence of specific geologic and tectonic settings that are favorable for mineral deposition. The reported presence of minerals in specific areas is also used for inferring the potential for mineralization.[115]

Of the Philippines' total petroleum resources of about nine billion barrels fuel of oil equivalent (bfoe) (or about 690 MTOE), more than half (or about five billion bfoe) is estimated to be deposited in the offshore of West Palawan and Sulu Sea regions.

The BCT is said to hold vast deposits of natural gas and oil, especially Maguindanao along Central Mindanao's 220,000-hectare Liguasan Delta. The last known exploration work, however, was in 1997 by the Malaysian petroleum giant Petronas Carigali and the Philippine National Oil Company. Maguindanao is also said to hold 108,000,000 MT in coal deposits.

Map 12 illustrates the permissible mining areas based on Executive Order No. 79 series of 2012. This includes the existing nickel mining operation in Languyan, Tawi-Tawi.

A.5. Renewable Energy

As discussed in **Chapter 8**, the BCT has various renewable energy resources, including geothermal, wind, solar, and hydroelectric power, providing potential for a sustainable energy base. Biomass is another potentially significant power resource. These existing and potential resources could be explored in line with the overall objective of environmentally-sustainable human development.

A.6. Urban Areas and Residuals Management

Four urban areas—the cities of Marawi in Lanao del Sur, Lamitan and Isabela in Basilan, and Cotabato City in Maguindanao—account for 18% of the Bangsamoro population, with an average density of 1,070 per sq km. In these cities and in the 128 municipalities in the region, only 47 comprehensive land use plans are in effect, mostly from the 1980s and 1990s.[116]

In capital cities and towns, solid waste management is consistently identified as one of the main sources of dissatisfaction. Only one sanitary landfill receives the combined wastes of 128 municipalities and four cities, estimated at 940 MT per day and expected to reach 972.14 MT per day in 2016.[117] The region also has 19 materials recovery facilities (MRFs) serving 19 barangays.

With a high concentration of urban areas along waterways, poor waste management results in flooding and water supply contamination. Only three LGUs have approved solid wastes management plans in compliance with the Ecological Solid Wastes Management Act.

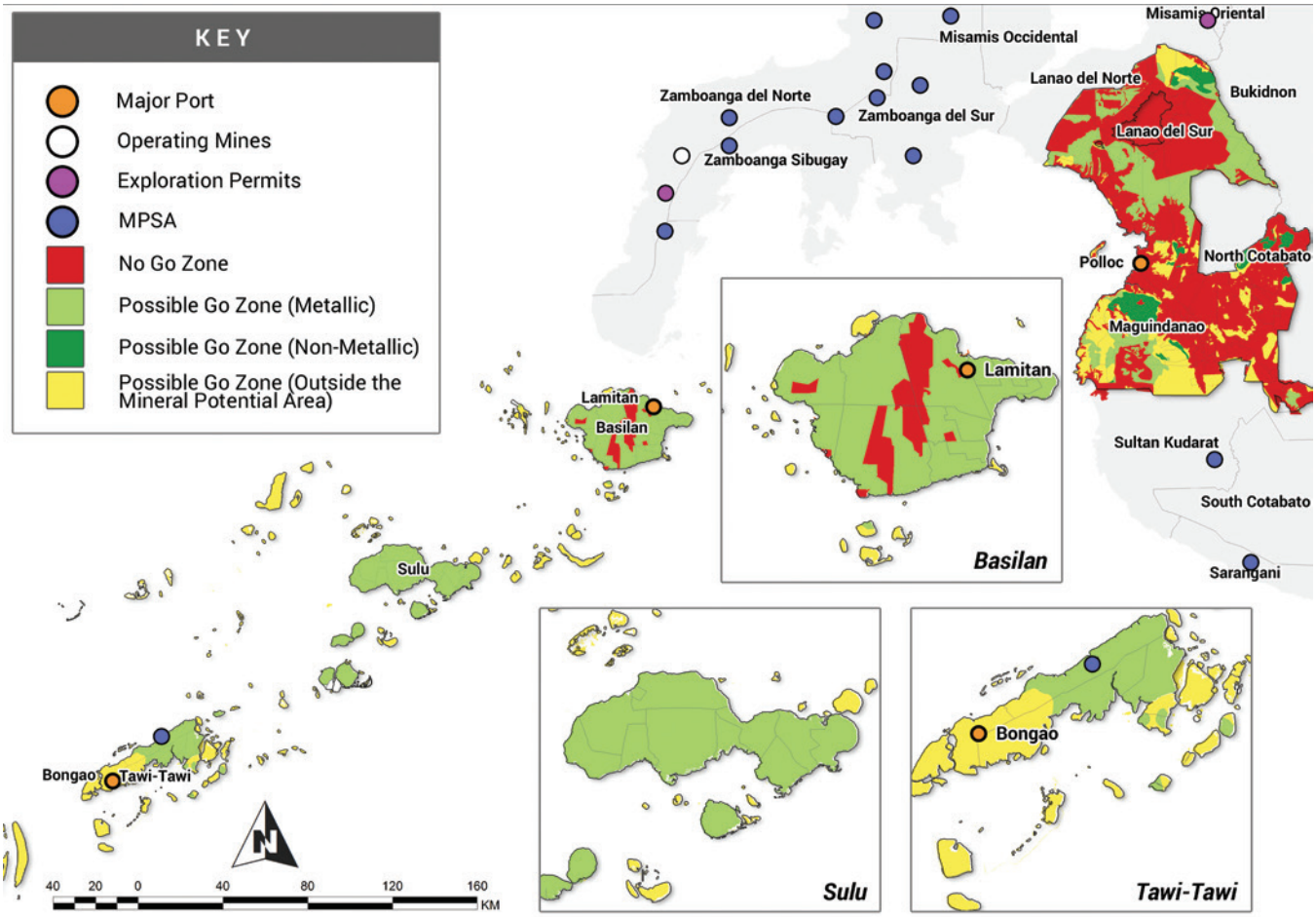
As discussed in **Chapter 9**, the ARMM has been cited as having persistently low coverage rates for safe water and sanitary facilities. It has the poorest access to safe water and to sanitary toilets, at 55% and 34%, respectively.[118]

Consequently, it has the highest reported incidence of water pollution from sewage and the highest reported incidence of sanitation and hygiene-related diseases. The DENR-EMB has designated several BCT water bodies as Water Quality Management Areas (WQMA) for which management plans will be drawn up, to keep water quality within the water body's classification or improve the quality to higher classification.

A.7. Climate Change Adaptation and Disaster Risk Reduction and Management

Like many other parts of the Philippines, the Bangsamoro is prone to natural hazards, many of which are aggravated by climate change. These include flooding, rain-induced landslides, volcanic eruptions, storm surges, and earthquakes. Flooding around the Mindanao River Basin frequently causes large-scale displacement. Cotabato City and many municipalities in Lanao del Sur, Maguindanao, North Cotabato are vulnerable to rain-induced landslides. North Cotabato, Lanao del Sur, Lanao del Norte, Maguindanao, and Sultan Kudarat are earthquake-risk areas, with Maguindanao considered high-risk.

Map 12: Integrated Mining Map (EO 79) (2013)



Source: DENR-MGB (2013)

There are at least five volcanic complexes in and around the BCT: (a) Lanao Volcanic Complex; (b) Ragang Volcanic Complex; (c) Mt. Parker; (d) Mt. Matutum Volcano Complex; and (e) Mt. Dajoh.[119]

Particularly vulnerable to storm surges and tsunamis are the coastlines of Basilan, Sulu, and Tawi-Tawi. The periodic El Niño Southern Oscillation (ENSO), which caused the highest economic losses in Maguindanao in 1998, also threatens the region.

While typhoons are infrequent in the ARMM, the peripheral effects of a typhoon passing through neighboring provinces can be felt in the region.[120] PAGASA data show that in the period from 1955 to 2010, a span of 55 years, only four cyclones (one tropical depression, two tropical storms, and one typhoon) passed through the BCT. However, the same number of cyclones passed through the area in just the past four years (2011 to 2013), indicating a radical change in pattern for this hazard.

Climate change projections by PAGASA include an increase of 1.0-1.2°C in the short term (2020) and 2.0-2.4°C in the medium term (2050) in ARMM temperatures. Rainfall in the short term is projected to increase by as much as 7.2% from December to February and decrease by as much as 7.4% from June to August. The frequency of extreme events is also expected to increase significantly. The number of days with temperatures exceeding 35°C is projected to rise at least eightfold from the observed baseline. The number of dry days is projected to increase by more than 150%, and days with extreme rainfall by at least 250%.

Despite these significant risks, the BCT has had no vulnerability and disaster risk assessments and has limited capacity for disaster risk reduction and management and climate change adaptation (see **Map 13**).

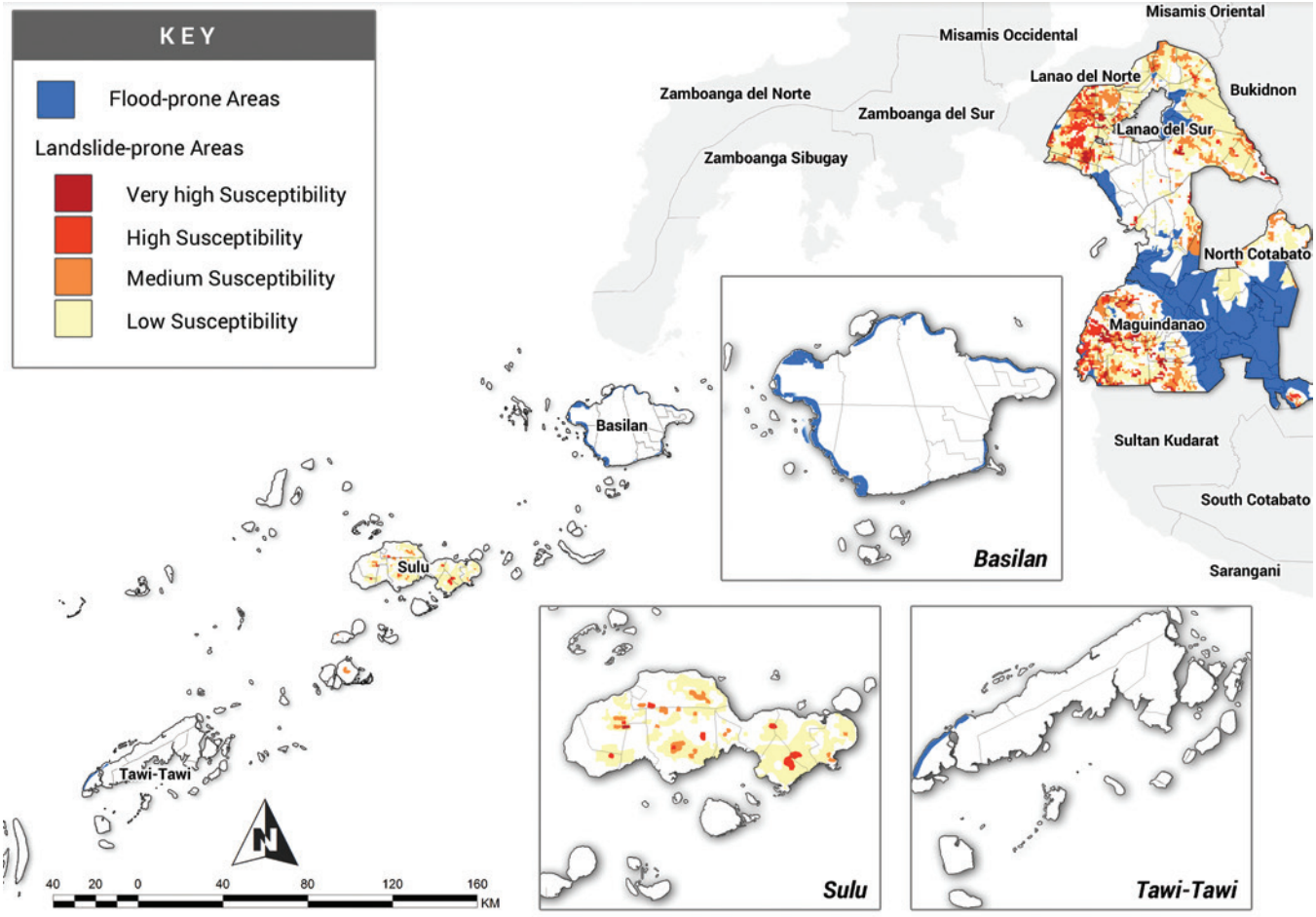
B. Strategic Goals

Sharp focus will be needed on regional and local institution-building for environmental governance to enable the Bangsamoro to manage the environmental threats caused by indiscriminate exploitation and degradation[121] and cope with the impacts of natural hazards and climate change. This will need to be complemented by environmental baseline establishment and quick-impact programs and projects to address both poverty alleviation and wealth creation needs in host communities, and improve the environmental and natural resources base quality for sustainability. The two sectoral goals are: (a) enhancement of the environment and natural resources of the Bangsamoro and (b) increased resilience of local communities to natural hazards and climate change.

To attain these goals, the BDP will aim to:

1. Conserve and enhance the ecological integrity of the Bangsamoro region in the context of comprehensive sustainable development and vicegerency and
2. Enhance the Bangsamoro communities' capacity to manage disaster risks from natural hazards and develop resilience to climate change impacts.

Map 13: Vulnerability (2008)



Note: DENR-MGB describes the degrees of landslide susceptibility as follows:

- **Very High Susceptibility**—Areas usually with steep to very steep slope, and are underlain by weak materials. Recent landslides, escarpments and tension cracks are present. Human initiated effects could be an aggravating factor.
- **High Susceptibility**—Areas usually with steep to very steep slopes, and are underlain by weak materials. Areas with numerous old/inactive landslides.
- **Medium Susceptibility**—Areas with moderately steep slopes. Soil creep and other indications for possible landslide occurrence are present.
- **Low Susceptibility**—Gently sloping areas with no identified landslides.

Source: SERD-CAAM (2008)

C. Strategies

C.1. Environmental Governance

Preserving the rich ecosystem across the Bangsamoro has wide-ranging effects on the wellbeing and economic potential of the region. Sustainable management of environmental resources will improve the ability of communities to benefit from their natural surroundings, reduce the prevalence of flooding, and contribute toward developing a tourism industry in the region. This will require a strong environmental governance regime that will include:

a. Formulation of a **comprehensive framework for sustainable development** in the Bangsamoro and a **Strategic Environmental Management Plan (SEMP)**;
b. **Capacity-development** of Bangsamoro environment and sustainable development institutions, including a Bangsamoro Sustainable Development Board (BSDB) and the envisioned Ministry of Environment;
c. **Integrated Environmental Governance** systems to have a broader form of management for areas of particular ecological significance, such as Lake Lanao and the Ligawasan Marsh;
d. A **mechanism for equitable sharing** in the use of Lake Lanao waters as a source power generation for the effective development of the watershed ecosystem;
e. Strong policies under the **Bangsamoro Waters and Zone of Joint Cooperation** agreed by the Central Government and the Bangsamoro Government;
f. A **comprehensive natural resource assessment**, especially of biodiversity and of mineral deposits;
g. A **culture-based information drive** to help the people of the BCT realize the importance of sustainably managing the environment; and
h. An **ecotourism** development strategy based on preserving landscapes, seascapes, and abundant biodiversity in the BCT. As discussed in **Chapter 7,** the ecotourism potential has high implications on the region's economic growth and promotion of social cohesion.

C.2. Forest and Watershed Restoration

The region's forest cover has been dramatically shrinking over the past decade, and the effects on communities and the ecosystem are evident, with rampant flooding, landslide, temperature increases, etc. This concern will be addressed through:

a. **The restoration and enhancement of degraded and denuded forestlands, including nurseries, and coastal and marine ecosystems** will not only ensure future sustainability of these habitats and their resources, but can also double up as labor creation opportunities;
b. **The protection of hedgerows through planting of appropriate species** that will hold the soil nutrients and prevent from erosion, and siltation;
c. The **immediate forest based livelihoods** from non-timber forest products (NTFP) and agro-forestry in support of forest protection;
d. **Forest boundary delineation** to define the extent of forest cover for both protection and production purposes; and
e. A **strong monitoring mechanism** to ensure that efforts are sustained. This will include hiring of forest guards and sea guards—job positions that can lend themselves well to the out-of-school youth and decommissioned forces.

C.3. Land Governance

The BDP recommends formulating an **interim land policy** that will lead to development in the medium term of a strong and unified policy and legal framework on land rights, with the objective of restoring public confidence in the land administration system and building the foundations of reconciliation and trust-building. This would include a sound institutional framework, with one land administration agency for land registration, cadastral survey and mapping, and collection of land and related fees. It would also call for fair, impartial, and streamlined procedures and reasonable transaction costs that would encourage participatory policymaking.

C.3.1. Short-Term Actions (2015 and Mid-2016)

To reduce the risk of a strong increase in land conflicts and associated violence and instability in the post-CAB environment, three policy actions in the transition period are recommended:

a. **Ensuring adequate and timely information on land conflicts** by strengthening the local institutions' capacity to monitor land conflicts and establishing an early warning system that allows for a rapid response aimed at preventing escalation.

The initial task will be setting up a geographic information system to capture data on land disputes and conflict prevalence, initially focusing on areas where the prevalence of land conflicts is considered the highest and/or the risks of escalation are considered the greatest.

This would include existing data on rights from DENR, LRA, DAR, and NCIP and on land classification, particularly the boundaries of alienable and disposable land from the DENR; mapping of ongoing and potential conflicts related to natural resources and plantations, with particular attention given to the special issue surrounding indigenous peoples and ancestral domains; and mapping of areas likely to be of interest to agribusiness and mining investors.

This information would help focus initial efforts to: understand the nature and extent of disputes; test appropriate mechanisms to resolve them; and provide the basis for selecting initial areas to pilot efforts to register land rights systematically.

It would inform ongoing initiatives, such as the DENR-Land Management Bureau's memorandum of agreement with the ARG to undertake jointly the cadastral survey in Maguindanao and Basilan, and facilitate coordination with the National Land Use Commission (NLUC), an interagency body on land use and physical planning, which was recently strengthened and reformed as a NEDA Board Committee.

The following land-related analytical studies could also be undertaken:

i. Inventory of laws and regulations relating to land and property rights in the Bangsamoro;
ii. Assessment of the capacity of the formal judicial and informal/traditional dispute mechanisms in key locations;
iii. Intentions survey among displaced persons and combatants, to provide an indication of potential population movements and areas where tensions relating to land may emerge; and
iv. Documentation of potential areas for commercial plantations, including assessing the availability of land and willingness of small holders to participate in plantation ventures.

b. **Limiting the number of land conflicts that may arise from the CAB** by implementing a joint information campaign aimed at discouraging people to take land matters in their own hands and encouraging respect for past and current land rights.

c. **Ensuring that existing land conflicts can be resolved** by strengthening the capacity of local institutions to mediate land conflicts, especially through improved coordination, communication and learning among the different actors involved. These mechanisms would need to provide for sustainable settlements, framing jurisdictions acceptable to the law of the community and Islam. Establishment of an ad hoc mediation body for dealing with land dispute that cannot readily be dealt with the local level could also be considered.

All the above actions would need to reflect the cultural sensitivities to the traditional forms of land ownership,

especially in some Moro communities, and also in some IP communities, where, among other things, individual titles are not necessarily desired or feasible at this time.

C.3.2. Medium-Term Actions (Mid-2016 to 2022)

A land policy will be needed to provide the basis for the legislative agenda of the Bangsamoro Government on land tenure, with the objective of developing a participatory, systematic, and cost-effective registration process. Given that a significant number of existing land titles are in dispute, it would be important to have a comprehensive communication and outreach program.

C.4. Urban Ecosystem and Waste Management Program

The Bangsamoro urban areas are crowded and their being located along rivers and coastlines contributes significantly to pollution in the region. To tackle this, the Bangsamoro Government would need to:

a. Formulate a **Bangsamoro Core Territory Sustainable Cities/Towns Plan** and initiate redevelopment in pilot areas to serve as a model for urban management in the region;
b. Develop and implement a **comprehensive residuals management program** and a **comprehensive waste management program** across the BCT, including installation of additional waste treatment facilities; and
c. Work with LGUs to establish and operationalize **solid waste management councils**.

C.5. Climate Change Adaptation and Disaster Risk Reduction

Communities across the Bangsamoro are vulnerable to climate change and disasters, and have very little capacity for prevention. The Bangsamoro Government would need to:

a. Conduct **Comprehensive Vulnerability Assessments** across the region;
b. Support LGUs to formulate risk-based **comprehensive land use plans (CLUP)**; and
c. **Build the capacity of officials in LGUs and the Bangsamoro Government** for climate change adaptation and disaster risk reduction.

D. Summary of Priority Programs

The programs to achieve the goals and objectives and respond to the problems identified in the region are described in **Table 26.**

Table 26: Priority Environment and Natural Resource Programs*

Objectives	Priority Programs	Components
To preserve the ecological integrity of the Bangsamoro in the context of comprehensive sustainable development	**Environmental Governance**	• Formulation of a comprehensive framework for sustainable development in the Bangsamoro comprising key legislative measures and a Strategic Environmental Management Plan (SEMP) • Capacity-development of Bangsamoro environment and sustainable development institutions, including creation of a Bangsamoro Sustainable Development Board (BSDB) and a Ministry of Environment • Integrated Development for Lake Lanao and Liguasan Marsh • Strengthen and support Community Empowerment for Environmental Conservation and Protection • Policy for the Bangsamoro Waters and Zones of Joint Cooperation • Comprehensive Biodiversity Assessment of the Bangsamoro • Restoration and enhancement of degraded/denuded forest lands (including nurseries) and comprehensive coastal and marine reform program • Establishment of monitoring mechanisms (including hiring of forest guards and sea guards)
	Urban Ecosystem and Waste Management Program	• Formulation of BCT Sustainable Cities/Towns Model Plan(s) and initiation of redevelopment • Development and implementation of a BCT-wide comprehensive residuals management program • Establishment and operationalization of LGU-level solid waste management councils • Ecological Solid Waste management program
Reduce land conflict (short-term and long-term)	**Comprehensive Land Administration and Management Reform Program for the Bangsamoro**	• Mapping and analytical work on land rights and land conflict • Strengthening of conflict mediation mechanisms
To enhance Bangsamoro communities' adaptive capacity for climate change and DRRM	**CCA/DRRM for Social Justice and Mitigation of Displacement**	• Comprehensive Vulnerability Assessments and Watershed Characterization • Formulation of risk-based Comprehensive Land Use Plans (CLUPs) for all LGUs in the Bangsamoro • CCA/DDRM capacity-building

*** Programs on mineral resources and other extractives can be found in Chapter 7.**

NOTES

102 "Proposed Bangsamoro Basic Law," Article XIII, Section 2.
103 Ibid., Section 3.
104 This was confirmed by DENR-ARMM FMS Director Ismael Mabaning during a meeting discussion on August 19, 2014 at the DENR-ARMM office.
105 National Mapping and Resource Information Agency (2010).
106 Department of Energy and Natural Resources-Autonomous Region in Muslim Mindanao (2012).
107 Japan International Cooperation Agency (2014) and Benito (2014).
108 Philippine Statistics Authority (2012).
109 World Wildlife Fund (2014).
110 Malik and Alcos-Cabangbang (2013).
111 Mindanao Development Authority (2012).
112 See Tiamson and Ballesteros (2013).
113 According to the Census of Agriculture, this figure is well below the 520,000 ha of temporary and permanent crops, suggesting a large number of exclusions at the scoping stage.
114 Gutierrez and Borras (2004).
115 Japan International Cooperation Agency (2014).
116 Housing and Land Use Regulatory Board (2014).
117 National Solid Waste Management Commission (2014).
118 Department of Health (2011).
119 MRBIMDP (2012) and PDPFP Sulu (2013).
120 Tio (2014).
121 The *ARMM Regional Development Plan* (2013) identified the causes of environmental degradation and exploitation of resources as weak enforcement of laws, low level of awareness on the benefits of the environment, lack of LGU support, and climate change vulnerability.