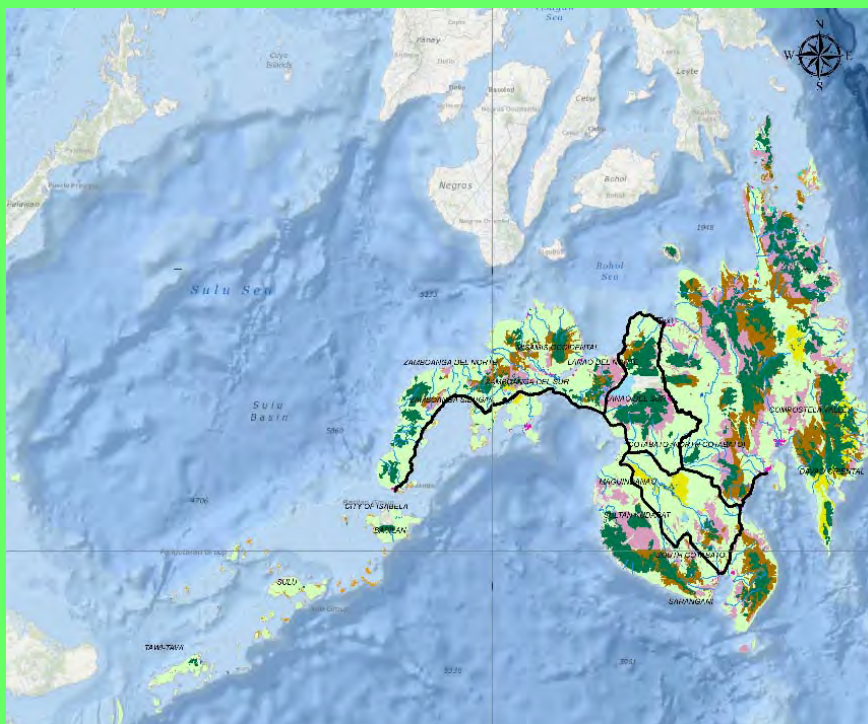


Comprehensive Capacity Development Project for the Bangsamoro

Development Plan for the Bangsamoro

Final Report

Sector Report 3: Environment



April 2016

RECS International Inc.
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The Republic of the Philippines
Bangsamoro Transition Commission (BTC)
Bangsamoro Development Agency (BDA)

Japan International Cooperation Agency
(JICA)

Comprehensive Capacity Development Project
for the Bangsamoro
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Source of GIS map on the cover: JICA Study Team (base map by U.S. National Park Service).

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Abbreviations

AAD	annual average daily traffic	BLMI	Bangsamoro Leadership and Management Institute
AAGR	average annual growth rate		
AAIIBP	Al-Amanah Islamic Investment Bank of the Philippines	BLMO	Bangsamoro Land Management Office
A&D	alienable and disposable	BOD	board of directors
AC	advisory circular	BOI	Board of Investment
ACC	Area Control Center	BPO	business process outsourcing
ACSR	aluminum conductor steel reinforced	BS	Bachelor of Science
		BSP	Central Bank of the Philippines [Bangko Sentral ng Pilipinas]
ADB	Asian Development Bank		
AFB	association of farmer beneficiaries	BSWM	Bureau of Soils and Water Management
AFMA	Agriculture and Fisheries Modernization Act		
AFP	Armed Forces of the Philippines	BTA	Bangsamoro Transition Authority
AHFF	agriculture, hunting, forestry, and fishery	BTB	boom truck with bucket
		BTC	Bangsamoro Transition Commission
		BTD	boom truck with digger
AJD	Agrarian Justice Delivery	BuB or BUB	bottom-up budgeting
AMARDI	Al Mujahidun Agro Resources and Development Inc.	CA	College of Agriculture
		CA	compulsory acquisition
AO	Administrative Order	CAAM	Conflict Affected Areas of Mindanao
ARB	agrarian reform beneficiary		
ARBO	ARB organization	CAAP	Civil Aviation Authority of the Philippines
ARC	agrarian reform community		
ARCDSP	ARC Development Support Project	CAB	Comprehensive Agreement on Bangsamoro
ARCESS	ARC Connectivity and Economic Support Services	CADT	certificate(s) of ancestral domain title
ARG or ARMM-RG	ARMM Regional Government		
ARMM	Autonomous Region in Muslim Mindanao	CAGR	compound annual growth rate
		CALABARZON	Cavite, Laguna, Batangas, Rizal, and Quezon
ARMM HELPS	ARMM Health, Education, Livelihood, Peace and Governance and Synergy (Program)	CALT	certificate(s) of ancestral land title
		CARD	Center for Agricultural and Rural Development
ARMMIARC	ARMM Integrated Agricultural Research Center	CARL	Comprehensive Agrarian Reform Law
ASEAN	Association of South East Asian Nations	CARP	Comprehensive Agrarian Reform Program
ASPBI	Annual Survey of Philippine Business and Industry	CARPER	CARP-Extension with Reforms
		CASELCO	Cagayan De Sulu Electric Cooperative
AT	Agricultural technician		
ATI	Agricultural Training Institute	CBCRM	community-based coastal resource management
ATM	air traffic movement		
ATM	automated teller machines	CBFM	Community-Based Forest Management (Program)
AWG	American wire gauge		
BASELCO	Basilan Electric Cooperative	CBFMA	community-based forest management agreement
BASULTA or BaSulTa	Basilan, Sulu, and Tawi-Tawi		
BBAC	Bangsamoro Business Advisory Council	CBO	Cotabato (Awang) Airport
		CCA	climate change adaptation
		CCCH	Coordinating Committee for Cessation of Hostilities
BBL	Bangsamoro Basic Law		
BCT	Bangsamoro Core Territory	CCDP or CCDP-B	Comprehensive Capacity Development Project for the Bangsamoro
BDA	Bangsamoro Development Agency		
BDH	berthing/deberthing hours		
BDP	Bangsamoro Development Plan	CCT	conditional cash transfer
BFAR	Bureau of Fisheries Aquatic Resources	CDA	Cooperative Development Authority
		CD-CAAM	Community Development in CAAM
BHC	Barangay Health Center	CDOCCI	Cagayan de Oro Chamber of Commerce and Industry
BIAF	Bangsamoro Islamic Armed Force		
BIFF	Bangsamoro Islamic Freedom Fighters	CDP	Comprehensive Development Program
BIMP-EAGA	Brunei-Indonesia-Malaysia-Philippines East ASEAN Growth Area	CDP-ELA	Comprehensive Development Plan-Executive Legislative Agenda
		CDRRMC	City Disaster Risk Reduction and Management Council
BIW	Bangsamoro Investment Window		
BLGU	Barangay Local Government Unit	CDS	cooperative development staff

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CEB	Cebu Pacific Air	ECP	environmentally critical project
CEC	cation-exchange capacity	EEZ	exclusive economic zone
CEPALCO	Cagayan Electric Power and Light Company	EIA	environmental impact assessment
		EIAM	Environmental Impact Assessment and Management (Division)
CIF	cost, insurance, and freight	EIRR	economic internal rate of return
CIS	communal irrigation system	EIS	environmental impact statement
CLOA	certificate(s) of landownership award	EMB	Environmental Management Bureau
CLPC	Cotabato Light and Power Company	EO	Executive Order
CLT	certificate(s) of land transfer	EPIRA	Electric Power Industry Restructuring Act
CLUP	comprehensive land use plan		
CMO	central management office	ERC	Energy Regulatory Commission
COSUCECO	Cotabato Sugar Central Corporation	ESWM(P)	Ecological Solid Waste Management (Plan)
CP	core project		
CPO	Cotabato Project Office	EU	European Union
CSO	civil society organization	EWS	early warning system
CSR	corporate social responsibility	FAA	Federal Aviation Administration
DA	Department of Agriculture	FAB	Framework Agreement on Bangsamoro
DA-BAR	Department of Agriculture's Bureau of Agricultural Research	FAD	fish aggregating devices
DA-RFO	DA-Regional Field Office	FAO	Food and Agriculture Organization
DAF	Department of Agriculture and Fisheries	FDI	foreign direct investment
		FFWS	flood forecasting and warning system
DAO	Department Administrative Order		
DAR	Department of Agricultural Reform	FGD	focus group discussion
DBM	Department of Budget and Management	FIA	federation of irrigators' associations
		FIDA	Fiber Industry Development Authority
DBP	Development Bank of the Philippines	FIES	Family Income and Expenditure Survey
DCCCII	Davao City Chamber of Commerce and Industry, Inc.	FIT	farmers information technology
DD	detailed design	FIT	feed-in-tariff
DDP	Distribution Development Plan	FMB	Forest Management Bureau
DED	detailed engineering design	FMR	farm-to-market road
DENR	Department of Environment and Natural Resources	FNRI	Food and Nutrition Research Institute
DILG	Department of Interior and Local Government	FS	feasibility study
		FTZ	free trade zone
DLPC	Davao Light and Power Company	GAA	General Appropriations Act
DME	Distance measuring equipment	GDE	grading and balling establishment
DOF	Department of Finance	GDP	gross domestic product
DOJ	Department of Justice	GEM	Growth with Equity Mindanao (Program)
DOLE	Department of Labor and Employment	GIS	geographical information system
DOST	Department of Science and Technology	GIZ	German Society for International Cooperation [Deutsche Gesellschaft für Internationale Zusammenarbeit]
DOT	Department of Tourism		
DOTC	Department of Transportation and Communications	GM	genetically modified
		GMP	good manufacturing practice
DPWH	Department of Public Works and Highways	GPBP	Grassroots Participatory Budgeting Program
DRIMS	Dynamic Response Intelligent Monitoring System	GPH	Government of the Philippines
		GPPB	grassroots participatory planning and budgeting
DRRM	disaster risk reduction and management		
		GRDP	gross regional domestic product
DRRMCEP	DRRM Capacity Enhancement Project	GRP	gross regional product
		GSR	Green Super Rice
DSWD	Department of Social Works and Development	HACCP	hazard analysis and critical control points
DTI	Department of Trade and Industry	HDI	human development index
DTI-EMB	DTI Export Marketing Bureau	HEART	Humanitarian Emergency Action Response Team
DUs	distribution utilities		
DVOR	Doppler VHF omnidirectional range	HF	high frequency
EA	environmental assessment	HI	horizontal inequality
EC	electric cooperative	HIPC	halal industry promotion center
ECA	environmentally critical area	HVC	high-value crops
ECC	environmental clearance certificate		

HVCDP	High Value Crops Development Program	LMB	Land Management Bureau
IA	irrigators' association	LMP	Leyte-Mindanao Interconnection Project
IAC	inter-agency committee	LOA	length overall
IATA	International Air Transport Association	LRA	Land Registration Authority
ICAO	International Civil Aviation Organization	LTI	Land Tenure Improvement
ICT	information and communication technology	Magelco or MAGELCO	Maguindanao Electric Cooperative
ICTSI	International Container Terminal Services, Inc.	MAO	Municipal Agriculture Office
IDP	internally displaced people	MASL	meter(s) above sea level
IEC	information and education campaign	MC	moisture content
IEE	initial environmental examination (or evaluation)	MDGs	Millennium Development Goals
IFAD	International Fund for Agricultural Development	MEDP	Missionary Electrification Development Plan
IFMA	Integrated Forest Management Agreement (Program)	MEP	Mindanao Energy Plan
IFSAR	interferometric synthetic aperture radar	MF	microfinance
ILO	International Labour Organization	MFI	microfinance institution
ILPC	Iligan Light and Power Company	MGB	Mining and Geo-science Bureau
IMEM	Interim Mindanao Electric Market	MHPP	mini-hydro power plant
IMT	international monitoring team	MICC	Matling Industrial and Commercial Corporation
IP	indigenous people	MILF	Moro Islamic Liberation Front
IPA	Investment Promotion Agency	MIS	Management Information Service
IPC	Investment Promotion Center	MIMAROPA	Mindoro, Marinduque, Romblon, and Palawan
IPP	independent power producer	MINDA or MinDA	Mindanao Development Authority
IPRA	Indigenous People Rights Act	MLGU	municipal local government unit
IRA	internal revenue allotment	MMAA	Muslim Mindanao Autonomy Act
IRI	International Roughness Index	MMDA	Metropolitan Manila Development Authority
IRSG	International Rubber Supply Group	MMHCBI	Mindanao Muslim Halal Certification Board Inc.
IT	information technology	MNLF	Moro National Liberation Front
IWRM	integrated water resources management	MOA	memorandum of agreement
J-BIRD	Japan-Bangsamoro Initiatives for Reconstruction and Development	MOOE	maintenance and other operating expenses
JAKIM	Department of Islamic Development Malaysia	MPA	marine protected area
JETRO	Japan External Trade Organization	MPC	multi-purpose cooperative
JICA	Japan International Cooperation Agency	MPDC	Municipal Planning and Development Coordinator
JNC	Joint Normalization Committee	MRB	Mindanao River Basin
JOL	Jolo Airport	MRBIMDMP	MRB Integrated Management and Development Master Plan
JST	JICA Study Team	MRCC	Mindanao Regional Control Center
JV	joint venture	MRDP	Mindanao Rural Development Program
KBA	key biodiversity area	MRF	material recovery facility
KOICA	Korea International Cooperation Agency	MSME	micro, small, and medium enterprises
L	length	MSU	Mindanao State University
LAD	land acquisition and distribution	MSU-IIT	MSU-Iligan Institute of Technology
LAMP	Land Administration and Management Project	MSU-LNCAT	MSU-Lanao National College of Arts and Trade
LAMPCO	Linabu Agrarian Multi-Purpose Cooperative	MSU-TCTO	MSU-Tawi-Tawi College of Technology and Oceanography
LASURECO	Lanao Del Sur Electric Cooperative	NADA	Needs Assessment Design Analysis
LBP	Land Bank of the Philippines	NAIA	Manila Ninoy Aquino International Airport
LCA	local conservation area	NAMRIA	National Mapping and Resource Information Agency
LCL	less than full container load or less container load	NAPC	National Anti-Poverty Commission
LDRRMC	Local DRRM Council	NASA	National Aeronautics and Space Administration
LDRRMF	Local DRRM Fund	NCIP	National Commission on Indigenous Peoples
LGU	local government unit	NCMF	National Commission on Muslim Filipinos
LGUOUS	LGU-owned utilities		
LiDAR	light detection and ranging		

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NCR	National Capital Region	PAPI	precision approach path indicator
NDCC	National Disaster Coordinating Council	PB	Power Barge
NDRRMC	National Disaster Risk Reduction and Management Council	PCA	Philippine Coconut Authority
NEA	National Electrification Administration	PCAARRD	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
NECP	non-environmentally critical project	PCB	power circuit breaker
NEDA	National Economic Development Authority	PCC	Philippine Carabao Center
NFA	National Food Authority	PCC	Portland cement concrete
NGA	National Grains Authority	PCCI	Philippine Chamber of Commerce and Industry
NGCP	National Grid Corporation of the Philippines	PCDP	Provincial Comprehensive Development Plan
NGO	non-governmental organization	PCIC	Philippine Crop Insurance Corporation
NGP	National Greening Program	PCN	pavement classification number
NIA	National Irrigation Administration	PD	Presidential Decree
NICCEP	National Industrial Cluster Capacity Enhancement Project	PDP	Philippine Development Plan
NIPAS	National Integrated Protected Areas System	PDPFP	Provincial Development and Physical Framework Plan
NIS	national irrigation system	PEIS	Philippine Environmental Impact Statement
NLUC	National Land Use Commission	PENRO	Provincial Environment and Natural Resources Office
NOAH	Nationwide Operational Assessment of Hazards	PERF	Production Economic Research Fund
NPC	National Power Corporation	PEZA	Philippine Economic Zone Authority
NPC-SPUG	NPC-Small Power Utility Group	PFDA	Philippine Fisheries Development Authority
NREL	National Renewable Energy Laboratory	PhilFIDA	Philippine Fiber Development Authority
NREP	National Renewable Energy Program	PHIVOLCS	Philippine Institute of Volcanology and Seismology
NSO	National Statistics Office	PICRI	Philippine Industrial Crops Research Institute
NWFP	non-wood forest product	PIOUs	private investor-owned utilities
NWRC	National Water Resources Council	PMO	project management office
OBOR	optimum berth occupancy rate	PO	people's organization
OCD	Office of Civil Defense	PP	Presidential Proclamation
OCT	original certificate(s) of title	PPA	Philippine Ports Authority
ODA	official development assistance	PPP	public private partnership
OECD	Organization for Economic Cooperation and Development	PRA	Philippine Retirement Agency
OFID	OPEC Fund for International Development	PRDP	Philippine Rural Development Program
OIC	Organization of Islamic Cooperation	PRTC	Philippine Rubber Testing Center
OPAg	Office of the Provincial Agriculturist	PSA	Philippine Statistics Authority
OPAPP	Office of the Presidential Advisor on the Peace Process	PSALM	Power Sector Assets and Liabilities
OPEC	Organization of Petroleum Exporting Countries	PSC	project steering committee
OPV	Office of the Provincial Veterinarian	PSE	Philippine Stock Exchange
OPV	open-pollinated variety	PTA	Parent-Teacher Association
ORG	Office of the Regional Governor	PTB	passenger terminal building
OSCC	Office for Southern Cultural Communities	PTF-MRBRD	Presidential Task Force on MRB Rehabilitation and Development
OTOP	one town one product	RA	Republic Act
PA	protected area	RBCO	River Basin Control Office (of DENR)
PAG	private armed group	R&D	research and development
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration	RAED	Regional Agricultural Engineering Division
PAL	Philippine Airlines	RBOI	Regional Board of Investment
PAMANA	Philippine Development Program and Framework for Peace and Development [Payapa at Masaganang Pamayanan]	RC	reinforced concrete
PAMB	Protected Area Management Board	RCC	regional control center
PAO	Provincial Agriculture Office	RCM	rice crop manager
		RDC	regional development council
		RDE	research, development, and extension

RDRRMO	Regional DRRM Office	USAID	United States Agency for
REDPB	Regional Economic and Development Planning Board	USDA	International Development United States Department of
RE	renewable energy	USM	Agriculture
REZA	Regional Economic Zone Authority	USMARC	University of Southern Mindanao
RGDP	regional gross domestic product	VAT	USM Agricultural Research Center
RHU	Rural Health Unit	VCA	value added tax
RIS	River Irrigation System	VHF	value chain analysis
RNS	National Route Numbering System	VLT	very high frequency
RPMA	Regional Ports Management Authority	VOS	voluntary land transfer
ROPAX or RoPax	roll-on/roll-off passenger	VPA	voluntary offer to sell
RORO or RoRo	roll-on/roll-off	VSU	vehicle parking area
ROW	right-of-way	VTT	Visayas State University
RPDO	Regional Planning and Development Office	WASH	Value transformation training Water, Sanitation and Hygiene (programs by UNICEF)
RWY	runway	WB	World Bank
SB	Small Business	WDIL	wind direction indicator light
SEA	strategic environmental assessment	ZAM	Zamboanga International Airport
SERD-CAAM	Socio-economic Restoration and Development of Conflict-affected Areas in Mindanao	ZAMBASULTA	Zamboanga, Basilan, Sulu, and Tawi-Tawi
SEP-CDP	Socio-Economic Profile- Comprehensive Development Program		
SEZ	special economic zone		
SGCP	State of the Grid in China		
SIASELCO	Siai Electric Cooperative		
SME	small and medium-sized enterprise		
SMS	short message system		
SOCKSARGEN	South Cotabato-Sultan Kudarat- Saranggani-General Santos City		
SPUG	small power utilities group		
SRA	Sugar Regulatory Administration		
S/S or SS	substation		
SSIPs	small-scale irrigation projects		
SUCs	State Universities and Colleges		
SULECO	Sulu Electric Cooperative		
SV	supervision		
SWIMP	small water impoundments with multipurpose potential (or small water impounding project)		
SWISA	small water irrigation system association		
TAWELCO	Tawi-Tawi Electric Cooperative		
TCP	Technical Cooperation Project		
TCT	transfer of certificate of title		
TDP	transmission development plan		
TESDA	Technical Education and Skills Development Authority		
TIKA	Turkish Cooperation and Coordination Agency		
TISP	Transition Investment Support Plan		
T/L	transmission line		
TMS	Technical Management Services		
TP	turboprop		
TransCo	National Transmission Corporation		
UAS	Upi Agricultural School		
UN	United Nations		
UNCTAD	United Nations Conference on Trade and Development		
UNEP	United Nations Environment Programme		
UNHCR	United Nations High Commissioner for Refugees		
UNICEF	United Nations Children's Fund		

Unit of Measurement

<u>Area</u>		<u>Weight</u>	
m ²	square meter	µg	microgram
km ²	square kilometer	mg	milligram
ha	hectare (= 10,000 m ²)	kg	kilogram
		t	ton (=1,000 kg)
<u>Energy</u>		DWT	deadweight tonnage
W	watt	GRT	gross register tonnage
kW	kilowatt	GT	gross tonnage
kWh	kilowatt-hour	kTOE	kilo ton of oil equivalent
MW	megawatt	MT	metric ton
GWh	gigawatt-hour		
kV	kilovolt	<u>Volume</u>	
MVA	megavolt-ampere	L	liter
		m ³	cubic meter (= 1,000 liter)
<u>Length</u>		<u>Other</u>	
mm	millimeter	°C	degree Celsius
cm	centimeter	%	percent
ft	foot or feet	mil.	million
m	meter	MPa	megapascal
LM	linear meter	mps	meter per second
km	kilometer		
<u>Time</u>			
sec, s	second		
min	minute		
hr	hour		
yr	year		

Currency

JPY	Japanese yen
PHP	Philippine peso
US\$ or USD	United States dollar

CHAPTER 1 LEGAL AND INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

The framework agreement for Bangsamoro (FAB) signed between the Central Government and the MILF in October 2012 recognized the importance of natural resources in long-term development of the Bangsamoro region through harmonization of development and environmental management objectives and plans between the central and regional levels to meet the needs of the Bangsamoro people. Section 8, Chapter IV of the FAB establishes the following agreement:

Sustainable Development of the Bangsamoro People

[S]ustainable development is crucial in protecting and improving the quality of life of the Bangsamoro people. To this end, the Bangsamoro shall develop a comprehensive framework for sustainable development through proper conservation, utilization, and development of natural resources. For efficient coordination and assistance, the Bangsamoro legislative body shall create, by law, an intergovernmental body composed of representatives of the Bangsamoro and the Central Government, which shall ensure the harmonization of environmental and developmental plans, as well as formulate common environmental objectives.

In the transition, both the development programs and environmental policies in the Bangsamoro region will still be implemented by the existing ARMM departments until such time that the BBL is passed by Congress and approved by the President, and the new Bangsamoro entity is established. Under the existing legal and institutional framework, national environmental laws, regulations, and guidelines are generally found to be applicable, and are indeed applied, by DENR-ARMM and the provincial LGUs in the Bangsamoro Core Territory (BCT) for the ongoing and new development programs and projects, whether implemented by the government sector or business/private sector. Even in the post-transition period, it can be surmised that national environmental laws, regulations, and guidelines will play a significant role in crafting the counterpart regional and local laws and regulations in the BCT region to achieve the objectives of Section 8, Chapter IV of FAB.

In this context, this section describes the Country's existing legal and institutional framework for environmental management, defines the specific regulations and guidelines for environmental impact assessment (EIA) for development projects, and identifies the local environmental plans, programs, and projects supporting the sustainable development objectives in the BCT.

1.1 National Context

The legal basis of environmental laws, regulations and guidelines in the Philippines originates from Section 16, Article II (Principles and State Policies) of the 1987 Constitution,¹ which states the following:

State Policy

The State shall protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature.

¹ The 1987 Constitution ratified on 2 February 1987 is the fourth fundamental law to govern the Philippines since the country became independent on 4 July 1946. The first three consisted of the 1935 Constitution, 1973 Constitution, and 1986 Provisional "Freedom" Constitution. All of these fundamental laws declare the State's sovereignty over the nation's natural resources, and order the same State Policy to safeguard the environment relative to the development, conservation and utilization of these resources.

This policy serves as aspiration and guidance for the government for the issuance of national laws, regulations, and guidelines governing environmental management, in general, and the EIA of projects at various stages (feasibility study, detailed engineering design, construction/ development, and operation/maintenance), in particular, to pursue the sustainable development path. In the 1970s, three environmental laws were issued to establish the Philippine Environmental Impact Statement (PEIS) System in the country (Table 1.1).

Table 1.1 Basic Laws on the Philippine Environmental Impact Assessment (PEIS)

Legal Instrument	Title and Date of Issuance
Presidential Decree (PD) 1511	Philippine Environmental Policy (1977)
PD 1152	Philippine Environment Code (1977)
PD 1586	Establishing an Environmental Impact Statement System, including Other Environmental Management Related Measures and for Other Purposes (1978)

Two additional environmental laws define environmentally critical areas (ECAs) and environmentally critical projects (ECPs). These laws are (i) Presidential Proclamation (PP) No. 2146 of 1981, Proclaiming Certain Areas and Types of Projects as Environmentally Critical and within the Scope of the PEIS Established under PD 1586; and (ii) PP 803 of 1986, Declaring Golf Course Projects as ECPs. These laws require projects or undertakings classified as ECPs occurring in ECAs to prepare and submit an EIS to be able to secure an environmental clearance certificate (ECC) prior to implementation. As shown in Table 1.2, the existing PEIS System covers four ECP types and 12 ECA categories.² However, DENR may include non-environmentally critical project (NECP) types in the PEIS System which, if located in ECAs, can have significant impacts on the environment.

Table 1.2 Summary List of ECP Types and ECA Categories

A. List of ECPs	
Declared by PP 2146 (1981)	
1.	Heavy industries: Non-ferrous metal industries, iron and steel mills, petroleum and petro-chemical industries including oil and gas, smelting plants
2.	Resource extractive industries: Major mining and quarrying projects, forestry projects (logging, major wood processing projects, introduction of fauna [exotic animals] in public and private forests, forest occupancy, extraction of mangrove products, grazing, fishery projects (dikes for fishponds)
3.	Infrastructure projects: Major dams, major power plants (fossil-fueled, nuclear-fueled, hydroelectric or geothermal), major reclamation projects, major roads and bridges
Declared by PP 803 (1986)	
4.	All golf course projects
B. List of ECA Categories	
Declared by PP 2146 (1981)	
1.	All areas declared by law as national parks, watershed reserves, wildlife preserves, sanctuaries
2.	Areas set aside as aesthetic potential tourist spots
3.	Areas which serve as the habitat of any endangered/threatened species of Philippine wildlife (flora and fauna)
4.	Areas of unique historic, archeological, or scientific interest
5.	Areas which are traditionally occupied by cultural communities or tribes
6.	Areas frequently visited and/or hard hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)
7.	Areas with critical slopes
8.	Areas classified as prime agricultural lands
9.	Recharged areas of aquifers
10.	Water bodies characterized by one or any combination of the following conditions: tapped for domestic purposes; within the controlled and/or protected areas declared by appropriate authorities; or which support wildlife and fishery activities

² These ECP project types and ECA categories are technically defined by DENR-EMB in Section II, Annex 2-Ia for ECAs and Annex 2-1b for ECPs, pursuant to the authority vested on EMB by *Administrative Order No. (AO) 42* issued by the President in 2000.

11.	Mangrove areas characterized by one or any combination of the following conditions: with primary pristine and dense young growth, adjoining mouth of major river systems, near or adjacent to traditional productive fry or fishing grounds, areas which act as natural buffers against shore erosion, strong winds and storm floods, areas on which people are dependent for their livelihood
12.	Coral reefs characterized by one or any combination of the following conditions: with 50% and above live coralline cover, spawning and nursery grounds for fish, natural breakwater of coastlines

Source: DENR-EMB, 2007. *Revised Procedural Manual for DAO*, No. 30, series of 2003 (DAO 03-30), p. 5.

DENR may also exclude from the PEIS System some projects, regardless of location or threshold size, if the environmental impacts are insignificant as a result of the use of clean technology and the nature of the project's measures to mitigate environmental issues or enhance environmental quality.

The ECPs are categorized into single projects and co-located projects. Single projects are further classified into three major groups: Group I pertains to ECPs that are located in either ECAs or non-environmentally critical areas (NECAs); Group II pertains to NECPs located in ECAs; and Group III pertains to NECPs in NECAs. Table 1.3 presents the projects that fall under these three single project groupings.

Table 1.3 Summary List of Single Project Groupings

	Group I		Group II		Group III
1.	ALL golf course projects, heavy industries, fishery, logging, and grazing projects with EIS requirement (with highest potential level of impact significance)		Heavy industries, fishery, and logging projects with Initial Environmental Examination (IEE) as the highest documentary requirement (with moderate to nil significance of impact)		ALL Group II project types outside ECAs
2.	ALL projects introducing exotic fauna in public and private forests	1.	MINOR wood processing projects		
3.	MAJOR wood processing projects	2.	MINOR infrastructure projects		
4.	MAJOR mining and quarrying projects	3.	MINOR mining and quarrying projects		
5.	MAJOR listed infrastructure projects				
	37 listed project types are under Group I with EIS requirement		118 listed project types are under Group II with EIS requirement		

Co-located projects are single projects grouped under one or more proponents/locators, which are located in a contiguous area and managed by one administrator, who is also the ECC applicant. The location or threshold of specific projects within the contiguous area will be defined during the EIS process based on the carrying capacity of the project environment. The nature of these projects is called "programmatic." To this date, only one programmatic EIA has so far been prepared for co-located projects in Central Luzon Region, based on the latest information gathered from the DENR-EMB EIA and Management (EIAM) Division.

Presently, the PEIS System applies mainly to projects that may have significant impacts on the quality of the environment and the welfare of the people depending on it. A draft bill titled, "An Act to Establish the Philippine Environmental Assessment (EA) System," has been filed and approved by the Committee on Ecology of the House of Representatives of the Philippine Congress in the 15th Congress in 2012, but this remains at the Committee level pending completion of the requirements for public hearing to secure majority endorsement by various stakeholders. The draft bill envisages the national application of a comprehensive EA System to encompass all development policies, plans, programs, and projects with significant environmental impacts, as illustrated in Figure 1.1.

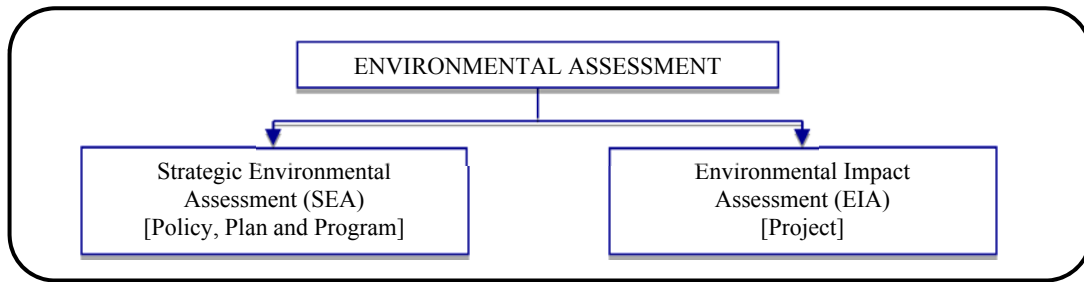


Figure 1.1 Proposed Framework for the Philippine Environmental Assessment System (Draft Bill, 2012)

Section 4 of Presidential Decree (PD) 1151 requires “all agencies and instrumentalities of the national government, including government-owned or controlled corporations, as well as private corporations, firms and entities” to prepare an environmental impact statement (EIS) “for every action, project or undertaking which significantly affects the quality of the environment.” The EIS System was formally established in 1978 with the passage of PD 1586 and the following implementing regulations and guidelines were contained in administrative or memorandum circulars issued by DENR- EMB:

PEIS Implementing Regulations and Guidelines
<ul style="list-style-type: none"> - Department of Environment and Natural Resources (DENR) Administrative Order (DAO) No. 21, series of 1992: Amending the Revised Rules and Regulations Implementing PD 1586 (PEIS System); - DAO No. 37, series of 1996: Revising DAO 21, Series of 1992 - Further Strengthening the Implementation of the EIS System; - DAO No. 30, series of 2003: Implementing Rules and Regulations (IRR) of PD 1586; - DENR-Environmental Management Bureau (EMB) Memorandum Circular No. (MC) 01, series of 2005: Procedural Manual for DAO No. 30, series of 2003 - IRR of PD 1586; - DENR-EMB MC 05, series of 2006: Clarificatory Guidelines in the Implementation of DAO No. 30, series of 2003 - IRR of PD 1586; - DENR-EMB MC 01, series of 2007: EIA Review Manual; - DENR-EMB MC 02, series of 2007: Revised Procedural Manual for DAO 30, Series of 2003 - IRR of PD 1586; - DENR-EMB MC 08, series of 2007: Segregating from the EIA Process the Practice of Prior Submission of Permits, Clearances, Licenses, and Other Similar Government Approvals outside the EMB Mandate; and - DENR-EMB MC 05, series of 2014: Revised Guidelines for Coverage Screening and Standard Requirements under the PEIS System.

These guidelines provide detailed procedures for the actual conduct of EIA/IEE of projects. The EIA process for securing ECC of a specific project is presented in Figure 1.2, which distinguishes the role of the project proponent and DENR-EMB as the government regulatory agency that issues ECCs. The EIA process also highlights the importance of public involvement starting from EIA scoping and EIA study to the review of the EIA Report and the monitoring and evaluation (M&E) of the project’s Environmental Management Plan (EMP).

When does a project need to conduct the EIA process? Or technically speaking, when does a project require an EIA? PD 1586 requires all projects established after 1982, which have been declared as ECPs or in ECAs as defined by DENR-EMB, to undergo the EIA process. Projects that are not ECPs or are not in ECAs do not have to go through the EIA process, but may be required to develop and implement environmental safeguards, as deemed necessary.

Projects that are required to go through the EIA process must secure ECCs from DENR-EMB. An ECC is a decision document issued to the project proponent after a thorough review of the EIA Report. The ECC specifies the commitments of the proponent that are necessary for the project to comply with existing environmental laws and regulations or to operate within best environmental practice that are not currently covered by existing laws and regulations. Although projects that are neither ECPs nor within ECAs are not required to undergo the EIA process, the proponents are usually advised to secure the Certificate of Non-Coverage (CNC) to confirm their exemption.

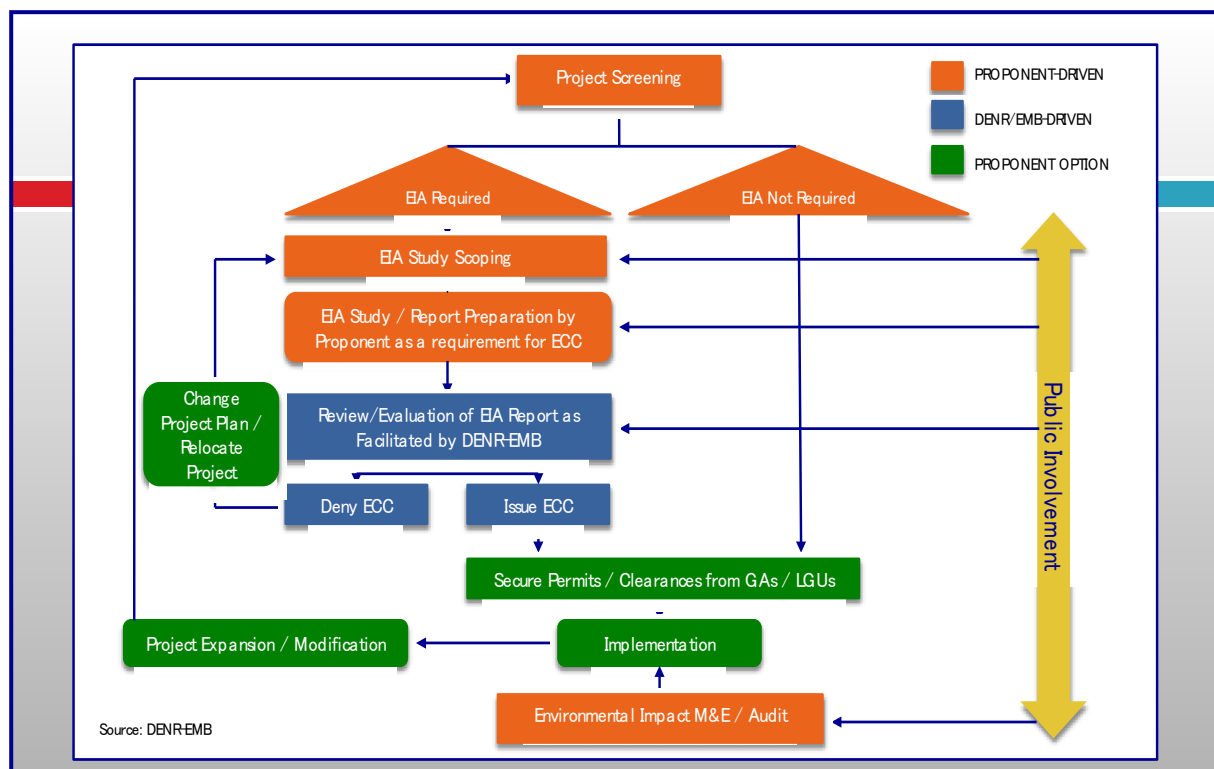


Figure 1.2 Diagram of EIA Process for ECC Application

While the EIA process is an effective planning tool to safeguard the environment from adverse impacts of projects, it is also a supplement to existing environmental laws, as outlined in Table 1.4. All projects must comply with provisions of these laws as defined in the corresponding implementing rules and regulations (IRRs) issued by DENR-EMB and other concerned government agencies at the national level, and by the LGUs at the provincial, city, municipal, and barangay levels.

Table 1.4 Other Important Environmental Laws

Legal Instrument	Title and Date of Issuance
RA 6969	Toxic Substances and Hazardous and Nuclear Wastes Control Act (1990)
RA 8749	Philippine Clean Air Act (1999)
RA 9003	Ecological Solid Waste Management Act (2000)
RA 9275	Philippine Water Act (2004)

To implement these environmental laws, regulations, and guidelines, including the PEIS System, Executive Order No. 192 of 1987: Reorganizing the DENR, designated this department as the lead government agency, while its Environmental Management Bureau (EMB) was tasked to develop and recommend EIA rules and regulations and provide technical assistance for their implementation and monitoring. EMB is one of the six functional bureaus of DENR initially charged with policy review and development on environmental management and supporting DENR field offices in implementing environmental laws and regulations as well as monitoring of environmental compliance by operators of projects with predetermined environmental impacts. Part of its legal mandate is to make recommendations for the DENR Secretary for the improvement of environmental policies, regulations, and guidelines.

In January 2000, EMB was transformed from being a staff bureau to a line bureau of DENR, including the setting up of EMB Regional Offices throughout the country by virtue of Section 2, Rule XLIV of DENR AO No. 81, Series of 2000. As a result, EMB's mandate was expanded to include on-the-ground enforcement of EIA rules and regulation as well as monitoring and audit of ECC compliance by project implementers "to properly manage and protect the environment in order to attain sustainable development while recognizing the primary responsibility of local government units, non-government agencies, private and business organizations in dealing with environmental problems."

Moreover, EO 192 provides that the President of the Philippines or his duly authorized officer should issue the ECCs for ECPs or projects within ECAs. Administrative Order No. 42, Series of 2002, issued by the President, delegates this authority to the DENR Secretary, as alter ego of the President, to grant or deny ECCs and further designates the EMB Central and Regional Directors as approving authorities for ECC applications.

1.2 BCT Context

1.2.1 Outline of related institutions

Under RA 6734 of 1989: Providing for and Organic Act the Autonomous Region in Muslim Mindanao, the ARMM Regional Government was established to oversee the development and implementation of plans and programs for this region. One of its line agencies is DENR-ARMM, which handles matters related to the environment and natural resources of the region, while EMB-ARMM provides staff support on environmental concerns, including the review of applications for ECCs, issuance of ECC/CNC for compliant projects/undertakings, and conduct of periodic compliance monitoring. A cursory look at the limited published documents from DENR-ARMM suggests that nationally promulgated environmental laws, regulations, and guidelines are also applied to projects or undertakings in the BCT.

Organizationally, DENR/EMB-ARMM has adopted the structure of DENR-EMB, with two main divisions—EIAM Division and Pollution Control (PC) Division—responsible for the screening of projects for category determination and the evaluation, preparation and recommendation of ECC and the evaluation, preparation, and recommendation of pollution clearance and related documentary requirements for approval of higher authorities, respectively. In some major programs, such as the ARMM Social Fund for Peace and Development, implemented in the region, environmental safeguards policies and guidelines have applied DENR AO 37, Series of 1996 and other related issuances in the granting of ECCs/CNCs for projects and sub-projects.³ Specific guidelines for ecological destinations in the Turtle Islands in the province of Tawi-Tawi have also specified the application of DENR AO 37, Series of 1996 to the applications of proponents of ecotourism development projects.⁴

DENR-ARMM, in cooperation with other regional departments and environmentalists, is also taking a lead role in the passage of the proposed Regional Environment Code and Regional Sustainable Forest Management Act (Regional Legislative Assembly Bill No. 91) to ensure sustainable development of the Bangsamoro area.

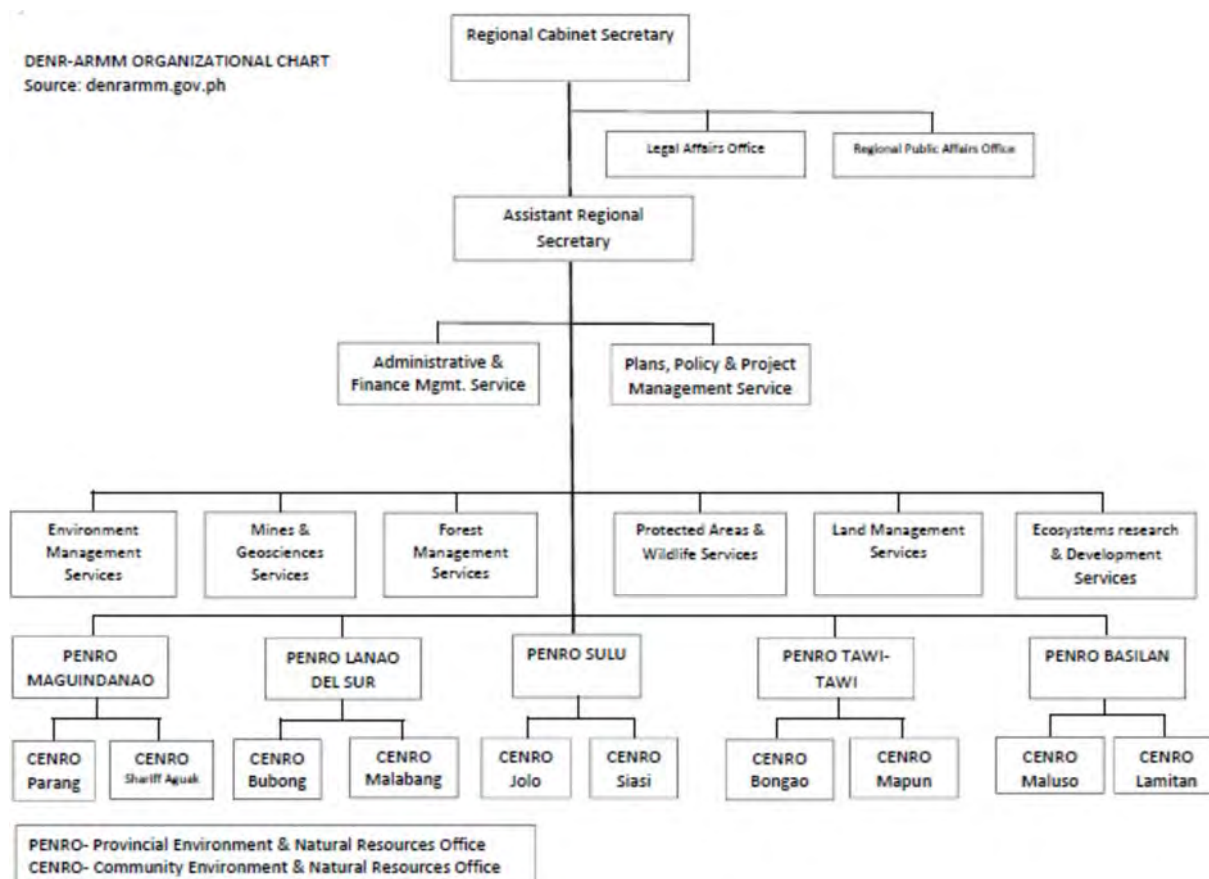
The organization chart of DENR-ARMM is shown in Figure 1.3. There are six divisions, called bureaus, in charge of Environmental Management Services, Mines and Geosciences Services, etc. PENRO (one in each province) and CENRO (two in each province) are in charge of implementing of projects. The number of the staff is 874 including 139 in Regional office, 281 in Lanao del Sur, 203 in Maguindanao, 65 in Basilan, 102 in Sulu, and 84 in Tawi-Tawi. The enrollment limit of DENR-ARMM is 888, and there are 14 job vacancies.

In addition to DENR/EMB-ARMM, the other institutions and organizations identified as being actively involved in environmental management in the BCT include: DA-ARMM; DOST-ARMM; provincial, city, municipal, and barangay LGUs; CSOs; academic institutions; CBOs; business groups, and development partners (i.e., World Bank, ADB, JICA, UNDP, USAID, AusAID, EU, CIDA, and SIDA) based on the available documents gathered from various stakeholders in the BCT as well as from the websites of the donor agencies. Officials and staff of some of these institutions and organizations have either participated in FGDs or KIIs conducted by the Study Team at the regional, provincial, and

³ World Bank. 2002. *Mindanao: ARMM Social Fund for Peace and Development - Framework and Operational Guidance of Environmental Safeguards*. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2002/08/23/0000949460208090412_0471/Rendered/PDF/multi0page.pdf

⁴ DENR AO No. 31, Series of 1999: Ecological Destination Development Guidelines for Turtle Islands, Tawi-Tawi.

municipal/city levels, as further discussed in the section 5.



Source: DENR-ARMM homepage.

Figure 1.3 Organizational Chart of DENR-ARMM

1.2.2 Activities of DENR-ARMM

The budget of the Regional Office (Headquarters) of DENR-ARMM comes from ARMM. It can cover personnel salaries and Maintenance & Operation Expenses (MOE), but not enough to implement project, therefore, there are no projects by DENR-ARMM themselves at present. The following projects are on-going, but those are all the national projects, for which the budget is provided from the national government is implemented under their instructions.

- National Greening Program
- Cadastral Survey Project
- Forest Land Boundaries & Delineation

The National Greening Program (NGP) is a massive forest rehabilitation program of the Philippine government established by virtue of Executive Order No. 26 issued on Feb. 24, 2011 by the President. It seeks to grow 1.5 billion trees in 1.5 million hectares nationwide within a period of six years, from 2011 to 2016.

Aside from being a reforestation initiative, the NGP is also seen as a climate change mitigation strategy as it seeks to enhance the Country's forest stock to absorb carbon dioxide, which is largely blamed for global warming. It is also designed to reduce poverty, providing alternative livelihood activities for marginalized upland and lowland households relating to seedling production and care and maintenance of newly-planted trees.

As a convergence initiative among the Departments of Agriculture, Agrarian Reform and DENR, half of the targeted trees to be planted under the program would constitute forest tree species intended for timber production and protection as well. The other 50% would comprise of agroforestry species.

Areas eligible for rehabilitation under the program include all lands of the public domain. Specifically, these include forestlands, mangrove and protected areas, ancestral domains, civil and military reservation, urban greening areas, inactive and abandoned mine sites and other suitable lands. The tree species to be planted are Lauan, Mahogany, Apitong, etc.

In ARMM, DENR-ARMM is promoting the program in the five provinces. The province-wise budget allocation for NGP in ARMM, and stage-wise allocation are shown in Tables 1.5 and 1.6.

Table 1.5 NGP Budget Allocation by Province

(Unit: PHP)

	Maguindanao	Lanao del Sur	Basilan	Sulu	Tawi-Tawi	Total
1st District	9,644,900	7,992,200	1,540,000	2,832,000	920,000	22,929,100
2nd District	6,817,700	7,104,200	1,540,000	3,452,000	744,000	19,657,900
Regional Office	-	-	-	-	-	6,999,000
Total	16,462,600	15,096,400	3,080,000	6,284,000	1,664,000	49,586,000
(%)	33.2	30.4	6.2	12.7	3.4	100.0

Note: 1st and 2nd district are political sub-divisions.

Source: DENR-ARMM homepage

Table 1.6 NGP Budget Allocation by Stage and Province

(Unit: PHP)

	Survey, Mapping & Planning	Production of Seedlings	Site Preparation & Social Monilization	Plantation Maintemance	Total
Maguindanao	831,600	10,548,000	2,311,000	2,772,000	16,462,600
Lanao del Sur	770,400	9,618,000	2,140,000	2,568,000	15,096,400
Basilan	180,000	1,800,000	500,000	600,000	3,080,000
Sulu	369,000	3,660,000	1,025,000	1,230,000	6,284,000
Tawi-Tawi	99,000	960,000	275,000	330,000	1,664,000
Total	2,250,000	26,586,000	6,251,000	7,500,000	42,587,000
(%)	5.3	62.4	14.7	17.6	100.0

Source: *ibid.*

Another important issue for DENR-ARMM is community-based forest management (CBFM). A community-based forest management agreement (CBFMA) is an agreement between DENR and a registered people's organizations (PO) for a period of 25 years for renewal, and for another 25 years to provide tenurial security and incentives to develop, utilize, and manage specific portions of forest lands that are under Executive Order No. 263 and DENR Administrative Order No. 96-29.

DENR-ARMM has eleven CBFMAs, but only two ortanizations are active, and no reports have been submitted for all the agreements. Therefore, first, the CBFMA holders performance shall be monitored and evaluated by DENR to check the compliance with the terms and condition, but those activities have not been done partly because of lack of fund. A challenge is that no more national fund had been given to support the CBFM programs of ARMM after the creation of ARMM. Accordingly, fund is required to resume the CBFM in ARMM.

The existing eleven CBFMAs are shown in Table 1.7. The active ones are only No.5. Tiruray Integrated Farmers Association, and No.10 Teduray Farumfungon Temikur MPC.

Table 1.7 Community-based Forest Management Agreements of DENR-ARMM

As of December 2014

	Peoples Organization (PO)	No.	Location	Area (ha)	Date Issued	Expiration
1	Mindanao Alliance for Rural Advancement in Lanao Inc.	99-001	Barangay Lamalico, Bumbara, Lanao del Sur	5,757	6/25/1999	6/25/2024
2	Kualabaro Upland Farmers Association	99-002	Tubic Dacula & Parang Pantay, Languyan, Tawi-Tawi	312	11/25/1999	11/25/2024
3	Kabulnan Tree Planters and Tree Growers Multi-purpose Cooperative	99-003	Salman and Saniag, Amaputuan, Maguindanao	2,000	4/26/2000	4/26/2025
4	Kenebera Multi-purpose Cooperative	99-006	Kenebeke DOS, Maguindanao	1,000	1/9/2001	1/9/2026
5	Tiruray Integrated Famers Association Inc.	2001-007	Sta. Fe, Looy, South Upi, Maguindanao	794	7/16/2001	7/16/2026
6	Kabingaan Socio-economic MPC	2003-011	Barangay Aloh & Tangkapaan, Tapul, Sulu	4,527	4/20/2003	4/20/2028
7	Sitio Malnos Agro-industrial MPC	2007-012	Barangays Paitan, Maman, Mamali & Sambolawan, Buluan, Maguindanao	714	3/13/2007	3/13/2032
8	Tandubato Island Multi-purpose Coop.	2008-013	Barangay Tandubato, Tandubas, Tawi-Tawi	500	2/26/2008	2/26/2033
9	Ragayan Farmers Rattan MPC	2009-014	Malalis, Sultan Demalondong	514	2/10/2009	2/10/2034
10	Teduray Fagumfungon Temikur MPC	2009-016	Sito Betubekasan Barangay, Tomicor Amapatuan, Maguindanao	1,150	12/17/2009	12/17/2034
11	Maruhom Sidic Multi-purpose Coop.	2009-015	Barangay Rogero, Bubong,, LDS	1,841	10/23/2009	10/23/2034

Source: Forest Management Bureau, DENR-ARMM

CHAPTER 2 NATURAL ENVIRONMENT

This section describes the baseline conditions of the natural environment in the BCT based on the available secondary data.

2.1 Geography and Geology

2.1.1 Locations and land area

The BCT covers the five ARMM provinces with two cities and the expansion areas consisting of six municipalities in the province of Lanao del Norte and 39 barangays in six municipalities in the province of North Cotabato including the Cities of Cotabato (province of Maguindanao) and Isabela (province of Basilan). It lies in Central and Western Mindanao and is located at 07°13' North and 124°15' East.

The BCT has an estimated total land area of 1,386,735 ha based on the 2013 estimates published by the National Mapping and Resource Information Agency (NAMRIA), excluding the land areas for the barangays in the municipalities of Pigkawayan and Pikit in the province of North Cotabato, which are part of the BCT with no available data (Table 2.1). It comprises at least 4.7% of the Philippines' total land area of 30 million ha and 13.6% of Mindanao's land area of about 10.2 million ha. Presently, the BCT includes five provinces and a portion of two provinces, four cities, 122 municipalities, and 2,669 barangays.

Table 2.1 Total Land Area and Distribution in BCT by Province and Municipality

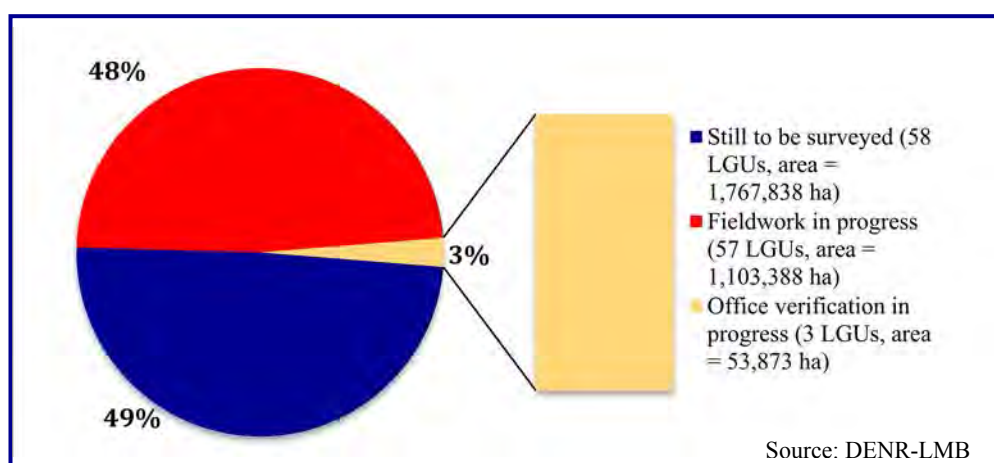
Province/Municipality	Total Land Area (ha) ¹		Number of Barangays ²	
	NAMRIA, 2013	LGUs, various years		Reference year
BCT*	1,386,735	1,716,958	2,647	2014
Basilan	132,723	351,170	210	2014
Lanao del Sur	387,289	387,300	1,159	2014
Maguindanao	504,760	597,053	508	2014
Sulu	160,040	167,376	410	2014
Tawi-Tawi	108,740	120,876	203	2014
Lanao del Norte, BCT†	70,738	70,738	118	2014
North Cotabato, BCT‡	22,445	22,445	39	2014

*Total land area of BCT not including barangay land area in the municipalities of Pigkawayan and Pikit in North Cotabato due to no data; †land area of six municipalities in Lanao del Norte Province, which are included as part of BCT; ‡land area of barangays in the municipalities of Aleosan, Kabacan, Carmen, and Midsayap in North Cotabato, which are included as part of BCT, excluding barangays in the municipalities of Pigkawayan and Pikit due to no data.

Sources: ¹ Land area: NAMRIA for the five BCT provinces, as reported in the 2013 Philippine Forestry Statistics, and the respective LGUs' Provincial Comprehensive Development Plans (PCDPs), Provincial Development and Physical Framework Plans (PDPFPs), Comprehensive Land Use Plans (CLUPs), and Socio-economic Profiles (SEPs) for the five BCT provinces and the expansion areas in the provinces of Lanao del Norte and North Cotabato; ²Number of barangays: Philippine Statistics Authority (PSA).

The BCT areas in Lanao del Norte Province (comprising the municipalities of Baloi, Munai, Nunungan, Pantar, Tagoloan, and Tangkal) and North Cotabato Province (comprising 69 barangays in the municipalities of Aleosan, Carmen, Kabacan, Midsayap, Pigkawayan, and Pikit) were officially approved to be part of the Bangsamoro region (formerly ARMM) by virtue of the 2001 plebiscite. As shown in Table 2.1, the existing documents and plans from the respective LGUs indicate a higher total land area in the BCT estimated at 1,716,958 ha, or a difference of 330,223 ha compared to the data derived from NAMRIA. Data discrepancy in the five BCT provinces can be attributed to the absence of cadastral survey in some of these areas. The National Cadastral Survey Program of the Land Management Bureau (LMB) under DENR has covered two cities and 116 municipalities in the BCT for cadastral survey. As of August 2014, the program reported the status of the cadastral survey as

Fieldwork in Progress in 57 of the first phase target of 60 LGUs covering an estimated area of 1,157,261 ha, while the status of the other three was *Office Verification in Progress*. The remaining 58 LGUs with an estimated area of 1,767,838 ha are still to be surveyed at that time. Figure 2.1 shows the latest status of the cadastral survey in the BCT.⁵



Note: <http://www.lmb.gov.ph/index.php/programs-and-projects/nat-l-cadastral-survey-project>

Figure 2.1 Status of Cadastral Survey in BCT, 2014

2.1.2 Land classification and land cover

Using the NAMRIA data on land classification in the Philippines, the total land area of 1,386,735 ha in the BCT in 2013 was distributed as: (i) forest land, with an area of 665,151 ha, or 48% of the total; and (ii) alienable and disposable (A&D) land with an area of 628,401 ha or 45% of the total (Table 2.2). The balance of 7% of the total land area pertains to the BCT's expansion areas with no available data on existing land classification.

Table 2.2 Land Classification in BCT by Province and Municipality, 2013

Province/Municipality	Total Land Area (NAMRIA, 2013)	Land Classification			
		Forest Land		A&D Land	
		Area (ha)	% of Total	Area (ha)	% of Total
BCT*	1,386,735	665,151	48.0	628,401	45.0
Basilan	132,723	47,149	35.5	85,574	64.5
Lanao del Sur	387,289	254,154	65.6	133,135	34.4
Maguindanao	504,760	198,138	39.3	306,622	60.7
Sulu	160,040	112,353	70.2	47,687	29.8
Tawi-Tawi	108,740	53,357	49.1	55,383	50.9
Lanao del Norte, BCT†	70,738				
North Cotabato, BCT‡	22,445				

*Total land area of BCT not including barangay land area in the municipalities of Pigkawayan and Pikit in North Cotabato due to no data; †land area of six municipalities in Lanao del Norte, which are included as part of BCT; ‡land area of barangays in the municipalities of Aleosan, Kabacan, Carmen, and Midsayap in North Cotabato,

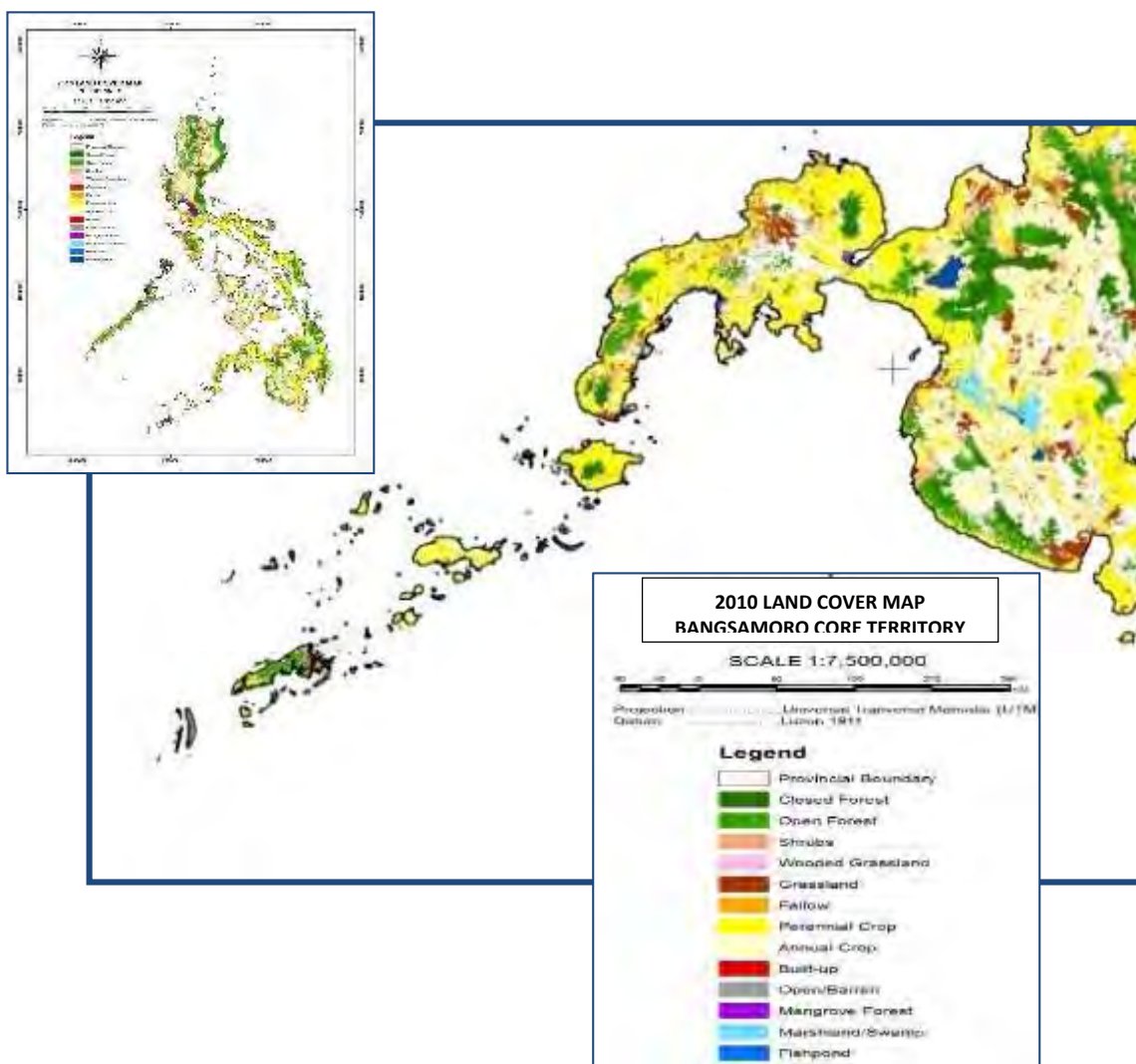
⁵ Under the Philippines laws, the authority and mandate to undertake Cadastral Survey is given to the DENR through its Land Management Bureau at the national level, and the Land Management Sectors in all DENR Regional Offices. The Cadastral Survey process requires DENR or its survey contractors to coordinate with the concerned LGUs. Under normal conditions, the coordination work with the concerned LGUs often results in the latter's approval or concurrence of the results of the Survey. However, in some instances, neighbouring provinces, cities or municipalities have ongoing boundary disputes not because of technical considerations but because of political reasons (i.e., the contested areas are political base of both contesting governors or mayors), and the coordination work done by the DENR with relevant LGUs does not result in their concurrence of the results of the Survey. Hence, the law does not really require the DENR to get the concurrence of the LGUs for the results of the Survey. Any boundary disputes are resolved by the court using the DENR's Cadastral Survey results.

excluding barangays in the municipalities of Pigkawayan and Pikit due to no data.

Source: Prepared by the PRIMEX Survey Team based on NAMRIA data as reported in DENR/FMB, 2013, Philippine Forestry Statistics.

Among the existing five BCT provinces, Lanao del Sur has the largest forestland estimated at 254,154 ha, or 38.2% of the total forestland in the region. It is followed by Maguindanao, with a forestland area of 198,138 ha, or 29.8% of the total regional forestland, and Sulu with 112,353 ha, or 16.9% of the total regional forestland. Basilan has the smallest forestland estimated at 47,149 ha, or 7.1% of the total regional forestland. However, relative to the individual provincial total land areas, forestland has remained high in Sulu (70.2%), Lanao del Sur (65.6%), and, to a certain extent, Tawi-Tawi (49.1%), compared to the regional average of 48%. In Basilan and Maguindanao, the proportion of forestland is lower than the regional average.

Figure 2.2 presents the total land cover of BCT in 2010. The region is now largely covered by annual and perennial crops, with pockets of closed forest in the provinces of Lanao del Sur and Tawi-Tawi. The light blue patch of water in the map represents the Liguasan Marsh in the province of Maguindanao.



Source: https://images.search.yahoo.com/search/images;_ylt=A0SO804BxPpUGVIA7bxXNyoA;_ylu=X3oDMTEzdjc0cTYwBGNvbG8DZ3ExBHBvcwMxBHZ0aWQDVklQNTgyXzEEc2VjA3Nj?p=Philippines+Land+Cover+Map+of+ARMM&fr=yfp-t-901

Figure 2.2 Total BCT Land Cover Map, 2010

Forest cover in the main BCT areas increased from 250,346 ha (or 40.5% of its total land area) in 2003 to 301,894 ha (or 45.4% of its total land area) by 2010. Figure 2.3 presents the forest cover of the region

in 2010. The open forest had the largest share, estimated at 49% (146,431 ha), followed by closed forest at 33% (99,889 ha) and mangrove forest at 18% (55,574 ha). Compared to the forest cover in 2003, the increase in total forest cover in 2010 was the result of the increase in the reported open forest and mangrove forest, which could be attributed to reforestation and other rehabilitation programs of the national and local governments.



Source: DENR/FMB, 2013 Forestry Statistics.

Figure 2.3 Forest Cover in BCT Provinces, 2010

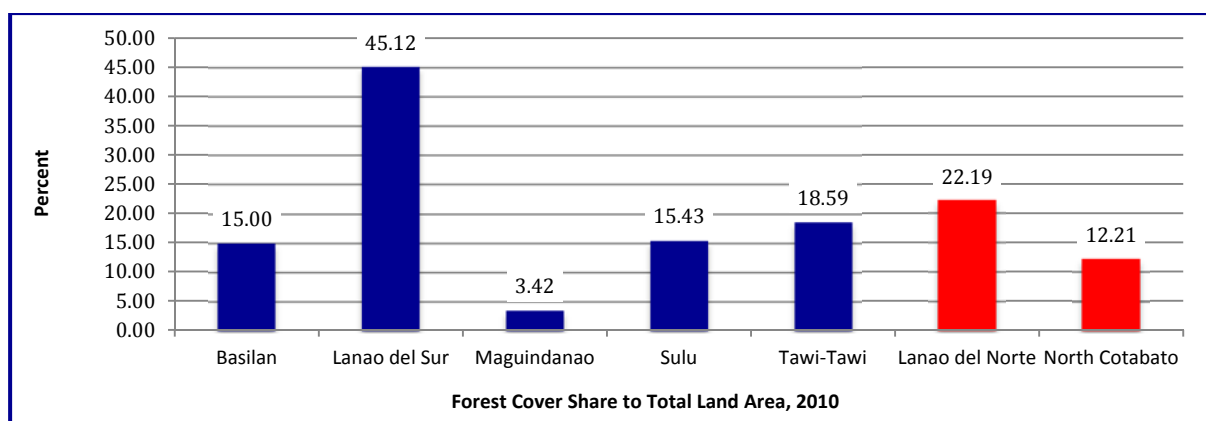
Table 2.3 shows the area and geographic distribution of the forest cover in the region, by province, in 2010, including estimates for the provinces of Lanao del Norte and North Cotabato, where the BCT expansion areas are located. Breakdown of forest cover data is unavailable at the municipal and barangay levels to date. Among the BCT provinces, Lanao del Norte and Maguindanao have the largest forest cover in absolute terms, estimated at 150,151 ha and 52,351 ha, respectively, in 2010. However, in relation to the respective forestland areas, Tawi-Tawi, and Lanao del Sur have denser forest cover estimated at 88.5% and 59.1% compared to the other three provinces (i.e., Basilan at 45.2%, Sulu at 27.4% and Maguindanao at 26.4%).

Table 2.3 Area and Geographic Distribution of Forests, 2010

Province	Forest land (ha)	Forest cover (ha)			
		Total	Closed	Open	Mangrove
Total BCT	665,151	301,894	99,889	146,431	55,574
Basilan	47,149	21,320	11,442	1,003	8,875
Lanao del Sur	254,154	150,151	80,245	69,442	464
Maguindanao	198,138	52,351	8,202	43,087	1,061
Sulu	112,353	30,839	0	757	30,083
Tawi-Tawi	53,357	47,233	0	32,142	15,091
Lanao del Norte	150,731	66,384	11,934	52,122	2,328
North Cotabato	506,618	39,947	7,896	31,381	670

Source: *ibid.*

A closer look at the 2010 forest cover of BCT provinces, however, reveals that a significant part of their natural forest vegetation has disappeared due to various anthropogenic activities (i.e., logging, shifting cultivation, and land use conversion). Only the province of Lanao del Sur has some remaining good closed forest cover, estimated at 45.12% (80,140 ha), while forest cover has reached a critical level in the other provinces (Figure 2.4).



Source: *ibid.*

Figure 2.4 Share of Forest Cover in Land Area of BCT and Other Provinces in Mindanao

2.1.3 Soil characteristics

Generally, the dominant soil types in the BCT consist of clay loam, sandy loam, and silt loam, which are favorable for rice, corn, and other cash crops on the lowland areas, and commercial crops on the upland areas. These soil types are characteristics of the entire region, particularly in Lanao del Sur, Maguindanao, and the extension areas in Lanao del Norte and North Cotabato. While these soil types are found in the three island provinces of Basilan, Sulu, and Tawi-Tawi, the data gathered reveal problems on soil erosion and nutrient deficiency (i.e., nitrogen, phosphorous, and potassium) associated with the current soil conditions. Table 2.4 presents the different soil types and characteristics in the BCT by province, city and municipality.

Table 2.4 Soil Types and Characteristics in BCT by Province, City, and Municipality

Province/City/Municipality	Soil Types	Soil Characteristics
BCT*		
Basilan	Bulaon clay Bancal clay loam	Bulaon clay is the most dominant soil type in the province, with a few Bancal clay loam. In the central part of the mountains, soils are differentiated.
Lanao del Sur	Salaman loam clay Ragain loam clay Buaya-an loam clay Pu-an loam clay Binidayan silt loam Aduyo clay loam Langkong sandy loam Kundarangan clay loam Malabang sandy loam Aduyo-bam castellan complex Caromatan silt loam Bolinao silt loam Kidapawan clay loam Jansan clay loam Kudarang loam clay	Salaman loam clay, Ragain loam clay, Buaya-an loam clay and Pu-an loam clay are good types of soil suitable for agricultural cultivation. These soil types account for 1.23% of the soils in the province. Binidayan silt loam is a moderately good type of soil, accounting for 11.1%, for agricultural production. Aduyo clay loam, Langkong sandy loam, and Kundarangan clay loam are fairly good types of soil but limited for agricultural production. These soil types comprise about 33.3% of the soils in the province. Malabang sandy loam, Aduyo-bam castellan complex, Caromatan silt loam, Bolinao silt loam, Kidapawan clay loam, and Jansan clay loam are suitable for pasture and forest production. These soil types account for 15.62% of the soils in the province. Mountain soil, which is suitable for forestry, accounts for 30.15% of the soils in the province. Kudarang loam clay is another soil type identified, but its land suitability characteristic is not defined.
Maguindanao	San Miguel loam Langkong clay Buldon sandy loam Timaga clay loam Kabacan clay loam	San Miguel loam is the dominant type of soil in the province, and is found in 12 of the 28 municipalities, followed by Timaga clay loam found in another 5 municipalities. Clay loam and sandy loam soils are favorable for rice and corn cultivation. Lands with these

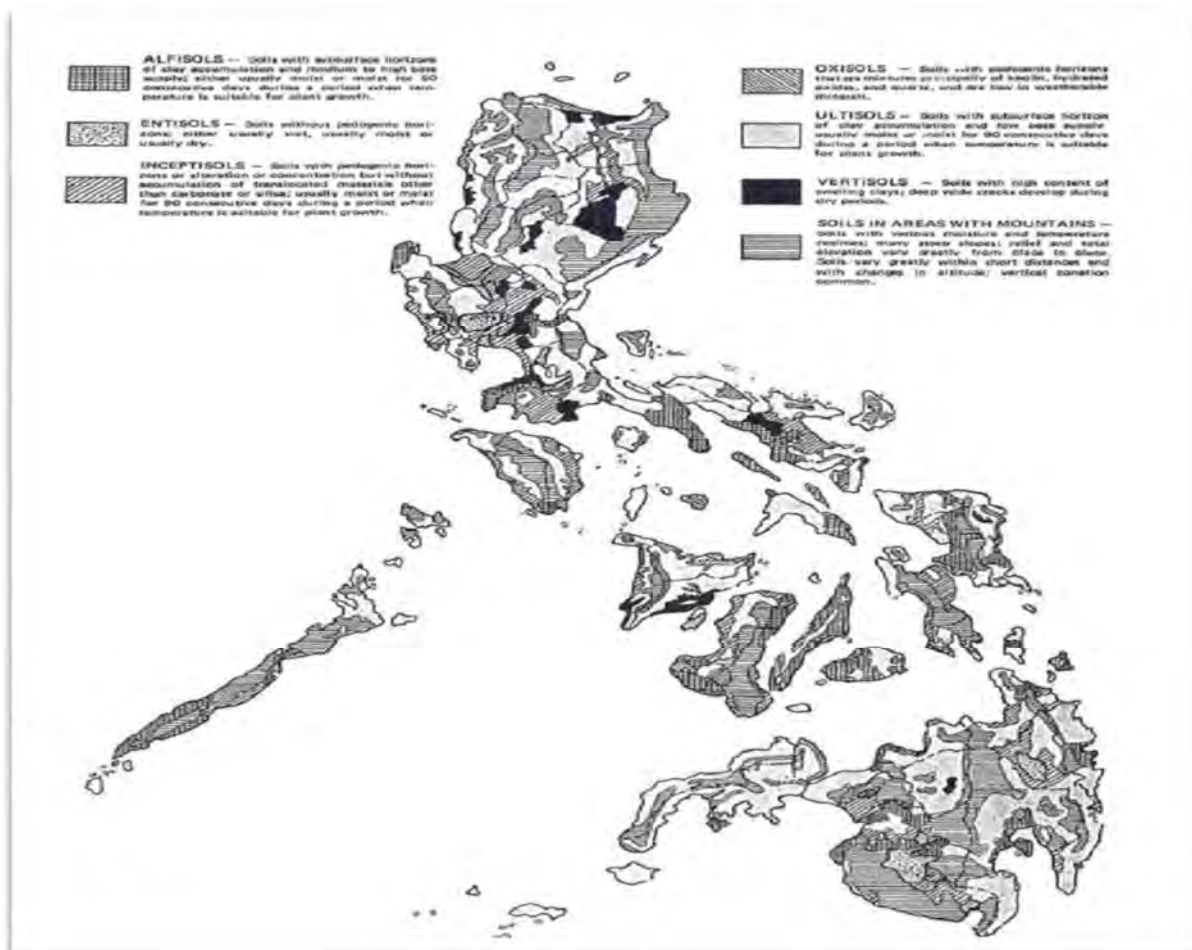
Province/City/ Municipality	Soil Types	Soil Characteristics
	Faraon clay loam Timaga clay loam Tamontaka clay loam Balut clay loam	soils are presently used for rice, corn, fruit (citrus, banana), cassava, coconut, and abaca production.
Sulu	Alfisols Inceptisols Ultisols	Soils with igneous rock of volcanic origin are found in the bigger islands, while limestone soils arising from coral formations are found in smaller islands of the province.
Tawi-Tawi	Qingua and San Miguel series Jasaan, Loiusiana, Tapul and Aduyon series Hydrosol Mountain soil	Qingua silt clay loam and Qingua loam soils are found in most parts of the province, while San Miguel sandy loam soils are found mainly in the southern part. Clay loam soils are the predominant agricultural soil type in the 7 municipalities of the province. Upland soils are made up of the Jasaan, Loiusiana, Tapul, and Aduyon series.
Marawi City	Silt clay Aduyan clay	Silt clay and Aduyan clay are suitable for the ceramic industry.
Lamitan City	Hydrosol Bancal Clay loam Bulawan clay loam Mountain soil	No data available.
Cotabato City	Faraon clay Tamontaka clay	Faraon clay is the dominant soil type in the inner parts, accounting for 80% of the soils in the city, and is moderately suited for limited cultivation and less suited for urban development. Tamontaka clay is found along Rio Grande de Mindanao on the north and south directions, comprising 15% of the city's land area. This soil type has high fertility and is highly suited for cultivation.
Isabela City	Bulawan clay loam Bancal clay loam Hydrosol	Soil in the city is almost entirely Bulawan clay loam, which can be cultivated for rice, corn, coconut, and other farm crops with proper soil management to address its deficiency in nitrogen, phosphorus, and potassium. Bancal clay loam is found in small parts of the city, in the lowland area of Barangays San Rafael, Binuangan, and Tabiawan.
Lanao del Norte BCT†	Coarse loamy and fine loamy types Aduyon clay/ clay loam Antipolo clay loam / loam Alluvial clay loam	Coarse loamy and fine loamy soils are unique to the municipalities of Balo-i and Pantar. Aduyon clay and Antipolo clay loam soils are found in the municipality of Munai and are generally suited for the cultivation of rice, corn, coconut, fruit trees, vegetables, and other high-value root crops. Aduyon clay loam is the dominant soil in the municipality of Nunungan, which is presently acidic (pH of 5.0–5.5) and requires soil treatment for agricultural cultivation. Antipolo loam, alluvial clay loam, and Aduyon clay loam are found in the municipality of Tangkal.
North Cotabato BCT‡	Kudarangan series Kabacan series Kidapawan series Faraon series Aroman series San Manuel series Tacloban series Hydrosol Balut clay loam Tamontaka clay	Kudarangan clay comprises about 79% of the land area in the municipality of Aleosan. Kabacan clay loam, Faraon clay to clay loam, and Aroman clay loam are the other soil types in the municipality. Kabacan clay loam and Kabacan clay are the dominant soil types in the municipality of Kabacan, followed by San Manuel loam and Aroman clay. Undifferentiated soil is found in the northern part of the municipality. Aroman clay loam is the dominant soil type in the municipality of Carmen, followed by Kabacan clay loam, Faraon clay, Tacloban

Province/City/Municipality	Soil Types	Soil Characteristics
	Parang clay loam Langkong sandy loam Undifferentiated soil	clay, and Kidapawan clay loam. These soil types are very fertile and are highly suitable for almost all kinds of agricultural production. Kabacan clay, Kudarangan clay, San Manuel silty clay loam, and Hydrosol are found in the municipality of Midsayap. Balut clay loam, Tamontaka clay, San Manuel silty clay loam, Kudarangan clay, Parang clay loam, Langkong sandy loam, and undifferentiated mountain soil are found in the municipality of Pigkawayan.

*Not including barangays in Pigkawayan and Pikit in North Cotabato, which are included as part of BCT due to no available data; †land area of six municipalities in Lanao del Norte, which are included as part of the BCT; ‡land area of barangays in the municipalities of Aleosan, Kabacan, Carmen and Midsayap in North Cotabato, excluding barangays in Pigkawayan and Pikit due to no data.

Sources: ARMM Regional Physical Framework Plan (RPF), 2000-2030, and respective LGUs' Provincial Comprehensive Development Plans (PCDPs), Provincial Development and Physical Framework Plans (PDPFPs), Comprehensive Land Use Plans (CLUPs), and Socio-economic Profiles (SEPs) for the five BCT provinces and the expansion areas in the provinces of Lanao del Norte and North Cotabato.

Figure 2.5 presents a soil map of the Philippines, indicating the major soil types in the provinces of Lanao del Sur and Maguindao, which are categorized as alfisols, inceptisols, and ultisols. The map shows little information on the soil types in the three island provinces of the BCT.



Source: Moog, F. A. undated, Philippines: Country Pasture/Forage Resource Profile.
<http://www.fao.org/ag/aGp/agpc/doc/Counprof/Philippines/Philipp.htm>

Figure 2.5 Soil Map of the Philippines

Figures 2.6 through 2.8 show the soil maps of the Provinces of Basilan, Lanao del Sur and Maguindanao.

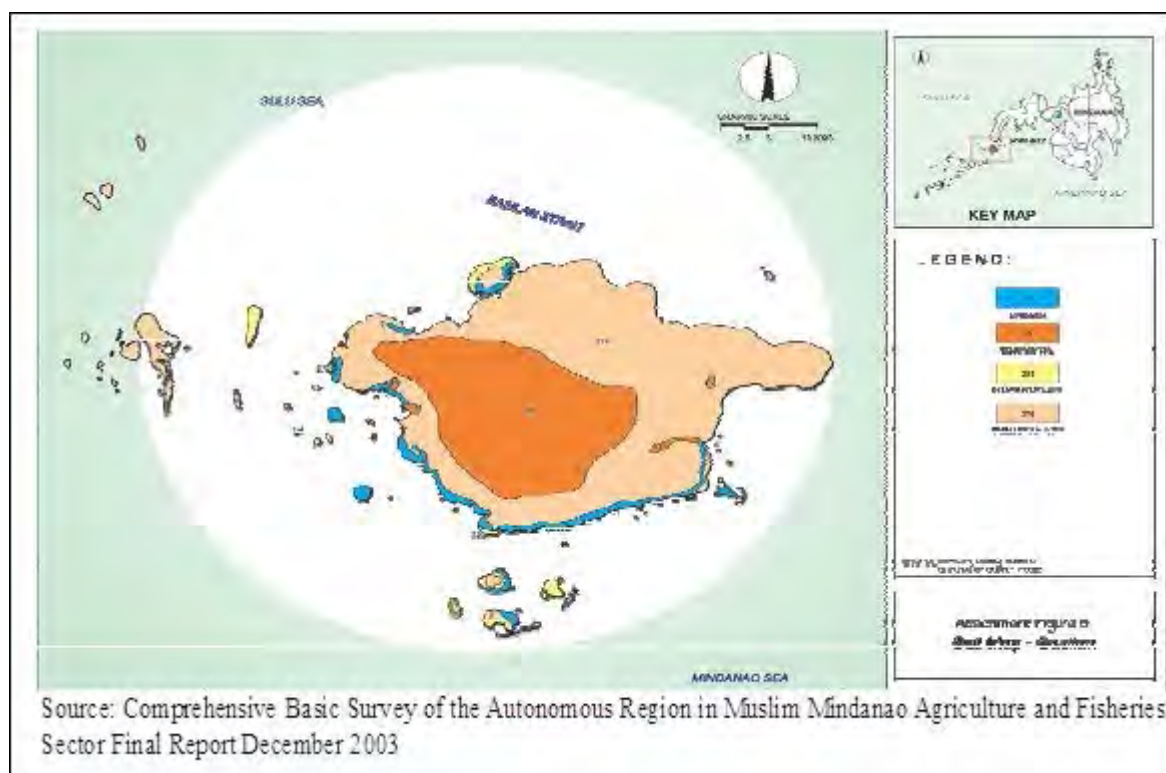


Figure 2.6 Soil Map of Basilan

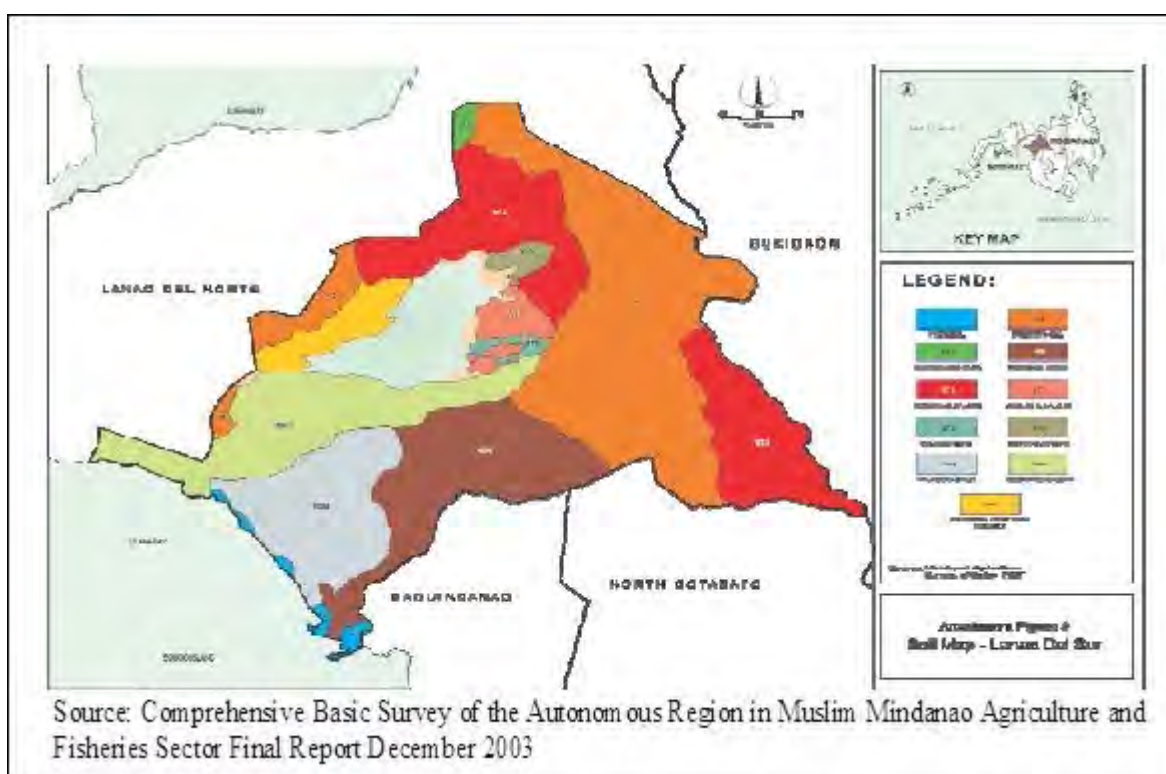


Figure 2.7 Soil Map of Lanao del Sur

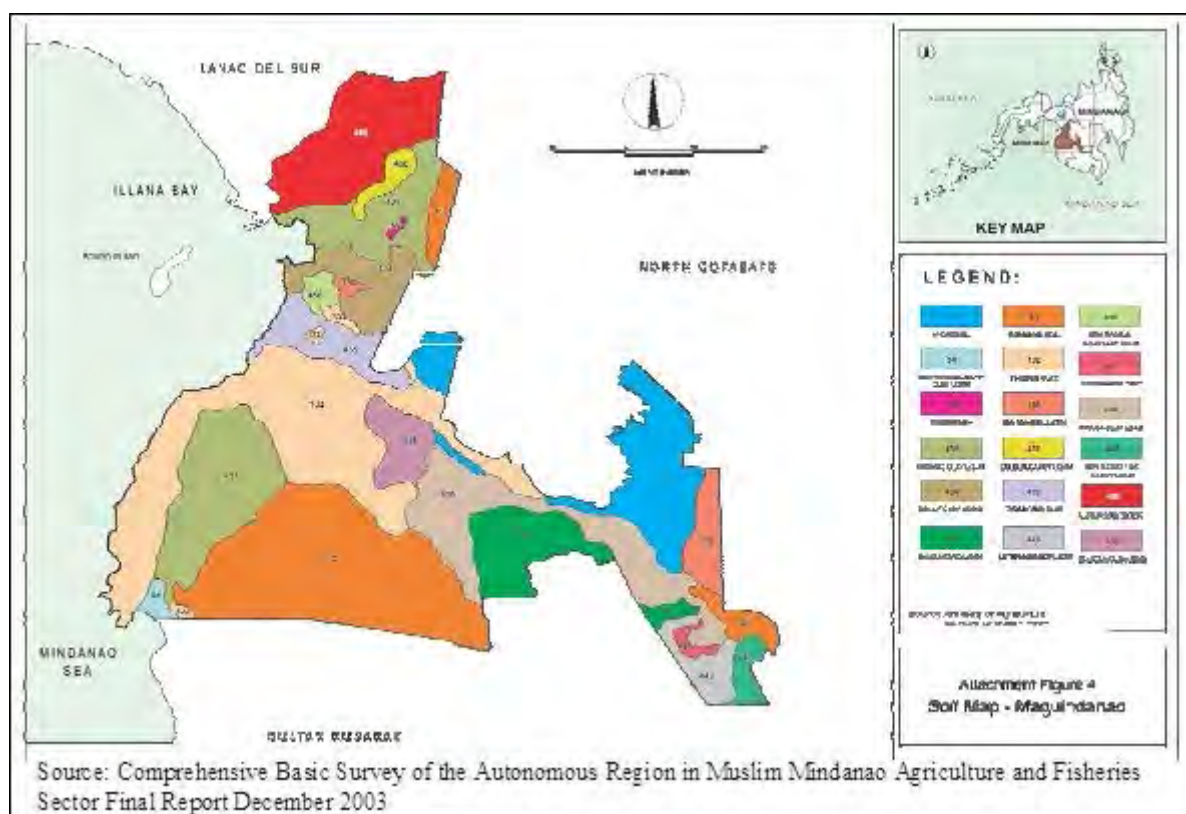


Figure 2.8 Soil Map of Maguindanao

2.1.4 Geological deposits

Table 2.5 presents available data on geological deposits in the BCT, which indicate major data gaps. Anecdotal reports indicate that mineral deposits of gold, manganese, iron, ore, copper, and coal are found in Basilan.⁶ DENR is reported to have identified natural gas and oil deposits in three areas of Mindanao and the Sulu Archipelago: (i) Cotabato Basin; (ii) Davao-Agusan Basin; and (iii) an area straddling Tawi-Tawi and Sulu.⁷ The Cotabato Basin includes Ligawasan Marsh (288,000 ha), straddling the provinces of Maguindanao, North Cotabato, and Sultan Kudurat.

Another study, said to have been conducted by the Philippine National Oil Company (PNOC) in the 1990s, indicated that natural gas and/or oil exists in five sites, including Datu Piang (Dulawan) and Sultan Sa Barongis in Maguindanao, and Lambayong in Sultan Kudurat. That study stated that, “the natural gas deposits in Sultan Sa Barongis alone would be enough to fuel a 60-megawatt (MW) combined cycle power plant for 20 years.” In August 2014, a Multipartite Forum on Environment and Natural Resources held in Cotabato City recognized the existence of vast deposits of fossil fuels and minerals in the BCT, particularly in Liguasan Delta, but details of the type, quantity, and location of these geological deposits are not available.

Table 2.5 Geological Deposits in BCT by Province, City, and Municipality

Province/City/Municipality	Geological Deposits	Major Characteristics
BCT*		
Basilan	No data	
Lanao del Sur	No data	
Maguindanao	No data	
Sulu	No data	

⁶ http://www.wowphilippines.ca/index.php?option=com_content&view=article&id=117:basilan&catid=46:auto-nomuos-region-of-muslim-mindanao&Itemid=137

⁷ <http://www.betterphils.blogspot.com/2011/08/wikileaks-us-says-island-mindanao-has-1.html>

Province/City/Municipality	Geological Deposits	Major Characteristics
Tawi-Tawi	Copper Nickel Oil Sand and gravel (quarrying)	Copper and nickel mining, and quarrying in the municipalities of Languyan, Panglima Sugala, Tandubas and Sapa-Sapa; oil survey underway in an area near the municipalities of Bongao and Mapun in the middle of Sulu Sea.
Marawi City	No data	
Lamitan City	No data	
Cotabato City	No data	
Isabela City	No data	
Lanao del Norte, BCT†	No data	
North Cotabato, BCT‡	Sand and gravel (quarrying in Aleosan, Carmen) Limestone (in Carmen)	

*Not including barangays in Pigkawayan and Pikit in North Cotabato, which are included as part of BCT due to no data; †land area of six municipalities in Lanao del Norte, which are included as part of BCT; ‡land area of barangays in the municipalities of Aleosan, Kabacan, Carmen and Midsayap in North Cotabato, excluding barangays in Pigkawayan and Pikit due to no data.

Sources: ARMM RFPF, 2000–2030; the respective LGUs' PCDPs, PDPFPs, CLUPs, and SEPs for the five BCT provinces and the expansion areas in the provinces of Lanao del Norte and North Cotabato.

2.2 Meteorology

2.2.1 Climate types

The ARMM RFPF, 2000–2030 describes the region's climatic condition as having generally "moderate and even distribution of rainfall throughout the year." Historically, the region has been spared from typhoons. Table 2.6 presents the prevailing climatic type/s by province, including those of the key cities, and the expansion areas in Lanao del Norte and North Cotabato at the municipal level, based on 1992 data of the Modified Coronas Climate Classification System established by PAGASA. Figure 2.9 maps out the climatic types in the BCT. In general, BCT falls under Climate Types III and IV, which are described as follows:

Type III: Seasons are not very pronounced, relatively dry from November to April, and wet during the rest of the year.

Type IV: Rainfall is more or less evenly distributed throughout the year.

Most of the existing regional, provincial, city, and municipal plans and profiles do not include data on average monthly rainfall and maximum and minimum rainfall that would provide more useful information for planning of development projects, particularly farming, fishing, and other livelihood activities of local communities, against the impact of climate change and extreme weather occurrences (i.e., El Niño).

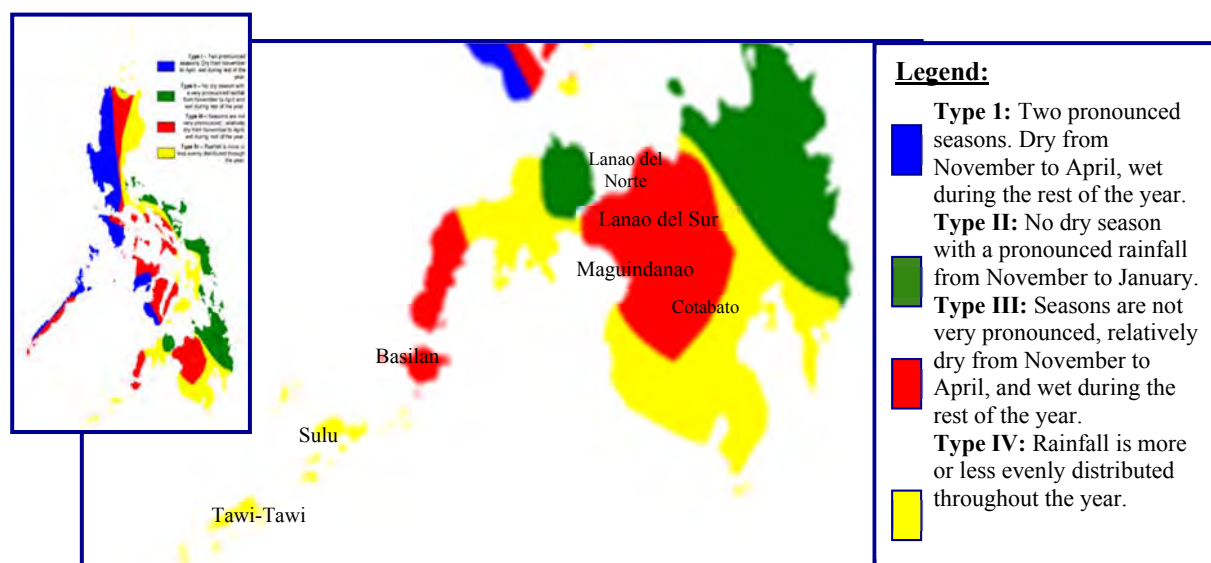
Table 2.6 Climate Type by Province, City, and Municipality in BCT

Province/Municipality	Climatic type	Precipitation (mm)		
		Av. annual	Max month	Min month
BCT*	Type III/IV			
Basilan	Type III			
Lanao del Sur	Type IV	115.0		
Maguindanao	Type IV	230.0		
Sulu	Type IV			
Tawi-Tawi	Type IV			
Marawi City	Type IV			
Lamitan City	Type III	188.0	382.2	51.0

Province/Municipality	Climatic type	Precipitation (mm)		
		Av. annual	Max month	Min month
Cotabato City	Type III			
Isabela City	Type III			
Lanao del Norte, BCT†	Type III/IV			
North Cotabato, BCT‡	Type III			

*Not including barangays in Pigkawayan and Pikit in North Cotabato, which are included as part of BCT due to no data; †land area of six municipalities in Lanao del Norte, which are included as part of BCT; ‡land area in barangays in Aleosan, Kabacan, Carmen and Midsayap in North Cotabato, excluding barangays in Pigkawayan and Pikit due to no data.

Source: Prepared by the PRIMEX Survey Team based on data taken from Provincial SEPs.



Source: https://en.wikipedia.org/wiki/Climate_of_the_Philippines

Figure 2.9 Climate Types in BCT by Province

2.2.2 Temperature

The existing climatic conditions in the BCT and the limited available data on temperature (Table 2.7), indicate that the region experiences generally cooler temperature than other regions in Luzon and the Visayas. Throughout the year, temperatures range from 21–30°C, except in the interior part of the province of Tawi-Tawi, where the annual mean temperature ranges from 30–33°C. The hottest months are from March to August in most areas, and the coolest months are from November to February.

Table 2.7 Temperature in BCT by Province and Municipality

Province/ Municipality	Temperature (°C)		
	Av. annual	Hottest months	Coolest months
BCT			
Basilan	26.6	Mar–May, 22.0	Nov–Feb, 22.0–28.0
Lanao del Sur	21.0	Mar–May	Nov–Feb, 12.0
Maguindanao	25.9-26.5	Mar–Jun, 28.3	Nov–Jan, 22.9
Sulu	26.0	May–Aug, 27.0	Feb
Tawi-Tawi	27.0–30.0 (coastal) 30.0–33.0 (interior)		
Marawi City	19.7	Mar–May	Dec–Feb, 14.0
Lamitan City		Feb	
Cotabato City	27.8 (2005–2013)	March, 37.7 (1997)	Dec–Jan, 20.0 (1986, 1987)
Isabela City			
Lanao del Norte, BCT*	24.7	30.1	22.3
North Cotabato, BCT†	28.0	Apr–Sep, 32.0	Dec–Feb, 23.0

*Including six municipalities in Lanao del Norte, which are included as part of BCT; †data available only on Carmen in North Cotabato; blank cell = no data available.

Source: ARMM RFPF, 2000–2030; <http://misskhaye.blogspot.com/2007/08/sulu-land-of-treasures-and-farers-of.html>

2.2.3 Humidity

As shown in Table 2.8, data on humidity is not available for most of the provinces, cities, and municipalities in the BCT. Humidity data are available only for the provinces of Basilan and Lanao del Sur; Cotabato City and Isabela City in Maguindao and Basilan, respectively; and the municipalities of Nunungan and Tankal in North Cotabato. In addition, only the province of Lanao del Sur and Cotabato City in Maguindanao have available data on mean sea level pressure. Based on available data, annual average humidity ranges from 75 to 87.4%, while annual mean sea-level pressure is in the range of 1009.3–1012.0 hPa.

Table 2.8 Humidity in BCT by Province and Municipality

Province	Av. annual humidity (%)	Av. annual sea-level pressure (hPa)
BCT		
Basilan	77.0	
Lanao del Sur	75.0-85.0	1009.3
Maguindanao		
Sulu		
Tawi-Tawi		
Marawi City		
Lamitan City		
Cotabato City	75.0 (2005–2013)	1012.0 (2005–2013)
Isabela City	77.0	
Lanao del Norte, BCT*	87.4 (Nunungan, Tangkal)	
North Cotabato, BCT†		

*Including six municipalities in Lanao del Norte, which are included as part of BCT; †data available only for Carmen in North Cotabato; blank cells = no data available.

Sources: ARMM RFPF, 2000–2030; *Sulu—Land of Treasures and Farers of the Seas*, 2007; <http://misskhaye.blogspot.com/2007/08/sulu-land-of-treasures-and-farers-of.html>

2.2.4 Precipitation

No data on precipitation are available for most of the provinces, cities, and municipalities in the BCT (Table 2.9). Available data for the provinces of Basilan, Lanao del Sur, and Maguindanao are also incomplete in terms of the exact period of observation and the three common parameters (i.e., annual average rainfall, highest monthly average rainfall, and lowest monthly average rainfall), which are useful for planning purposes. Available data show that the annual average rainfall ranges from a low of 297.2 millimeters (mm) in the province of Maguindanao to 1,100.0 mm in the province of Basilan and 2,895.5 mm in the city of Cotabato, also in the province of Maguindanao.

Table 2.9 Precipitation in BCT by Province and Municipality

Province/Municipality	Precipitation (mm)		
	Av. annual	Highest month	Lowest month
BCT			
Basilan	1,100.0		
Lanao del Sur		554.6 (2007)	8.7 (2005)
Maguindanao	297.2 (1971–2000)	635.3	
Sulu			
Tawi-Tawi			
Marawi City			
Lamitan City			
Cotabato City	2,895.5 (2005–2013)	344.4 (2005–2014)	96.6 (2005–2014)

Province/Municipality	Precipitation (mm)		
	Av. annual	Highest month	Lowest month
Isabela City			
Lanao del Norte, BCT*			
North Cotabato, BCT†		434.0 (1999)‡	42.0 (1999)‡

*Including six municipalities in Lanao del Norte, which are included as part of BCT; †data available only for Carmen in North Cotabato; ‡in Pigkawayan; blank cells = no data available.

Sources: *ibid.*

The highest average monthly rainfall ranges from 344.4 mm in the Cotabato City, province of Maguindanao to 635.3 mm in the whole province of Maguindanao. In the province of Lanao del Sur, the highest monthly rainfall is reported at 554.6 mm, while in the municipality of Pigkawayan in North Cotabato, it is 434.0 mm. In contrast, the lowest average monthly rainfall ranges from 8.7 mm in the province of Lanao del Sur to 96.6 mm in the city of Cotabato.

2.2.5 Wind direction and speed

Data on wind direction and speed are available only for the province of Basilan; the cities of Lamitan, Cotabato, and Isabela; and the municipalities of Balo-i in Lanao del Norte and Aleosan in North Cotabato. The prevailing wind in the province of Basilan comes from the southwest direction, with a speed of 7.4 km per hour (kph). The same wind direction and speed prevail in the City of Isabela, which is part of Basilan. However, the city of Lamitan, also in Basilan, experiences northwest wind from January to April with a speed of 4-6 kph and easterly wind from May to December with a speed of 6 kph (Table 2.10).

Data on wind direction for Cotabato City were obtained from two sources. Recent data acquired by the Study Team from PAGASA specifies a north-northwind direction with a speed of 2 meters per second (mps), while data gathered from the LGU indicates a southeasterly wind direction with a relatively weak wind speed without numerical values. Both sources describe wind speed as relatively weak. In the BCT expansion areas, both the municipalities of Balo-i and Aleosan reported to have a prevailing southeasterly wind direction.

Table 2.10 Wind Direction and Speed in BCT by Province and Municipality

Province/ Municipality	Wind direction and speed	
	Direction	Sepeed (kph)
BCT		
Basilan	Southwesterly wind prevails	7.4
Lanao del Sur		
Maguindanao		
Sulu		
Tawi-Tawi		
Marawi City		
Lamitan City	Northwest wind prevails from January to April Easterly wind prevails from May to December	4.0–6.0 6.0
Cotabato City	North-Northwesterly wind prevails Southeasterly wind prevails	Relatively weak (2 mps)
Isabela City	Southwesterly wind prevails	7.4
Lanao del Norte, BCT*	Southeasterly wind prevails (Balo-i)	
North Cotabato, BCT†	Southeasterly wind prevails (Aleosan)	

*Including six municipalities in Lanao del Norte, which are included as part of BCT; †data available only for Carmen in North Cotabato; blank cells = no data available.

Sources: *ibid.*

2.3 Topography

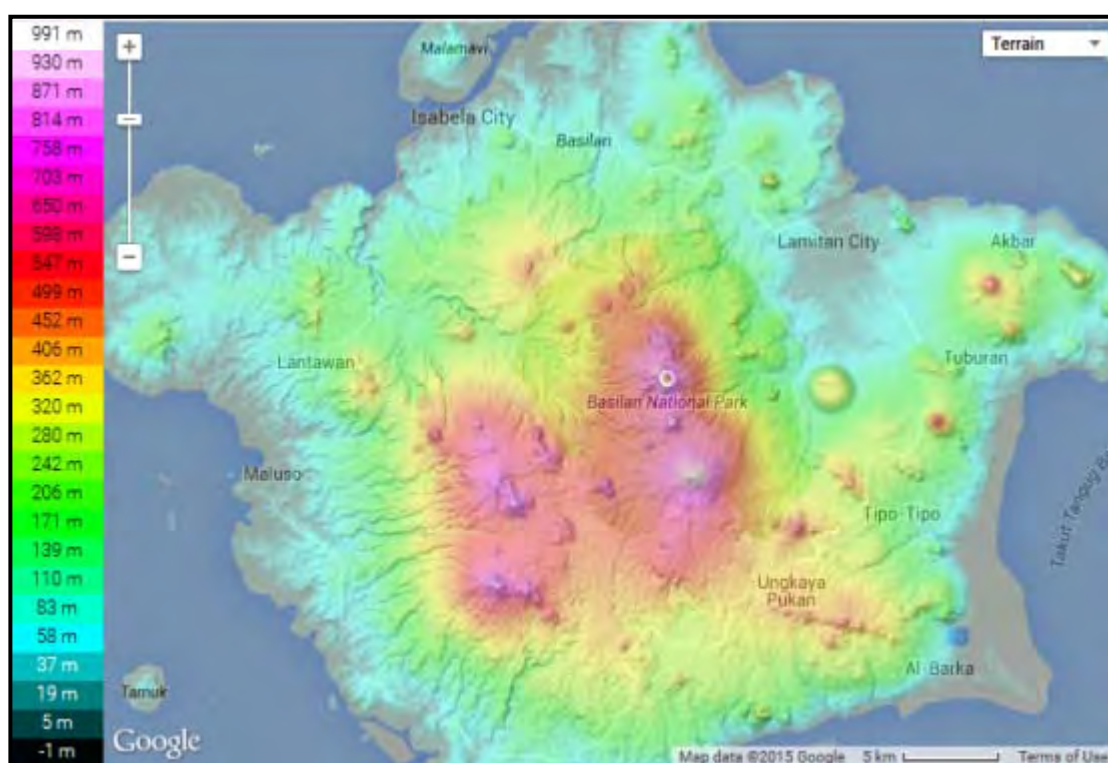
The topography of the provinces, cities, and municipalities in the BCT, as contained in the existing plans and profiles gathered by the Study Team, is described in terms of the general terrain and elevation as

well as the special landforms found in specific areas. In most instances, topographic maps are included to provide a clear picture of the descriptive characteristics of the elevation, terrain, and landforms of these areas. The existing classification of topographic characteristics in the BCT, such as the slope and terrain categories, varies across the provinces, cities, and municipalities, creating problems in data aggregation.

2.3.1 Elevations

(1) Basilan Province

Figure 2.9 shows the topographic map of Basilan, which is characterized by an undulating to rolling terrain from the coast, and rolling to moderately steep terrain in the inner part. The terrain gets steeper in the two mountain ranges that comprise the Basilan National Park. Based on the topographic map, the elevation of the province ranges from 0–991 meters above sea level (masl). Table 2.11 shows the slope distribution in the province. However, the total area of the slope distribution represents only about 39% of the total land area of the province.



Source: <http://en-ph.topographic-map.com/places/Basilan-8134258/>

Figure 2.10 Topographic Map of Basilan

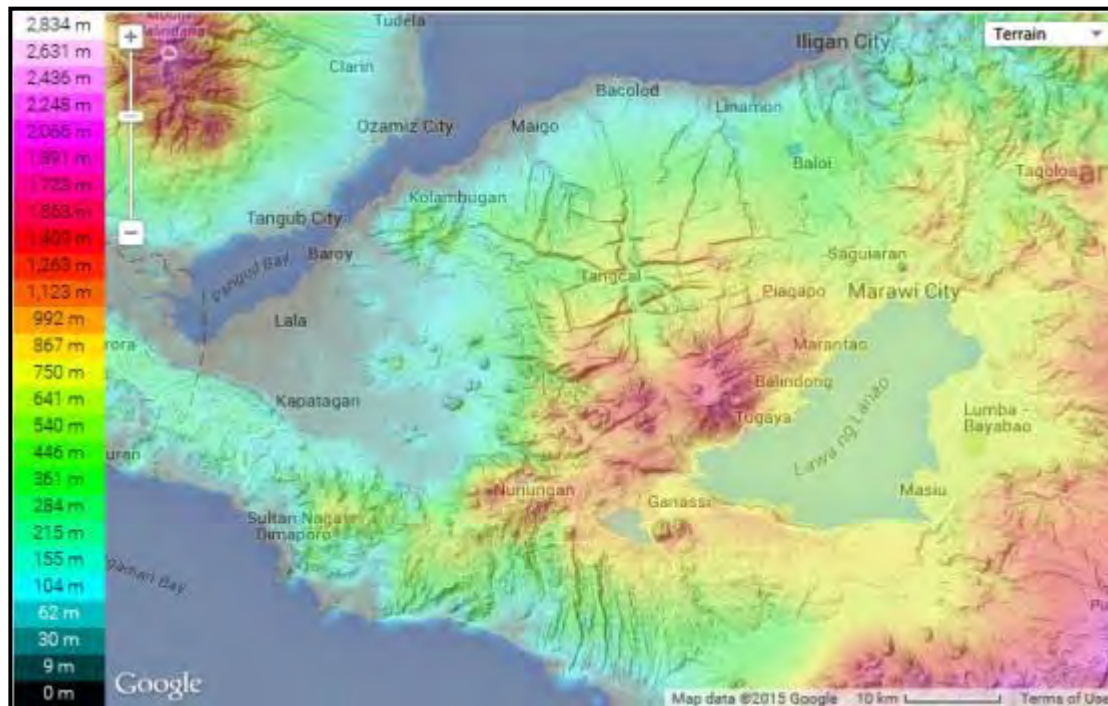
Table 2.11 Slope Distribution of Basilan

Slope (%)	Description	Area (ha)
0–3	Lowland	36,364
3–8		18,210
8–18	Highland	48,476
18–30		17,017
30–50	Upland	11,504
50 ≤		5,329
Total		137,900

Source: DENR, Basilan 2005 as cited in Basilan Comprehensive Plan, Executive-Legislative Agenda 2011–2013

(2) Lanao del Sur Province

Lanao del Sur is characterized by an undulating to rolling terrain covering 46.85% of the total land area, and rolling to moderately steep terrain comprising 21.46% of the total land area (Figure 2.11). From Illana Bay on its southwestern coast to its neighboring province of Bukidnon on the northwest, the elevation of the province ranges from 0–3,080 masl. The highest point in the province is found along the provincial boundary of North Cotabato on the south.



Source: <http://en-ph.topographic-map.com/places/Lanao-del-Sur-5473737/>

Figure 2.11 Topographic Map of Lanao del Sur

(3) Maguindanao Province

The ARMM RFPF, 2000–2030 describes the topography of the province of Maguindanao as generally sloping from the front side of the hills to relatively plain as it approaches the sea and Ligawasan Marsh (Figure 2.12). The rolling part is reported to cover 55% of the province’s total land area and the plains (i.e., nearly level and undulating to rolling), 45%.



Source: <http://en-ph.topographic-map.com/places/Maguindanao-2706689/>

Figure 2.12 Topographic Map of Maguindanao

(4) Sulu Province

The province of Sulu is composed of small packets of mountains and valleys and wide stretches of undulating to rolling lands, which form the agricultural base for farming activities. The Jolo and Siasi islands are mountainous and hilly areas, respectively, while the other islands, such as Pangutaran, have swampy, forested, flat, and low areas. The slope distribution of Sulu is shown in Table 2.12, while the topographic map is shown in Figure 2.13.

Table 2.12 Slope Distribution of Sulu

Slope (%)	Description	Area (ha)
0–3	Lowland	55,956.188
3–8		34,375.448
8–18	Highland	39,070.236
18–30		15,717.321
30–50	Upland	4,146.972
50 ≤		770.891
Subtotal		150,037.056
Unclassified		302.785
Lake		186,014
Total		150,525.855

Source: Sulu Provincial Development and Physical Framework, 2008–2013.



Source: <http://en-ph.topographic-map.com/places/Mindanao-6695590/>

Figure 2.13 Topographic Map of Sulu

(5) Tawi-Tawi Province

The topography of Tawi-Tawi ranges from level to moderately rolling and steep terrain (Table 2.13). The largest part of its land area (54.91%) is described as level to nearly level, covering an aggregate area of 66,370.4 ha and mostly located in the island municipalities of Sibutu, Sitangkai, Simunul, Sapa-sapa, South Ubian, part of Tandubas, Languyan, Panglima Sugala, and Bongao. These areas serve as the agricultural base, particularly for cultivation of cassava, which is the staple food of the people. Gently sloping to undulating areas, covering 2,138.9 ha (or 1.77%), are found in the municipalities of Bongao and Panglima Sugala and are used for cash and perennial crop production.

Undulating to rolling lands, covering 30,884.8 ha (or 25.55%), are found largely in the mainland of the province, particularly Languyan, Panglima Sugala, South Ubian, and a portion of Bongao. These lands are also used for agriculture. Rolling to moderately steep lands cover 11,458.4 ha (or 9.48%) and support watershed and irrigation projects as well as the remaining dipterocarp forest. Steep lands, covering 1,868.4 ha (or 1.55%), are located only in the municipality of Panglima Sugala. About 815.5 ha, or 6.75% of the land area of the province, remain unclassified, and cover the island municipalities of Mapun, Bas-bas Island, Mantabuan and portions of Languyan and Sapa-Sapa.

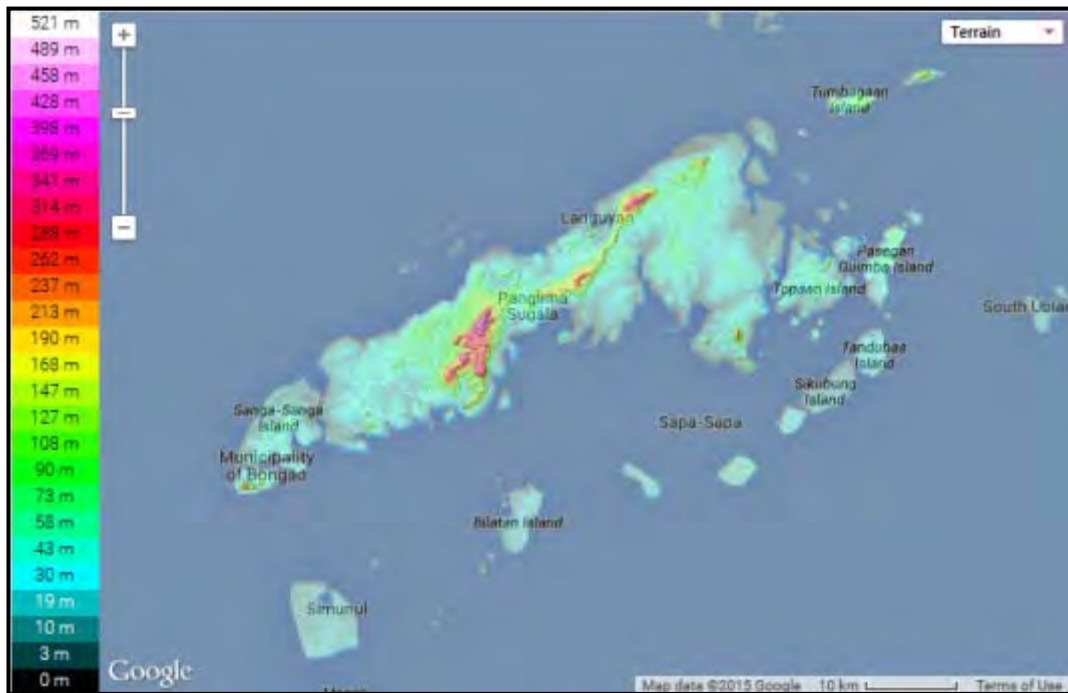
Table 2.13 Slope Distribution of Tawi-Tawi

Slope (%)	Description	Area (ha)	Share (%)
0–3	Level to nearly level	66,370.4	54.91
3–8	Gently sloping to undulating	2,138.9	1.77
8–18	Undulating to rolling	30,884.8	25.55
18–30	Rolling to moderately steep	11,458.4	9.48
30–50	Steep	1,868.4	1.55
Unclassified		815.5	6.75
Total		120,876.0	100.00

Source: DENR-ARMM, Tawi-Tawi as cited in Tawi-Tawi Provincial Development and Physical Framework Plan, 2008-2013

Figure 2.14 presents the topographic map of Tawi-Tawi, highlighting the generally low elevation of a

large portion of the land area of the province. The highest elevations are mainly located in the municipalities of Panglima Sugala (with Thumbhill Mountain) and Languyan.



Source: en-ph.topographic-map.com/places/Tawi-Tawi-4039329/

Figure 2.14 Topographic Map of Tawi-Tawi

(6) Marawi City

As shown in Figure 2.15, Marawi City has a hilly and gently rolling terrain that is favorable for permanent crops and pasture activities.

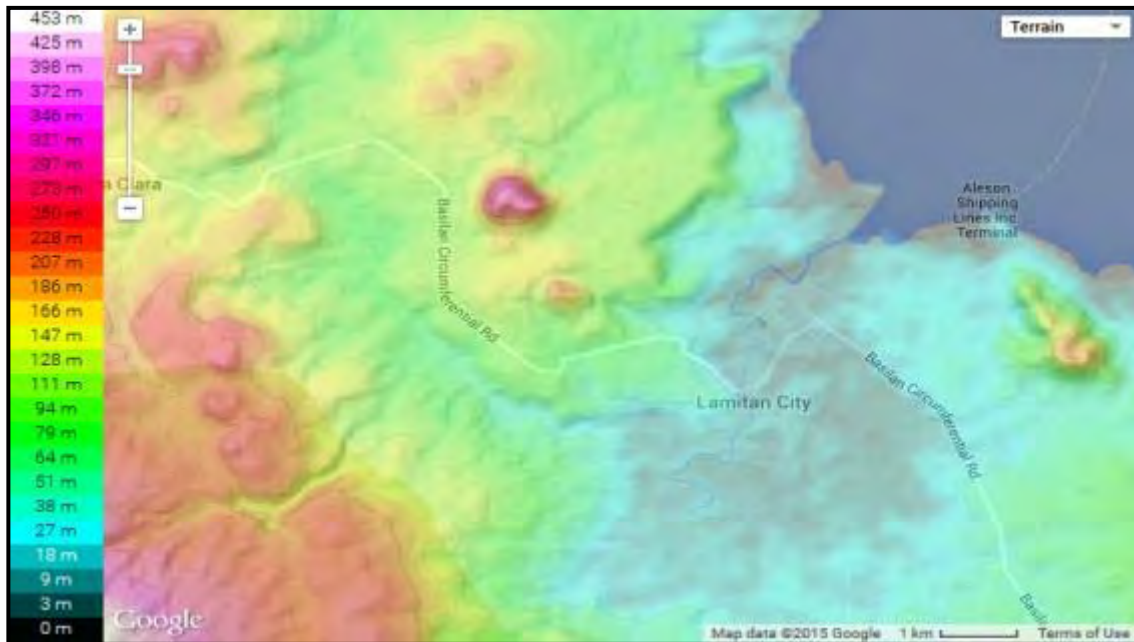


Source: <http://en-ph.topographic-map.com/places/Marawi-City-8929383/>

Figure 2.15 Topographic Map of Marawi City

(7) Lamitan City

The terrain of the city is relatively plain along the coastal areas and hilly in the interiors (Figure 2.16). One-fourth of the city's land area is level land, while the rest is composed of hills and valleys. The city is located at 2.5 masl, gently sloping to 320 m towards the hinterlands. Several rivers and creeks can be found in the city, which serve for drainage purposes.



Source: <http://en-ph.topographic-map.com/places/Lamitan-City-5473295/>

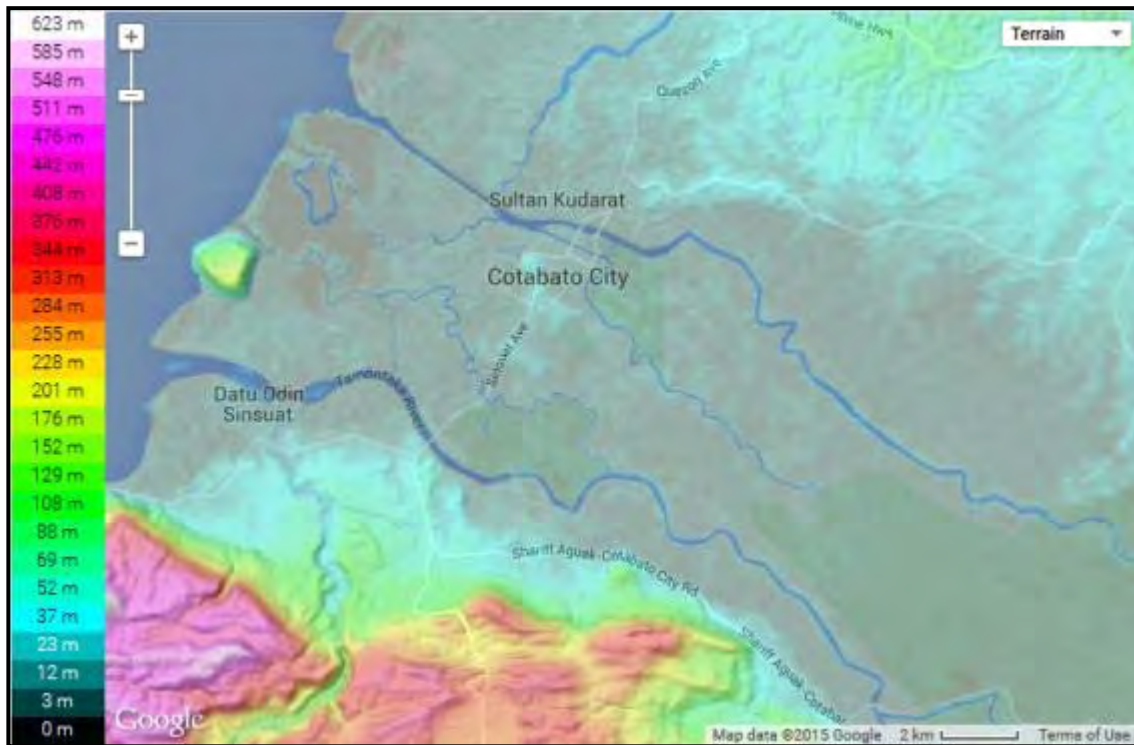
Figure 2.16 Topographic Map of Lamitan City

(8) Cotabato City

Cotabato City is situated in the lowest portion of the province of Maguindanao. Its topography is characterized by flat, level to nearly level, very gently sloping to gently undulating and moderately sloping or rolling terrain (Figure 2.17). It is basically a delta formed by two big rivers: Tamontaka River and Rio Grande de Mindanao. About 70% of its total land area is below sea level. There are only two existing elevated areas in the city: PC Hill and Timako Hill with altitudes of 27.4 m and 45.7 m, respectively.

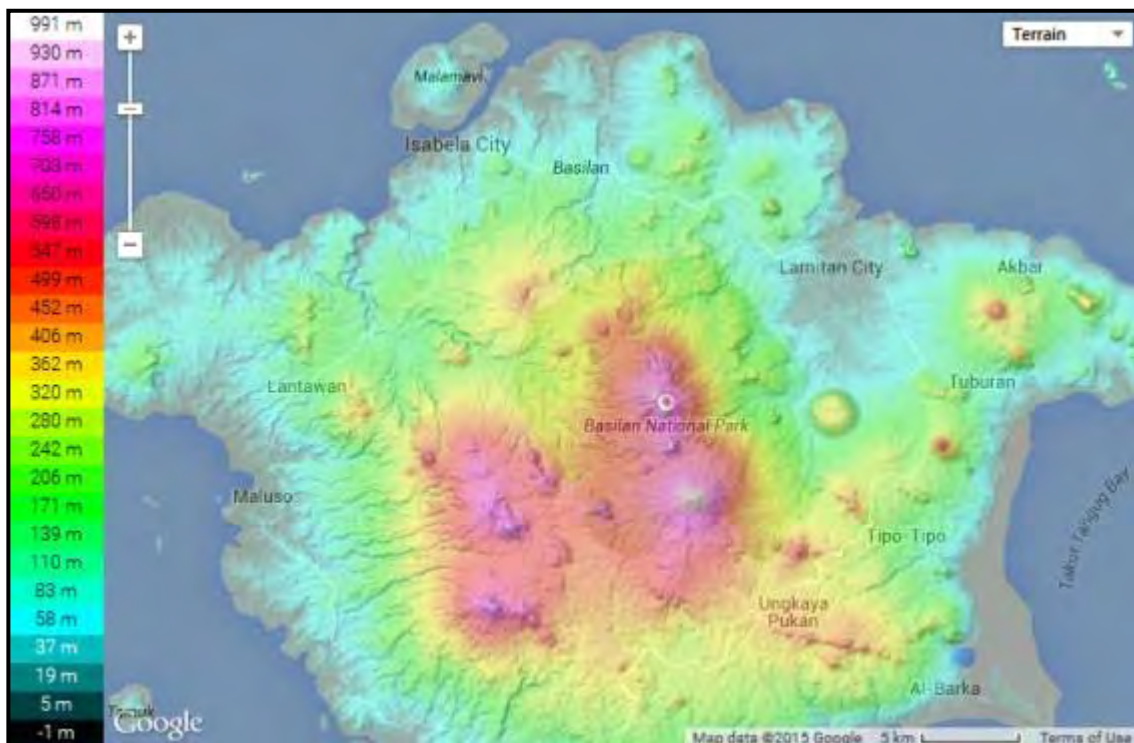
(9) Isabela City

Isabela City has an irregular, rolling terrain (Figure 2.18). The steepest parts of the city have a slope of over 60% and are found in barangays Menzi, Busay, Panunsulan, Calvario, Kapayawan, and Kapatagan in the mainland and in Barangay Sta. Barbara in Malamawi Island. The central district (*poblacion*) has an irregular topography, although it is mostly classified as nearly flat (0-5% slope). The market area has a flat terrain and low elevation, which ascends towards the City Capitol site in one direction and towards the Basilan National Highschool on the other. The area across Aguada River almost entirely has the same slope range and the elevation varies very slightly. The area bounded by Roxas Avenue, C.P. Garcia Street, and Valderosa Steet has a steeply sloping terrain. Alongside Roxas Avenue going to the end of Legaspi Street Extension, the Infante Hospital site and the Valderosa Street are on high and flat land, which slopes downwards by about 45 degrees between these important landmarks.



Source: <http://en-ph.topographic-map.com/places/Cotabato-City-7817849/>

Figure 2.17 Topographic Map of Cotabato City



Source: <http://en-ph.topographic-map.com/places/Isabela-City-9251843/>

Figure 2.18 Topographic Map of Isabela City

(10) Expansion Areas in Lanao del Norte Province

In Lanao del Norte Province, expansion areas of Bangsamoro include the municipalities of Balo-i, Munai, Nunungan, Pantar, Tagoloan, and Tangkal. The topographic characteristics of these areas, based

on the data and information collected by the JICA Study Team, are summarized in Table 2.14.

Table 2.14 Topographic Features of Expansion Areas in Lanao del Norte

Municipality	Topographic Features																					
Balo-i	The municipality is located in a mountainous area with an elevation of about 304.9 masl.																					
Munai	<p>The municipality is generally mountainous and its land feature is generally rugged, with an elevation of about 213.4 masl. It is famous for its rugged terrain. About 54% (10,609 ha) of its land area is very steep, with a slope of over 50%. The other slope categories are summed up in the table below, with the corresponding descriptions and covered areas of the municipality.</p> <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0–3</td> <td>Nearly level to very gently sloping</td> <td>636.54</td> </tr> <tr> <td>3–8</td> <td>Gently sloping to undulating</td> <td>1,060.90</td> </tr> <tr> <td>8–18</td> <td>Moderately sloping to rolling</td> <td>2,121.80</td> </tr> <tr> <td>18–30</td> <td>Rolling to hilly</td> <td>2,546.18</td> </tr> <tr> <td>30–50</td> <td>Hilly to steep</td> <td>4,234.60</td> </tr> <tr> <td>50 ≤</td> <td>Very steep</td> <td>10,609.00</td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	0–3	Nearly level to very gently sloping	636.54	3–8	Gently sloping to undulating	1,060.90	8–18	Moderately sloping to rolling	2,121.80	18–30	Rolling to hilly	2,546.18	30–50	Hilly to steep	4,234.60	50 ≤	Very steep	10,609.00
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50 ≤	Very steep	10,609.00																				
Nunungan	The municipality is generally mountainous, mostly covered by forests rich in flora and fauna. It has several mountains, the tallest of which is Mt. Inayawan with an elevation of 1,535 masl.																					
Pantar	The municipality is generally flat with moderately rolling to rolling and steep terrain, which is dissected by the tributary of Agus River. Its elevation ranges from 300 masl at its lowest point to 550 masl at its highest point. About 10% (900 ha) of the municipality's land area has an elevation of 300–500 masl, while 90% (8,110 ha) has an elevation of over 500 masl.																					
Tagoloan	No data available																					
Tangkal	<p>The municipality is generally mountainous, with 53.81% of its total land area situated at elevation 500–1,000 masl. Another 24.88% of the land area has an elevation of 1,000–2,000 masl. The area with the lowest elevation of 100–300 masl covers 612.95 ha (3.43%). The remaining area, covering 3,193.14 ha (17.88%), has an elevation of 300–500 masl. The slope categories of the municipality, with the corresponding descriptions and covered areas, are summed up in the table below.</p> <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>8–18</td> <td>Level to very gently sloping</td> <td>3,223.17</td> </tr> <tr> <td>18–30</td> <td>Gently sloping to undulating</td> <td>7,938.75</td> </tr> <tr> <td>30–50</td> <td>Moderately sloping to rolling</td> <td>2,767.91</td> </tr> <tr> <td>50 ≤</td> <td>Rolling to hilly, steep and rugged mountain</td> <td>3,926.67</td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	8–18	Level to very gently sloping	3,223.17	18–30	Gently sloping to undulating	7,938.75	30–50	Moderately sloping to rolling	2,767.91	50 ≤	Rolling to hilly, steep and rugged mountain	3,926.67						
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Source: Provincial/City/Municipal Development Plans.

(11) Expansion Areas in North Cotabato Province

In North Cotabato, expansion areas of Bangsamoro include six municipalities, namely, Aleosan, Carmen, Kabacan, Midsayap, Pigkawayan, and Pikit, covering 39 barangays that form part of the BCT. Given the relatively small areas of these municipalities, their topographic features generally reflect those of the barangays situated in the respective boundaries (Table 2.15).

Table 2.15 Topographic Features of Expansion Areas in North Cotabato

Municipality	Topographic Features												
Aleosan	<p>The municipality is generally plain, with level to nearly level terrain and with some rolling lands, scattered hills and plateaus. The slope categories of the municipality, with the corresponding covered areas, are presented in the table below.</p> <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0–3</td> <td>Suitable for agricultural production</td> <td>9,770.00</td> </tr> <tr> <td>3–8</td> <td>Suitable for agricultural production</td> <td>9,920.00</td> </tr> <tr> <td>8 ≤</td> <td>Potential for pasture and grazing</td> <td>4,760.00</td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	0–3	Suitable for agricultural production	9,770.00	3–8	Suitable for agricultural production	9,920.00	8 ≤	Potential for pasture and grazing	4,760.00
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0–3	Suitable for agricultural production	9,770.00											
3–8	Suitable for agricultural production	9,920.00											
8 ≤	Potential for pasture and grazing	4,760.00											
Carmen	The municipality is characterized by a flat terrain, valleys, and scattered hills in the southern part and by plateaus and mountain ranges in the northwest part. Its topography is												

Municipality	Topographic Features																		
	classified according to terrain characteristics, as shown in the table below. <table border="1"> <thead> <tr> <th>Terrain</th> <th>Barangays Covered</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>Lowland (plain)</td> <td>Barangays Ugalingan, General Luna, Nasapian, Kibayao, Pobalcion, and part of Barangay Tacupan</td> <td>38,989.00</td> </tr> <tr> <td>Upland (slightly rolling)</td> <td>Barangays Katanayanan, Kibenes, Ranzo, Palanggalan, Manarapan, Kitulaan, Langogan and Lanoon</td> <td>4,042.00</td> </tr> <tr> <td>Mountainous</td> <td>Barangays Tonganon, Tupig, Liliongan, Malapag, Macabenban and Tambad</td> <td>29,199.00</td> </tr> </tbody> </table>	Terrain	Barangays Covered	Area (ha)	Lowland (plain)	Barangays Ugalingan, General Luna, Nasapian, Kibayao, Pobalcion, and part of Barangay Tacupan	38,989.00	Upland (slightly rolling)	Barangays Katanayanan, Kibenes, Ranzo, Palanggalan, Manarapan, Kitulaan, Langogan and Lanoon	4,042.00	Mountainous	Barangays Tonganon, Tupig, Liliongan, Malapag, Macabenban and Tambad	29,199.00						
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Mountainous	Barangays Tonganon, Tupig, Liliongan, Malapag, Macabenban and Tambad	29,199.00																	
Kabacan	The municipality is characterized by almost flat terrain. About 70% (16,272 ha) of the total land area is flat to undulating and situated in the mid-portion and southern part. Moderate to steep lands of 30-50% slope, accounting for 30% (7,418 ha), are located on the northern part of the municipality, particularly in Barangays Bangilan, Pisan, Simone, Simbuhay, and Tamped.																		
Midsayap	The municipality is characterized by flat to hilly terrain. All barangays at the western part, which is traversed by the National Highway from Poblacion to Barangay Dulawan, have plain terrain. Gently rolling to hilly terrain is located on the northeastern part, particularly in Barangays Kiwanan, Kimagango, Anonang, Malamote, Upper Bulanang, Milaya, and Arizona. The southernmost barangays are marshy because they are located along the Rio Grande de Mindanao. The slope categories of the municipality with the corresponding covered areas are shown below. <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0-3</td> <td>Mostly irrigable rice lands, situated on the westerns and southern parts of the municipality</td> <td>24,376.29</td> </tr> <tr> <td>3-8</td> <td>Situated on the eastern barangays</td> <td>6,525.00</td> </tr> <tr> <td>8-18</td> <td>Situated on the northeastern barangays and the boundary of Barangays Nabalawag and Kadingilan</td> <td>2,137.50</td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	0-3	Mostly irrigable rice lands, situated on the westerns and southern parts of the municipality	24,376.29	3-8	Situated on the eastern barangays	6,525.00	8-18	Situated on the northeastern barangays and the boundary of Barangays Nabalawag and Kadingilan	2,137.50						
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3-8	Situated on the eastern barangays	6,525.00																	
8-18	Situated on the northeastern barangays and the boundary of Barangays Nabalawag and Kadingilan	2,137.50																	
Pigkawayan	The topography of the municipality is characterized by flat or level terrain on the southern part, with areas having a slope of 0-3% and covering 30.84% (10,488.24 ha) of the total land area; rolling to semi-hilly terrain on the central and northern parts, with areas having slopes of 3-8% and covering 7.49% (2,516.44 ha) of the total area; and mountainous to hilly terrain on the northern part, with areas having slopes of 15-25% and over 25% and covering 47.23% (16,065.30 ha) of the total land area. The slope categories of the municipality and coverage areas are shown in the table below. <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>0-3</td> <td>Level to nearly level</td> <td>10,488.24</td> </tr> <tr> <td>3-8</td> <td>Nearly level to gently sloping</td> <td>2,546.78</td> </tr> <tr> <td>8-15</td> <td>Moderately sloping</td> <td>4,910.68</td> </tr> <tr> <td>15-25</td> <td>Strongly sloping</td> <td>10,548.86</td> </tr> <tr> <td>25 ≤</td> <td>Very steep and rugged/mountainous</td> <td>5,516.44</td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	0-3	Level to nearly level	10,488.24	3-8	Nearly level to gently sloping	2,546.78	8-15	Moderately sloping	4,910.68	15-25	Strongly sloping	10,548.86	25 ≤	Very steep and rugged/mountainous	5,516.44
Slope (%)	Description	Area (ha)																	
0-3	Level to nearly level	10,488.24																	
3-8	Nearly level to gently sloping	2,546.78																	
8-15	Moderately sloping	4,910.68																	
15-25	Strongly sloping	10,548.86																	
25 ≤	Very steep and rugged/mountainous	5,516.44																	
Pikit	The municipality has generally flat to rolling terrain. <table border="1"> <thead> <tr> <th>Slope (%)</th> <th>Description</th> <th>Area (ha)</th> </tr> </thead> <tbody> <tr> <td>8-18</td> <td></td> <td></td> </tr> <tr> <td>18-30</td> <td></td> <td></td> </tr> <tr> <td>30-50</td> <td></td> <td></td> </tr> <tr> <td>50 ≤</td> <td></td> <td></td> </tr> </tbody> </table>	Slope (%)	Description	Area (ha)	8-18			18-30			30-50			50 ≤					
Slope (%)	Description	Area (ha)																	
8-18																			
18-30																			
30-50																			
50 ≤																			

Sources: Data from the Provincial/City/Municipal Development Plans.

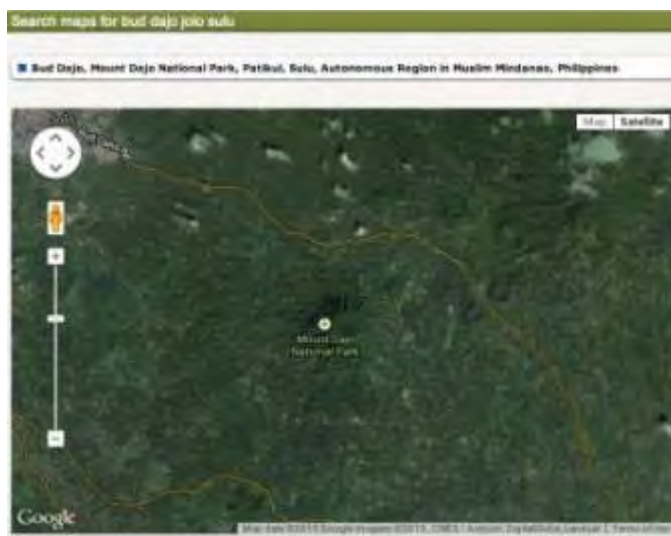
2.3.2 Major landforms

In the list of major landforms in the Philippines, the following are found in the BCT area:

- **Bud Dajo**, one of the active volcanoes in the Country and located 8.05 aerial km southeast of the Municipality of Jolo in the Province of Sulu (Figure 2.19);

- **Mount Makaturing**, a stratovolcano located in the municipality of Butig in Lanao del Sur with an elevation of 1,940 m and a base diameter of 29 km and is part of a string of volcanos called the Central Mindanao Arc (Figure 2.20);
- **Mount Ragang, or Mount Piapayungan and Blue Mountain**, as called by the local people, a stratovolcano considered the 7th highest mountain in the country located in the provinces of Lanao del Sur and North Cotabato with an elevation of 2,815 m and a base diameter of 32 km (Figure 2.21); and
- **Basilan National Park**, located at the eastern portion of the remaining public forest located between the city of Isabela and the municipalities if Lamitan, Tipo-Tipo, and Sumisip, with an elevation of 971 masl, where the tallest peak, Puno Mahaji or the Basilan Peak, is located and dominates the landscape (Figure 2.22).

In the descriptions of the individual provinces, cities, and municipalities in the BCT, other landforms (i.e., mountains, hills, and plains) were noted to be of economic value to the local people, but their specific characteristics and locations were not provided.



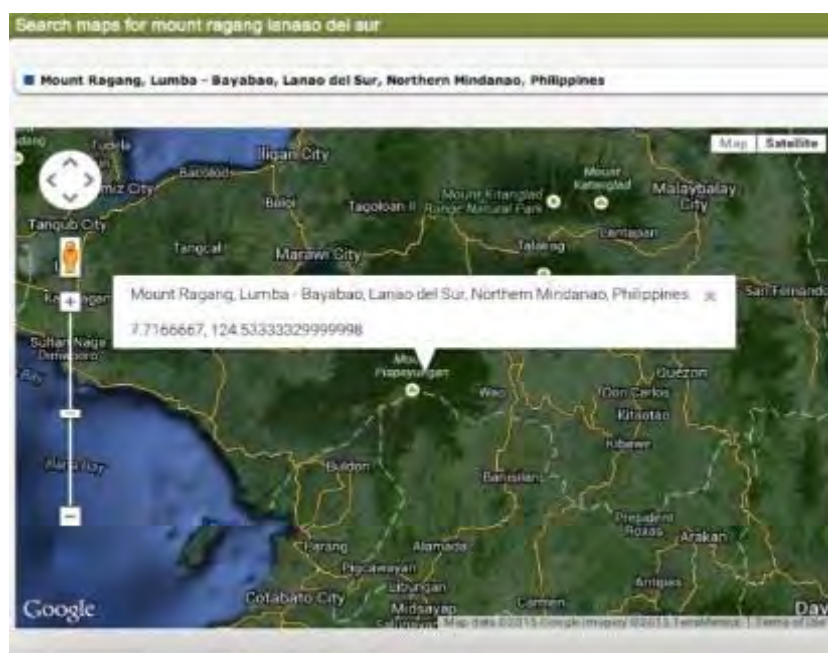
Source: http://www.getamap.net/search_maps_1_bud+dajo+jolo+sulu.html

Figure 2.19 Geographic Location and Photo of Bud Dajo, Jolo, Sulu



Source: http://www.getamap.net/maps/philippines/lanao_del_sur/_makaturing_mount/

Figure 2.20 Geographic Location of Mount Maturing, Butig, Lanao del Sur



Source: http://www.getamap.net/search_maps_1_mount+ragang+lanao+del+sur.html

Figure 2.21 Geographic Location of Mount Ragang, Lanao del Sur and North Cotabato



Source: http://www.getamap.net/search_maps_1_basilan+national+park+basilan.html

Figure 2.22 Geographic Location of Basilan National Park

2.4 Water Quality

Data on water quality are not readily available in the BCT, even in its four key cities, indicating that very little has been done in this aspect. Water quality assessment has been undertaken only in Lake Lanao in the Province of Lanao del Sur, because of its major importance in power generation, accounting for 70% of power supply in the entire Mindanao island, the socio-cultural and economic activities of the local communities in the provinces of Lanao del Sur and Lanao del Norte, and the sustainable development of Lake Lanao and its surrounding communities. In September 2011, an analysis of variance for parameters of water quality in three sample sites (Marawi City, Masiu, and Madamba)

around Lake Lanao “indicated that all parameters except for chloride and total dissolve solids showed significant difference at 5% level of significance. Excluding total coliform and phosphate, the concentrations of water quality parameters are within the normal limits based on the DENR Administrative Order No. 34 series of 1990.”⁸ Table 2.16 presents the results of the analysis of water quality parameters in Lake Lanao.

Despite the significant multisector resources invested in the development and conservation of Lake Lanao, as well as the various sociocultural and economic activities dependent on this resource, data gaps have been noted on water availability, utilization, and quality assessment in the lake area. In the four cities of Marawi, Lamitan, Cotabato, and Basilan, and in the municipalities of Bongao and Jolo, where there are operating local water districts, some water quality assessment may have been done, but data on the results of such studies were not readily available.

Table 2.16 Results of Analysis of Water Quality Parameters in Lake Lanao, Lanao del Sur, 2011

Sampling site	pH	Temp °C	Turbidity NTU	TDS mg/l	DO	Ca mg/l	PO ₄ mg/l	Mg mg/l	Ch mg/l	NO ₃ mg/l	Total coliform cfu/ml
Marawi City	7.7	25.2	2.32	51	5.53	0.88	0.0880	10.20	3.19	0.1281	102
Masiu	6.6	20.4	4.18	56	5.93	1.36	0.1186	10.88	3.33	0.0826	139
Madamba	6.5	25.4	1.28	52	5.43	1.20	0.0651	13.42	3.19	0.1293	97
DENR Standard Class A	6.5–8.5	3	No standard value	1,000	70	No standard value	0.1	No standard value	250	10	1,000

Note: Class A refers to “Public Water Supply Class II: For sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the National Standards for Drinking Water (NSDW) in the Philippines” based on DENR Administrative Order No. 34, series of 1990: Revised Water Usage and Classification/Water Quality Criteria Amending Section Nos. 68 and 69, Chapter III of the 1978 National Pollution Control Commission (NPCC) Rules and Regulations.

Source: Data from a study conducted by the Iligan City Waterworks System in September 2011.

2.5 Coastal and Marine Resources

2.5.1 Coral reefs

An earlier report indicates that 25% of the coral reef structures remaining in the Philippines lie within the island-province of Tawi-Tawi.⁹ However, the report also identifies the environmental stressors of coral reefs in the province, particularly population pressure and illegal fishing practices, which have caused the degradation of coastal ecosystems and threatened marine food security. This present state is compounded by the province’s high population growth rate and the incidence of poverty, as noted in the Social Environment Section of this report. A survey of fish diversity and abundance in Papahag Island in Tawi-Tawi was conducted by DA-BFAR in 2000, and the results recorded only 1,738 pcs of fish in an area of 1,250 m² with 58 species of reef fish. This figure was considered to be lower than those observed in the reefs in Central Visayas, indicating an overfished reef. However, the coral cover remains in good condition, with an average of 59% living coral cover.¹⁰

⁸ Pido, A. L. undated. Water Hyacinth (*Eichhornia Crassipes*, Mart.) and Its Implications to Lake Lanao Sustainability, *International Journal of Agriculture and Plant Research SCIE Journals*. [http://www.scie.org.au/issue/japr/vol2/no2/Water%20Hyacinth%20\(Eichhornia%20Crassipes,%20Mart.\)%20and%20Its%20Implications%20to%20Lake%20Lanao%20Sustainability.pdf](http://www.scie.org.au/issue/japr/vol2/no2/Water%20Hyacinth%20(Eichhornia%20Crassipes,%20Mart.)%20and%20Its%20Implications%20to%20Lake%20Lanao%20Sustainability.pdf). Accessed February 2015.

⁹ PATH Foundation Philippines Inc., November 2009. Demographic Trends in Philippines Marine Biodiversity Conservation Priority Areas. www.pfpi.org. Accessed February 2015.

¹⁰ DA-Bureau of Fisheries and Aquatic Resources (BFAR). 2000. *Coastal Resources Management Assessment of Papahag Island, Bongao, Tawi-Tawi* (Prepared by N. Katada and A.S. Pendulat). BFAR–ARMM, 37 p.

2.5.2 Fisheries

Data on fish catch, by species, were not available from the existing documents gathered. The available, incomplete production data reported mainly the total catch/production from commercial fisheries, municipal marine fisheries, and municipal inland fisheries in 2012/2013, as presented in Table 2.17. The total production from commercial fisheries, municipal marine fisheries, and municipal inland fisheries were estimated at 5,239.85 tons, 59,721.07 tons, and 30,694.96 tons, respectively, during the reporting period. However, the actual production data could be higher than these figures, considering the vast territorial waters of BCT provinces. Fish production per species per province is shown in Tables 2.18 through 2.23.

Table 2.17 Fisheries Production Data by Province

Production	Basilan	Lanao del Sur	Maguindanao	Sulu	Tawi-Tawi	Total
Commercial fisheries (ton)	No data	2,815.00 (2012)	834.74 (2013)	861.73 (2013)	728.38 (2012)	5,239.85
Fishing ground	Basilan Strait, Zamboanga Channel, Sulu Sea	Illana Bay, Moro Gulf	Illana Bay, Moro Gulf	Sulu Sea	Celebes Sea, Sulu Sea	
Municipal marine fisheries (ton)		20,476.00 (2012)	7,041.07 (2013) 33 species	No data	32,204.00 (2012)	59,721.07
Municipal inland fisheries	11,951.32 (2012)	No data	18,743.64 (2013) 18,506.29 (2013)	No data	No data	30,694.96
Fish			127.42			
Crustaceans			109.93			
Mollusks			(2013)			

Note: For Mindanao, 2013 production was based on 33 selected dominant fish species recorded by the Bureau of Agricultural Statistics (BAS), an agency that was transferred from the Department of Agriculture (DA) to the Philippine Statistics Authority (PSA). Blank cell means no data available.

Source: DA-BFAR-ARMM *Provincial Fisheries Profile*.

The level of fisheries production in ARMM, or the main BCT areas, in 2008 and 2009 showed a generally increasing trend (Table 2.24).

Table 2.24 Volume of Fisheries Production by Sector, 2008–2009

Year	Commercial	Municipal	Aquaculture
2008	89,905	99,307	564,732
2009	92,384	104,106	691,187

Source: NSO, 2011 *Philippine Yearbook*.

2.5.3 Seaweeds

The BCT is the top seaweed producing region in the Philippines. In 2013, the reported total seaweed production from the two BCT provinces of Maguindanao and Sulu was 115,296.34 tons. The annual seaweed production in the BCT from 1996–2014 is presented in Tables 2.25 and 2.26 and in Figure 2.23.

Table 2.25 Annual Production of Seaweeds in BCT by Province, 1996–2005

Province	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Basilan	541	512	435	368	423	3,821	3,975	3,821	3,352	3,798
Lanao del Sur	0	0	0	0	0	0	0	0	0	0
Maguindanao	0	0	0	0	612	5,288	7,000	6,930	9,198	14,450
Sulu	156,144	173,729	173,223	168,205	157,386	184,868	175,951	178,536	175,840	184,776
Tawi-Tawi	178,916	181,335	186,293	189,192	168,398	156,583	196,682	208,524	284,125	307,114
Total	335,601	355,576	359,951	357,765	326,819	350,560	383,608	397,811	472,515	510,138

Source: PSA, CountrySTAT Philippines.

Table 2.18 Fish Production in BCT: Marine Provincial Fisheries by Species, 2002–2014

Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	1	0	181.22	66.67	64.52	87.41	230.32	312.48	215.37	150.84	155.15	139.61
Anchovies (Dilis)	2,598.00	2,613.00	2,669.35	2,225.75	2,101.36	1,876.99	1,974.61	1,852.23	1,974.44	2,093.97	2,088.72	2,782.18	2,512.98
Big-eyed scad (Matangbaka)	6,349.00	7,185.00	7,373.24	7,077.69	7,650.08	8,276.40	9,038.60	10,008.27	10,733.33	10,978.32	11,019.52	11,957.51	12,336.51
Bigeye tuna (Tambakol/ Bariles)	0	0	0	1,066.51	2,791.99	2,564.27	962.9	142.86	300.02	327.84	354.62	412.83	462.78
Blue crab (Alimasag)	62	144	148.8	312.2	322.59	462.8	621.27	407.37	350.37	443.41	421.81	440.2	436.51
Caesio (Dalagang-bukid)	203	175	142.67	434.29	833.96	905.28	923.9	941.83	1,006.02	1,027.04	967.95	1,125.26	1,187.75
Cavalla (Talakitok)	1,257.00	1,265.00	1,280.35	1,455.42	1,609.58	1,578.43	1,729.99	1,925.13	2,125.56	2,205.85	2,054.41	2,181.42	2,387.03
Crevalle (Salay-salay)	756	705	707.89	1,182.33	1,187.20	1,369.02	1,571.34	1,351.99	1,400.39	1,370.70	1,475.67	1,702.46	1,496.18
Eastern little tuna (Bonito)	612	671	685.8	1,150.56	1,418.45	1,811.84	2,182.57	2,083.35	2,455.07	2,400.26	2,543.28	2,603.99	2,690.29
Fimbriated sardines (Tunsoy)	1,342.00	1,531.00	1,566.40	1,884.23	2,441.58	2,646.82	2,951.83	3,322.85	3,569.80	3,706.30	3,573.84	4,159.23	4,110.00
Flying fish (Bolador)	400	519	619.67	744.22	549.23	570.76	469.12	1,142.82	954.72	614.67	464.4	512.01	506.68
Frigate tuna (Tulingan)	5,574.00	5,903.00	6,138.00	5,624.53	6,808.47	7,202.50	7,422.00	6,840.46	7,448.52	7,900.65	7,746.22	7,521.19	8,105.22
Goatfish (Saramulyete)	337	293	321.32	738.34	885.68	963.22	949.76	1,069.95	1,183.36	932.17	846.82	928.99	870.6
Grouper (Lapu-lapu)	1,354.00	1,196.00	1,280.67	1,552.13	1,525.82	1,667.30	1,682.82	1,389.96	1,686.23	1,705.51	1,668.60	2,208.55	2,305.24
Hairtail (Espada)	46	72	95.12	307.27	630.51	606.29	468.54	292.63	295.27	264.86	209.84	211.34	205.16
Indian mackerel (Alumahan)	3,496.00	4,362.00	4,412.65	4,021.04	4,968.50	5,412.14	5,843.44	6,555.44	6,847.63	6,712.45	6,549.43	6,834.35	7,092.66
Indian sardines (Tamban)	3,152.00	3,790.00	4,148.83	4,051.48	2,517.55	2,502.52	2,889.25	3,177.58	4,107.26	4,216.68	4,065.80	4,207.34	4,460.49
Indo-pacific mackerel (Hasa-hasa)	336	407	408.52	651.79	1,076.49	1,077.14	1,434.93	1,141.14	1,244.94	1,531.09	1,226.56	1,334.06	1,566.42
Mullet (Kapak)	1,827.00	1,856.00	1,673.53	1,742.08	1,914.26	1,771.70	2,043.00	1,750.57	1,824.11	1,712.20	1,493.78	1,049.61	1,441.77
Parrot fish (Loro)	414	830	903.29	796.01	915.86	1,160.29	1,324.51	1,684.14	1,831.63	1,596.52	1,458.27	1,577.56	1,659.76
Porgies (Pargo)	913	1,138.00	1,174.25	1,213.42	1,851.79	1,969.03	1,905.61	2,151.96	2,066.44	2,097.65	1,809.52	2,144.16	2,260.02
Round herring (Tulis)	23	60	74.7	268.88	420.39	598.24	875.83	488.92	875.96	701.06	463.6	486.76	368.37
Roundscad (Galunggong)	4,251.00	4,540.00	4,624.01	4,097.93	3,860.55	4,610.86	4,880.56	5,615.88	6,143.59	6,251.77	6,529.11	6,849.14	7,115.46
Siganid (Samaral)	1,248.00	939	914.11	1,148.73	1,493.44	1,627.45	1,609.23	1,847.67	2,102.05	2,240.52	2,002.79	2,483.12	2,681.18
Skipjack (Gulyasan)	3,041.00	2,640.00	2,733.60	2,855.80	3,821.65	3,858.26	3,793.27	3,718.15	3,506.34	3,768.33	3,618.77	4,413.65	4,868.69
Slipmouth (Sapsap)	827	1,129.00	1,156.42	998.99	1,154.55	1,276.61	1,324.66	1,363.31	1,275.94	1,255.20	1,153.01	1,202.51	1,272.10
Snapper (Maya-maya)	1,025.00	951	1,099.73	905.55	1,038.72	1,163.61	1,659.03	971.95	1,017.75	1,007.87	1,068.75	1,071.79	1,037.60
Spanish mackerel (Tanigue)	620	530	566.26	561.11	861.84	844.92	1,147.86	998.18	1,073.98	1,125.48	1,187.17	1,506.29	1,524.50
Squid (Pusit)	573	954	933.53	995.73	939.03	1,121.41	1,502.14	1,223.42	1,263.63	1,242.15	1,253.43	1,246.98	1,303.27
Threadfin bream (Bisugo)	216	371	361.26	737.02	1,145.81	1,281.18	1,344.33	1,253.96	1,219.32	1,255.77	1,158.70	1,097.61	1,228.18
Yellowfin tuna (Tambakol/Bariles)	1,569.00	1,510.00	1,635.47	2,079.61	3,119.85	3,418.81	3,466.65	5,092.66	6,418.40	6,973.18	6,936.13	8,500.27	8,697.20
Others	13,557.00	12,667.00	13,307.95	8,169.92	7,724.91	7,997.22	8,489.25	11,278.99	11,653.29	11,314.35	9,276.78	8,831.18	8,449.53
Total, ARMM	57,978.00	60,947	63,157.39	61,231.78	69,648.36	74,257.83	78,570.21	83,315.94	90,267.84	91,189.19	86,838.14	93,738.69	96,779.74

Source: PSA, Country STAT Philippines.

Table 2.19 Fish Production in Basilan from Marine Municipal Fisheries by Species, 2002–2014

Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	1	0	0	0	0	0	0	0	0	0	0	0
Anchovies (Dilis)	940	423	352	202.65	212.34	191.41	172.32	181.98	177.42	183.92	185.45	172.27	173.93
Big-eyed scad (Matangbaka)	599	1,167.00	1,253.00	1,442.12	2,167.09	2,481.22	2,744.55	2,956.61	3,180.02	3,343.06	3,262.46	3,607.89	3,657.12
Bigeye tuna (Tambakol/ Bariles)	0	0	0	15.22	18.17	39.7	15.32	10.28	10.11	9.35	4.46	1.61	1.56
Blue crab (Alimasag)	6	3	4	5.16	0	0	0	0	0	0	0	0	0
Caesio (Dalagang-bukid)	138	100	62	23.12	14.7	18.89	16.9	19.32	18.14	16.96	15.17	15.34	16.77
Cavalla (Talakitok)	206	240	254	88.84	112.98	125.17	135.57	151.62	154.81	153.17	136.93	152.21	163.31
Crevalle (Salay-salay)	80	88	82	58.34	79.04	83.67	74.67	79.56	82.72	82.89	78.16	98.32	102.16
Eastern little tuna (Bonito)	0	25	33	172	68.58	98.53	190.01	201.39	213.09	219.11	225.53	234.71	253.26
Fimbriated sardines (Tunsoy)	315	353	334	371.74	693.96	870.58	997.65	1,127.75	1,215.77	1,257.64	1,153.12	1,119.70	1,100.72
Flying fish (Bolador)	0	10	11	0	0	0	0	0	0	0	0	0	0
Frigate tuna (Tulingan)	688	635	668	1,074.10	994.69	1,213.59	1,321.64	1,449.12	1,522.87	1,531.74	1,513.68	1,410.30	1,456.54
Goatfish (Saramulyete)	16	25	27	37.85	37.93	32.66	34.42	36.92	37.55	34.71	37.59	29.32	31.97
Grouper (Lapu-lapu)	102	133	134	54.04	67.57	51.28	70.32	78.25	81.24	76.8	81.45	90.86	98.26
Hairtail (Espada)	43	5	0	0.04	0	0.08	0	0	0	0	0	0	0
Indian mackerel (Alumahan)	940	1,460.00	1,526.00	1,453.71	2,025.27	2,294.93	2,307.91	2,407.19	2,483.76	2,278.48	2,129.69	2,081.50	2,189.53
Indian sardines (Tamban)	379	400	374	654.72	243.54	243.84	325.92	394.28	425.09	497.54	505	540.78	560.08
Indo-pacific mackerel (Hasa-hasa)	56	78	75	84.76	59.89	58.45	61.95	69.2	65.78	59.51	54.58	51.6	53.91
Mullet (Kapak)	32	19	27	0.24	3.06	4.01	0.26	0.27	0.26	0	0	0	0
Parrot fish (Loro)	22	37	39	40.4	34.92	41.91	40.44	43.34	43.92	41.36	40.98	49.53	50.5
Porgies (Pargo)	44	143	143	40.77	62.09	67.14	57.29	58.54	60.11	55.81	49	41.09	40.66
Round herring (Tulis)	0	5	4	66.6	0	0	0	0	0	0	0	0	0
Roundscad (Galunggong)	741	709	691	1,200.28	1,353.28	1,540.78	1,453.99	1,573.02	1,681.98	1,782.05	1,783.67	1,826.47	1,840.75
Siganid (Samaral)	53	32	13	20.63	21.76	20.36	25.03	27.37	29.41	31.49	29.45	24.59	25.48
Skipjack (Gulyasan)	706	460	500	468.56	220.86	280.24	343.83	349.4	364.86	371.86	366.85	422.52	432.81
Slipmouth (Sapsap)	135	146	100	109.3	101.19	94.29	102.22	109	105.19	100.52	94.7	62.45	56.33
Snapper (Maya-maya)	348	190	215	61.96	87.52	86.19	113.72	129.31	131.1	125.26	122.9	121.13	136.3
Spanish mackerel (Tanigue)	395	264	270	69.19	110.49	189.42	168.2	186.96	184.6	192.21	172.99	237.62	251.82
Squid (Pusit)	30	380	359	98.69	207.63	210.42	173.27	196.73	196.96	193.19	206.56	167.51	163.78
Threadfin bream (Bisugo)	132	224	229	143.89	261.68	257.83	220.23	234.04	229.61	228.66	207.87	207.18	217.18
Yellowfin tuna (Tambakol/Bariles)	207	171	273	420.76	231.45	292.1	348.43	381.69	372.67	350.35	317.5	341.3	347.83
Others	1,051.00	933	980	96.85	120.98	134.74	134.42	135.25	124.39	123.77	83.52	56.73	55.17
Total	10,406	10,862	11,036	10,581.53	11,618.66	13,030.43	13,658.48	14,597.39	15,203.43	15,352.41	14,871.26	15,177.53	15,491.73

Source: *ibid.*

Table 2.20 Fish Production in Lanao del Sur from Marine Municipal Fisheries by Species, 2002–2014

Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	0	0	0	0	0	0	0	0	0	0	0	0
Anchovies (Dilis)	895	947	974.66	953.86	964.23	826.5	843.46	850.67	866.82	858.44	858.65	1,554.14	1,309.91
Big-eyed scad (Matangbaka)	1,508.00	1,588.00	1,595.59	1,608.54	1,597.95	1,590.20	1,664.92	1,675.47	1,746.75	1,723.32	1,715.17	1,806.44	1,794.55
Bigeye tuna (Tambakol/Bariles)	0	0	0	0	8.15	0	0	0	0	0	0	0	0
Blue crab (Alimasag)	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesio (Dalagang-bukid)	0	0	0	0	0	25.56	38.72	39.42	39.94	40.85	40.07	182.92	213.53
Cavalla (Talakitok)	346	354	364.13	354.86	353.78	361.12	380.09	383.79	396.58	399.19	393.18	432.79	499.16
Crevalle (Salay-salay)	609	496	495.41	516.34	518.06	485.85	504.29	507.32	514.76	515.28	512.46	697.51	576.61
Eastern little tuna (Bonito)	0	0	0	0	0	0	0	0	0	0	0	0	0
Fimbriated sardines (Tunsoy)	849	864	890.32	875.46	875.32	904.28	898.93	900.92	919.92	931.02	917.28	1,363.28	1,421.23
Flying fish (Bolador)	0	0	0	0	0	0	0	0	0	0	0	0	0
Frigate tuna (Tulingan)	2,246.00	2,367.00	2,391.09	2,507.36	2,467.83	2,444.58	2,475.26	2,480.50	2,510.56	2,561.98	2,517.68	2,178.52	2,377.96
Goatfish (Saramulyete)	0	0	0	2.16	2.12	0	0	0	0	0	0	0	0
Grouper (Lapu-lapu)	494	247	251.06	256	261.9	269.93	264.29	268.86	275.47	270.05	271.45	619.78	606.28
Hairtail (Espada)	0	0	0	0	0	0	0	0	0	0	0	0	0
Indian mackerel (Alumahan)	886	933	944.12	1,013.02	1,013.51	1,024.94	1,037.69	1,047.15	1,065.38	1,057.12	1,056.55	1,055.51	1,307.91
Indian sardines (Tamban)	564	591	624.89	645.58	661.56	635.06	655.97	671.44	687.1	682.24	680.26	251.66	622.13
Indo-pacific mackerel (Hasa-hasa)	0	0	0	0	0	8.43	34.4	35.78	37.32	35.84	36.31	0	9.6
Mullet (Kapak)	1,205.00	1,224.00	967.63	964.67	956.66	916.1	916.21	920.55	922.46	921.5	921.5	356.43	698.3
Parrot fish (Loro)	0	0	0	0	0	0	0	0	0	0	0	0	0
Porgies (Pargo)	731	738	751.78	741.61	715.15	692.41	686.41	687.68	684.21	685.64	685.84	971.87	1,111.25
Round herring (Tulis)	0	0	0	0	4.61	0	0	0	0	0	0	0	0
Roundscad (Galunggong)	144	149	151.66	132.51	137.21	137.99	152.28	156.81	164.75	161.09	160.88	217.17	266.65
Siganid (Samaral)	457	231	234.88	228.58	217.28	223.34	210.63	216.81	218.01	217.93	217.59	566.84	755.09
Skipjack (Gulyasan)	1,679.00	1,695.00	1,731.19	1,646.64	1,567.01	1,505.37	1,424.22	1,426.13	1,413.79	1,421.89	1,420.60	1,916.82	2,078.16
Slipmouth (Sapsap)	361	368	373.18	363.91	364.74	365.44	384.53	398.38	408.57	405.17	404.04	454.73	542.75
Snapper (Maya-maya)	11	11	11	19.57	19.76	0	0	0	0	0	0	0	0
Spanish mackerel (Tanigue)	58	60	61	60.93	61.14	61.95	66.04	70.18	70.25	69.52	69.98	167.44	249.18
Squid (Pusit)	0	0	0	3.36	10.51	1.72	0	0	0	0	0	0	0
Threadfin bream (Bisugo)	0	0	0	0	0	26	28.07	33.56	34.31	31.98	33.28	0	12.66
Yellowfin tuna (Tambakol/Bariles)	302	311	312.82	309.39	311.37	308.46	311.42	318.3	327.81	488.89	378.33	886.53	813.61
Others	862	906	941.27	904.08	925.92	909.98	948.81	956.19	1,000.38	1,079.38	1,011.99	549.66	311.7
Total	16,209	16,083	16,071.68	16,113.43	16,021.77	15,732.21	15,934.64	16,054.91	16,315.14	16,569.32	16,315.09	18,243.04	19,592.22

Source: *ibid.*

Table 2.21 Fish Production in Maguindanao from Marine Municipal Fisheries by Species, 2002–2014

Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	0	0	0	8.12	7.91	22.75	10.24	10.39	5.99	6.79	0	0
Anchovies (Dilis)	231	220	202.74	121.2	69.58	70.15	170.19	226.21	303.17	419.65	439.04	436.72	440.22
Big-eyed scad (Matangbaka)	665	601	583.08	401.78	653.14	633.57	723.43	658.59	670.31	695.53	736.14	744.99	751.6
Bigeye tuna (Tambakol/ Bariles)	0	0	0	0	2.75	2.69	84.58	14.16	160.1	178.74	185.97	187.71	191.81
Blue crab (Alimasag)	10	10	9.43	11.37	55.03	55.79	65.93	74.68	58.99	60.27	63.46	59.75	56.35
Caesio (Dalagang bukid)	0	1	1.02	0.95	74.41	69.55	96.82	119.57	114.93	60.95	62.89	64.48	61.91
Cavalla (Talakitok)	478	313	292.9	256.89	327.03	328.09	386.1	370.54	399	392.22	400.33	407.21	405.22
Crevalle (Salay-salay)	0	20	20.53	3.5	14.2	0	0	0	0	0	0	0	0
Eastern little tuna (Bonito)	0	0	0	22.14	69.39	35.35	35.6	36.87	40.43	0	0	0	0
Fimbriated sardines (Tunsoy)	53	50	18	12.68	6.61	14.42	27.33	0	0	0	0	0	0
Flying fish (Bolador)	0	5	5.22	2.72	127.56	102.59	28.93	38.64	72.46	92.43	96.29	92.48	80.09
Frigate tuna (Tulingan)	826	879	852.7	662.77	609.92	581.67	719.23	728.64	751.33	751.41	798.01	820.7	830.31
Goatfish (Saramulyete)	95	28	28.22	9.02	53.09	58.68	50.99	48.48	32.31	0	0	0	0
Grouper (Lapu-lapu)	21	19	13.89	6.78	31.47	22.8	34.7	72.09	93.71	127.71	141.02	149.18	150.05
Hairtail (Espada)	0	0	0	0.75	71.2	52.24	20.03	42.76	49.36	54.83	56.48	58.5	54.26
Indian mackerel (Alumahan)	405	634	612.37	441.21	445.95	456.11	481.84	463.73	483.6	408.29	420.19	416.08	382.67
Indian sardines (Tamban)	382	440	416.42	423.79	371.75	326.72	354.49	379.84	402.47	414.92	315.72	306.67	331.84
Indo-pacific mackerel (Hasa-hasa)	81	78	73.97	55.46	73.32	78.98	56.21	72.57	74.35	93.98	100.97	99.47	95.5
Mullet (Kapak)	356	225	216.33	190.2	189.92	190.27	112.81	105.84	75.21	0	0	0	0
Parrot fish (Loro)	0	0	0	0	10	9.54	0	0	0	0	0	0	0
Porgies (Pargo)	0	0	0	0	0	0	0	0	0	0	0	0	0
Round herring (Tulis)	0	0	0	1.3	8.46	7.48	3.74	0	0	0	0	0	0
Roundscad (Galunggong)	791	893	871.24	601.34	633.44	628.03	686.72	710.92	737.47	759.2	856.28	868.16	883.32
Siganid (Samaral)	192	117	110.06	109.36	128.35	124.75	135.5	155.34	153.02	193.41	221.86	233.3	229.62
Skipjack (Gulyasan)	330	131	126.8	84.32	197.11	191.53	184.18	302.08	212.59	255.33	271.38	273.52	268.21
Slipmouth (Sapsap)	104	217	211.83	80.12	110.23	112.25	211.97	227.66	236	206.43	216.68	220.4	223.45
Snapper (Maya-maya)	11	11	10.71	12.13	78.26	78.83	99	104.31	105.98	67.69	71.52	72.47	74.52
Spanish mackerel (Tanigue)	60	38	36.13	28.94	57.41	53.28	72.16	74.22	85.1	92.65	95.29	98.69	87.59
Squid (Pusit)	37	35	32.11	28.9	35.37	47.14	112.18	127.12	131.84	89.3	99.84	122.14	134.17
Threadfin bream (Bisugo)	24	23	8	22.45	74.16	70.52	74.1	84.28	87.14	89.57	91.91	95.71	92.15
Yellowfin tuna (Tambakol/Bariles)	259	155	139.65	130.7	254.11	253.45	287.4	292.2	279.6	277.88	297.47	319.37	329.45
Others	1,192.00	840.00	786.05	420.48	385.82	394.05	428.92	419.16	439.9	532.86	702.29	893.37	852.34
Total	8,605	7,986	7,683.4	6,148.25	7,233.16	7,065.43	7,775.83	7,969.74	8,270.76	8,332.24	8,759.82	9,054.07	9,020.65

Source: *ibid.*

Table 2.22 Fish Production in Sulu from Marine Municipal Fisheries by Species, 2002–2014

Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	0	0	40.5	41.34	36.45	30.69	14.66	16.43	15.94	7.08	6.65	6.7
Anchovies (Dilis)	0	455	632.06	715	720.72	658.52	681.06	507.86	487.79	482.84	472.02	457.17	445.46
Big-eyed scad (Matangbaka)	2,456.00	2,507.00	2,511.10	2,502.00	2,513.63	2,802.07	3,097.15	4,059.40	4,236.23	4,241.43	4,400.97	4,601.56	4,881.45
Bigeye tuna (Tambakol/ Bariles)	0	0	0	355	428.91	464.21	455.53	31.53	32.66	31.37	29.47	26.72	25.79
Blue crab (Alimasag)	27	112	112.44	120.5	141.43	158.27	163.15	95.04	70.79	69.12	51.75	45.64	43.65
Caesio (Dalagang bukid)	62	71	76.42	79.5	74.42	52.97	51	53.05	52.18	52.29	50.88	51.58	54.25
Cavalla (Talakitok)	32	145	146.94	151	139.67	140.91	134.11	187.74	189.53	193.77	200.13	203.19	216.03
Crevalle (Salay-salay)	29	60	65.46	71.8	72.72	34.39	25.85	26.39	26.09	25.51	25.41	26.51	26.93
Eastern little tuna (Bonito)	394	411	405.52	409.52	612.39	827.99	902.06	997.21	1,227.23	1,233.53	1,291.22	1,315.98	1,325.99
Fimbriated sardines (Tunsoy)	0	127	175.28	202	204.19	196.56	207.48	266.1	260.2	257.85	255.38	257.4	260.04
Flying fish (Bolador)	0	77	111.71	137	292.86	313.09	306.81	138.51	128.72	125.88	98.93	81.64	73.93
Frigate tuna (Tulingan)	311	464	477.52	531	599.35	757.72	844.46	1,109.52	1,249.39	1,295.37	1,377.18	1,396.54	1,514.49
Goatfish (Saramulyete)	163	168	171.03	166.8	182.31	185.35	193.33	132.33	125.26	120.82	99.86	94.96	91.54
Grouper (Lapu-lapu)	365	379	386.38	402	448.68	518.09	492.67	459.25	446.09	443.7	451.09	455.67	465.73
Hairtail (Espada)	0	64	91.67	103.5	115.91	129.89	129.16	69.85	67.05	65.48	46.95	40.29	38.52
Indian mackerel (Alumahan)	402	413	429.08	499	506.84	466.26	468.54	690.83	717.49	751.37	772.5	797.47	800.35
Indian sardines (Tamban)	7	428	460.99	465	374.05	368.31	400.2	559.08	605.5	616.03	625.99	628.43	629.8
Indo-pacific mackerel (Hasa-hasa)	5	45	45.05	47.2	44.42	57.88	59.31	36.43	35.29	35.36	36.14	35.63	37.05
Mullet (Kapak)	0	145	201.58	191	183.09	197.89	188.4	118.2	110.21	108.57	83.16	77.36	72.91
Parrot fish (Loro)	110	470	467.08	493	503.33	551.39	540.62	462.79	475.1	461.3	458.13	381.15	367.87
Porgies (Pargo)	17	126	126.88	125	135.79	192.57	197.76	240.07	217.07	208.76	212.07	207.89	204.06
Round herring (Tulis)	0	30	44.85	52.5	53.3	64.61	62.97	47.43	42.37	40.26	35.17	32.6	31.42
Roundscad (Galunggong)	1,171.00	1,258.00	1,276.61	1,470.50	1,201.47	1,386.32	1,448.91	2,110.17	2,328.46	2,337.03	2,469.99	2,437.13	2,538.42
Siganid (Samaral)	425	438	432.07	451.2	493.3	512.72	535.78	536.1	546.09	545.7	526.53	526.57	527.56
Skipjack (Gulyasan)	143	171	171.36	175	183.39	246.08	270.96	471.75	413.81	421.93	424.05	435.01	462.82
Slipmouth (Sapsap)	0	150	212.25	232	239.62	257.83	240.49	189.61	182.95	179.19	144.18	142.74	145.68
Snapper (Maya-maya)	340	348	342.81	349	364.57	368.95	359.86	429.69	390.8	359.9	339.33	335.96	337.51
Spanish mackerel (Tanigue)	0	57	81.65	91.4	107.85	116.91	111.05	74.22	75.48	77.48	76.4	71.91	69.59
Squid (Pusit)	416	441	441.91	489	518.96	564.81	574.79	456.24	426.43	434.35	442.67	440.11	463.23
Threadfin bream (Bisugo)	11	69	70.78	78	84.43	94.11	94.01	89.37	76.57	69.25	65.52	61.58	61.65
Yellowfin tuna (Tambakol/Bariles)	319	347	350.14	399	571.06	676.27	713.35	697.63	687.19	634.9	598.33	569.41	529.73
Others	7,397.00	6,434.00	6,099.69	5,195.00	5,150.06	4,357.94	4,628.80	4,320.85	4,627.78	4,830.23	4,555.15	4,389.96	4,330.83
Total	14,602	16,410	16,618.31	16,789.92	17,304.06	17,757.33	18,610.31	19,678.9	20,574.23	20,766.51	20,723.63	20,632.41	21,080.98

Source: *ibid.*

Table 2.23 Fish Production in Tawi-Tawi from Marine Municipal Fisheries by Species, 2002–2014

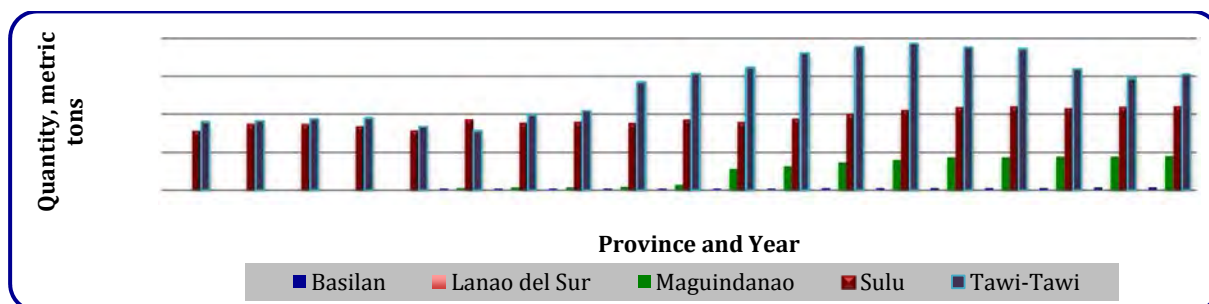
Fish Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Acetes (Alamang)	0	0	0	140.72	17.21	20.16	33.97	205.42	285.66	193.44	136.97	148.5	132.91
Anchovies (Dilis)	532	568	507.89	233.04	134.49	130.41	107.58	85.51	139.24	149.12	133.56	161.88	143.46
Big-eyed scad (Matangbaka)	1,121.00	1,322.00	1,430.47	1,123.25	718.27	769.34	808.55	658.2	900.02	974.98	904.78	1,196.63	1,251.79
Bigeye tuna (Tambakol/ Bariles)	0	0	0	696.29	2,334.01	2,057.67	407.47	86.89	97.15	108.38	134.72	196.79	243.62
Blue crab (Alimasag)	19	19	22.93	175.17	126.13	248.74	392.19	237.65	220.59	314.02	306.6	334.81	336.51
Caesio (Dalagang bukid)	3	3	3.23	330.72	670.43	738.31	720.46	710.47	780.83	855.99	798.94	810.94	841.29
Cavalla (Talakitok)	195	213	222.38	603.83	676.12	623.14	694.12	831.44	985.64	1,067.50	923.84	986.02	1,103.31
Crevalle (Salay-salay)	38	41	44.49	532.35	503.18	765.11	966.53	738.72	776.82	747.02	859.64	880.12	790.48
Eastern little tuna (Bonito)	218	235	247.28	546.9	668.09	849.97	1,054.90	847.88	974.32	947.62	1,026.53	1,053.30	1,111.04
Fimbriated sardines (Tunsoy)	125	137	148.8	422.35	661.5	660.98	820.44	1,028.08	1,173.91	1,259.79	1,248.06	1,418.85	1,328.01
Flying fish (Bolador)	400	427	491.74	604.5	128.81	155.08	133.38	965.67	753.54	396.36	269.18	337.89	352.66
Frigate tuna (Tulingan)	1,503.00	1,558.00	1,748.69	849.3	2,136.68	2,204.94	2,061.41	1,072.68	1,414.37	1,760.15	1,539.67	1,715.13	1,925.92
Goatfish (Saramulyete)	63	72	95.07	522.51	610.23	686.53	671.02	852.22	988.24	776.64	709.37	804.71	747.09
Grouper (Lapu-lapu)	372	418	495.34	833.31	716.2	805.2	820.84	511.51	789.72	787.25	723.59	893.06	984.92
Hairtail (Espada)	3	3	3.45	202.98	443.4	424.08	319.35	180.02	178.86	144.55	106.41	112.55	112.38
Indian mackerel (Alumahan)	863	922	901.08	614.1	976.93	1,169.90	1,547.46	1,946.54	2,097.40	2,217.19	2,170.50	2,483.79	2,412.20
Indian sardines (Tamban)	1,820.00	1,931.00	2,272.53	1,862.39	866.65	928.59	1,152.67	1,172.94	1,987.10	2,005.95	1,938.83	2,479.80	2,316.64
Indo-pacific mackerel (Hasa-hasa)	194	206	214.5	464.37	898.86	873.4	1,223.06	927.16	1,032.20	1,306.40	998.56	1,147.36	1,370.36
Mullet (Kapak)	234	243	260.99	395.97	581.53	463.43	825.32	605.71	715.97	682.13	489.12	615.82	670.56
Parrot fish (Loro)	282	323	397.21	262.61	367.61	557.45	743.45	1,178.01	1,312.61	1,093.86	959.16	1,146.88	1,241.39
Porgies (Pargo)	121	131	152.59	306.04	938.76	1,016.91	964.15	1,165.67	1,105.05	1,147.44	862.61	923.31	904.05
Round herring (Tulis)	23	25	25.85	148.48	354.02	526.15	809.12	441.49	833.59	660.8	428.43	454.16	336.95
Roundscad (Galunggong)	1,404.00	1,531.00	1,633.50	693.3	535.15	917.74	1,138.66	1,064.96	1,230.93	1,212.40	1,258.29	1,500.21	1,586.32
Siganid (Samaral)	121	121	124.1	338.96	632.75	746.28	702.29	912.05	1,155.52	1,251.99	1,007.36	1,131.82	1,143.43
Skipjack (Gulyasan)	183	183	204.25	481.28	1,653.28	1,635.04	1,570.08	1,168.79	1,101.29	1,297.32	1,135.89	1,365.78	1,626.69
Slipmouth (Sapsap)	227	248	259.16	213.66	338.77	446.8	385.45	438.66	343.23	363.89	293.41	322.19	303.89
Snapper (Maya-maya)	315	391	520.21	462.89	488.61	629.64	1,086.45	308.64	389.87	455.02	535	542.23	489.27
Spanish mackerel (Tanigue)	107	111	117.48	310.65	524.95	423.36	730.41	592.6	658.55	693.62	772.51	930.63	866.32
Squid (Pusit)	90	98	100.51	375.78	166.56	297.32	641.9	443.33	508.4	525.31	504.36	517.22	542.09
Threadfin bream (Bisugo)	49	55	53.48	492.68	725.54	832.72	927.92	812.71	791.69	836.31	760.12	733.14	844.54
Yellowfin tuna (Tambakol/Bariles)	482	526	559.86	819.76	1,751.86	1,888.53	1,806.05	3,402.84	4,751.13	5,221.16	5,344.50	6,383.66	6,676.58
Others	3,055.00	3,554.00	4,500.94	1,553.51	1,142.13	2,200.51	2,348.30	5,447.54	5,460.84	4,748.11	2,923.83	2,941.46	2,899.49
Total	14,162	15,615	17,760	17,472.93	23,471.5	26,673.27	28,580.98	30,836.58	35,648.62	36,008.27	32,067.37	36,522.14	37,503.25

Source: *ibid.*

Table 2.26 Annual Production of Seaweeds in BCT by Province, 2006-2014

Province	2006	2007	2008	2009	2010	2011	2012	2013	2014
Basilan	3,659	4,468	5,945	5,963	6,063	6,254	6,377	6,488	6,629
Lanao del Sur	0	0	0	0	0	0	0	0	0
Maguindanao	55,800	64,007	74,116	80,222	86,687	87,756	89,580	89,387	90,928
Sulu	178,150	187,236	199,206	210,251	217,377	219,956	214,230	218,694	220,440
Tawi-Tawi	323,076	361,910	377,892	386,649	376,271	372,484	319,177	294,596	305,000
Total	560,685	617,621	657,160	683,085	686,398	686,451	629,363	609,165	622,996

Source: PSA, CountrySTAT Philippines.



Source: PSA, Country STAT Philippines.

Figure 2.23 Annual Production of Seaweeds in BCT, 1996–2014

2.6 Inland Water Resources

2.6.1 Ligawasan Marsh

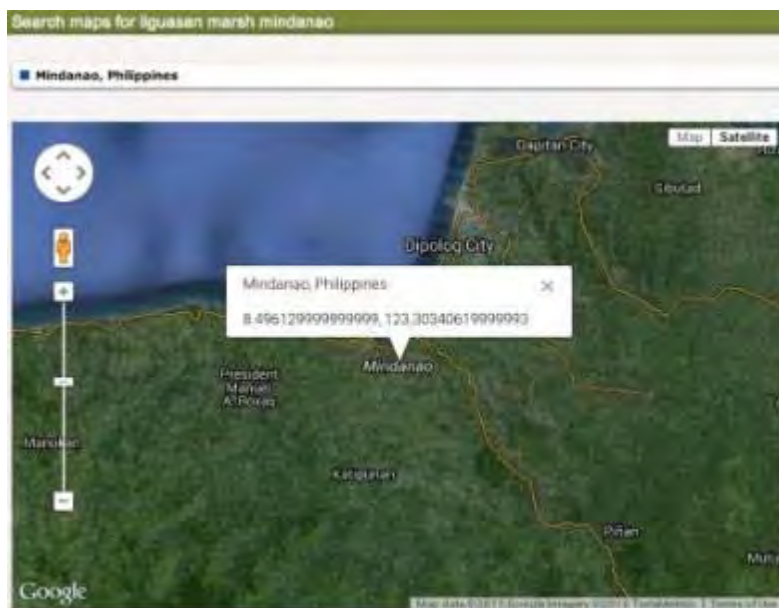
Ligawasan Marsh is a major wetland covering 288,000 ha of swamps in the provinces of Maguindanao, North Cotabato, and Sultan Kudarat, which serves as a source of water and irrigation for the lowlands of Central Mindanao (Figure 2.24). It supports a rich wildlife and is a source of livelihood for around 1.1 million people, mostly Maguindanawon Muslims in the area, mainly through fishing and agriculture.¹¹ An inventory of wildlife and vegetation conducted in 1999 identified a total of 218 species of flora and fauna, including the following species: rare oriental darter (*Anhinga melanogaster*), purple swamp hen (*Porphyrio porphyrio*), the threatened Philippine hawk eagle, spotted imperial pigeon, and the rufous-lored kingfisher.¹² It is believed to be the last home of the endangered Philippine crocodile (*Crocodylus mindorensis*) and the estuarine crocodile, and is the only place in the Country where the comb-crested Jacana bird can be found. This bird is also known as the lotus bird or lilytrotter bird, so named due to its habit of walking on the surface of water by leaping on leaves of louts or water lilies. The endangered monkey-eating eagle is also reported to be present in the forested areas of the marsh. The marsh also supports a huge variety of aquatic wildlife, including 20 species of fishes, three species of reptiles, and over 20 species of waterfowl, herons, egrets, and ducks.¹³ The same report indicates that the marsh is rich in mineral gas deposits.

The key threats to the marsh have been identified by De la Paz and Colson (2008) to include logging, siltation, diversion and obstruction of river flows, infill of marshlands for conversion to agriculture, conflicts, and the introduction of exotic species.

¹¹ NSO, 2000 as cited by NEDA, Mindanao Peace and Development Framework: 2011-2030 (Mindanao 2020), p.70.

¹² De la Paz, M.C. and L. Colson. 2008. *Population, Health, and Environment Issues in the Philippines: A Profile of the Autonomous Region in Muslim Mindanao (ARMM)*. Population Reference Bureau. <http://www.prb.org/Publications/Reports/2008/armm.aspx>

¹³ <http://www.gmanetwork.com/news/story/133892/news/regions/mariculture-park-planned-in-liguasan-marsh>



Source: http://www.getamap.net/search_maps_1_liguasan+marsh+mindanao+philip.html

Figure 2.24 Geographic Location of Ligawasan Marsh

2.6.2 Lake Lanao

Located in Lanao del Sur, Lake Lanao is the second largest lake in the Country and the largest in Mindanao with an area of 340 km² (Figure 2.25). Lake Lanao supports the Maria Cristina hydroelectric plant, the largest source of hydroelectric power in Mindanao and serves as the source of water for six Agus hydropower plants of the National Power Corporation (NAPOCOR), “which contribute about 35% to 40% of the power needs of Mindanao.”¹⁴ Of the six Agus hydroelectric power plants, two are within the administrative jurisdiction of the province of Lanao del Sur (Agus 1 and 2), and the rest are in Lanao del Norte.



Source: http://www.getamap.net/maps/philippines/cagayan/_lanao_lake/

Figure 2.25 Geographic Location of Lake Lanao, Lanao del Sur

¹⁴ Gonzales, I. 2013. Lake Lanao water level dropping, says Napocor; <http://www.philstar.com/nation/2013/04/10/928804/lake-lanao-water-level-dropping-says-napocor>

The lake is reported to be home to 18 endemic species of cyprinid fish of the genus *Barbodes*.¹⁵ These species (with the common names in parenthesis) of Lake Lanao are shown in Table 2.27.¹⁶ However, an investigation conducted in 1992 only managed to locate three of the endemic fish species, and only two (*B. lindog* and *B. tumba*) were located in 2008.¹⁷

Table 2.27 Endemic Cyprinids in Lake Lanao

Scientific Name	Local Name
<i>Mandibularca resinus</i> Herre*	Bagangan sa erungan
<i>Cephalacamsus pachychilus</i> Herre	Bitungu
<i>Ospafulus palaemophagus</i> Herre	Bitungu
<i>Ospafulus truncatulus</i> Herre	Bitungu
<i>Puntius baolan</i> Herre†	Baolan
<i>Puntius amarus</i> Herre	Pait or Dipura
<i>Puntius binotatus</i> Cuvier and Valenciennes	Pait
<i>Puntius clemensi</i> Herre	Bagangan
<i>Puntius flavifuscus</i> Herre	Tumba
<i>Puntius katolo</i> Herre	Katolo
<i>Puntius lanaoensis</i> Herre	Kundur
<i>Puntius lindog</i> Herre†	Lindog
<i>Puntius manalak</i> Herre†	Manalak
<i>Puntius sirang</i> Herre	Sirang or Tumaginting
<i>Puntius tras</i> Herre	Tras
<i>Puntius lumba</i>	Tumba
<i>Puntius diza</i> Herre†	Diza
<i>Sprattllicypris palata</i> Herre†	Palata

*Largest native species in Lake Lanao; †Species of high commercial value

The lake also supports a large number of waterfowl¹⁸ and around 42 endemic crab species. According to De la Paz and Colson (2008), Lanao Lake was once considered one of the most biodiverse lakes in the world, but persistent abuse through logging and pollution, particularly from Marawi City, have significantly degraded its water quality. Lake Lanao was proclaimed as a watershed reservation in 1992 through Presidential Proclamation 971 to ensure the protection of its forest cover and water yield for hydropower, irrigation, and domestic use.

The key threats to Lake Lanao include overfishing, pollution, and competition from introduced species which caused the extinction of flora and fauna species.¹⁹ In October 2006, a study conducted by the Mindanao State University (MSU) discovered massive algal contamination in Lake Lanao,²⁰ which was thought to be due to poor sewage and agricultural waste management. However, the DA-Bureau of Fisheries and Aquatic Resources (BFAR) reported that soil erosion from indiscriminate logging, extensive land use, and farming caused the algal contamination.²¹

¹⁵ Ismail, Sampson, and Noakes, 2014. *The status of Lake Lanao endemic cyprinids*. Environmental Biology of Fisheries 97(4): 425-434.

¹⁶ Ismail, Sampson and Noakes, 2014

¹⁷ Ismail, Sampson and Noakes, 2014; and Endangered Species Handbook: *It's Too Late—Fish Extinctions*. Retrieved 29 September 2012

¹⁸ Lake Lanao at the Wayback Machine (archived January 3, 2009)

¹⁹ Ismail, Sampson and Noakes, 2014; Endangered Species Handbook: *It's Too Late – Fish Extinctions*. Retrieved 29 September 2012; Fiedler, P.L., and P.M. Kareiva, eds (1998). *Conservation Biology - For the Coming Decade*, 2nd edition, p. 211. ISBN 978-0412096617; and Harrison, I.J., and M.L.J. Stiassny (1999). *The Quiet Crisis. A preliminary listing of the freshwater fishes of the world that are Extinct or "Missing in Action"*. pp. 271-331 in: MacPhee, R.D.E., eds. (1999). *Extinctions in Near Time*. ISBN 978-0306460920

²⁰ <http://www.mindanews.com/?s=contaminated+lake+in+danger>

²¹ Lake Lanao at the Wayback Machine (archived January 3, 2009)

2.7 Key Biodiversity Areas (KBAs) and Trigger Species

There are no available data on marine wildlife resources in the BCT. However, most of the key biodiversity areas (KBAs) identified in the Philippines host a range of globally significant species. KBAs, in the Philippine context, are identified using standard criteria based on the two major conservation planning principles of vulnerability and irreplaceability. Vulnerability is measured by the confirmed presence of one or more globally threatened species, while irreplaceability is determined through the presence of geographically concentrated species.²² The criteria presented in the box below indicates the types of wildlife resources, particularly the trigger animal and plant species, used to identify the KBAs in the country, including those in the BCT.

CRITERIA FOR IDENTIFICATION OF KBAs	
Criterion based on vulnerability	
<i>Criterion 1: Globally threatened species.</i> KBAs based on this criterion are identified by the regular occurrence of one or more globally threatened species — those assessed as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) according to IUCN Red List.	
Criteria based on irreplaceability	
<i>Criterion 2: Restricted-range species (RR).</i> KBAs based on this criterion hold a significant proportion (provisionally set at 5%) of the global population of one or more species with a limited global range size (provisionally set at 50,000 sq km). Both the maximum range size and threshold appropriate for this criteria need further testing. In the Philippines, due to a lack of data on range and population size (both global and local), endemic species were used as a proxy for restricted-range species.	
<i>Criterion 3: Congregatory species (CC).</i> KBAs based on this criterion hold a significant proportion (provisionally set at 1%) of the global population of a congregatory species, defined as a species that gathers in large numbers at specific sites during some stage in their life cycle (for example, breeding aggregations).	

Table 2.28 presents the types and distribution of the trigger (i.e., critically endangered, endangered, endemic, vulnerable, restricted-range, and congregatory) species in the KBAs of the BCT, using the Sulu Archipelago and Turtle Islands Wildlife Sanctuary as examples. Table 2.29 indicates the classification and number of trigger species of all the KBAs of the BCT as well as the major threats to these areas, although the list does not identify the common and/or scientific names of the specific species.

Table 2.28 Trigger Species in BCT's KBAs

KBA	Location		Trigger Species	Estimated Area (ha)
	Province	Municipalities		
Sulu Archipelago	Tawi-Tawi, Sulu, Basilan	Languyan, Sapa-sapa, Tandubas, Balimbing (Panglima Sugala), Sitangkai, Sibutu, Sapa-sapa, South Ubian, Simunul; Indanan, Jolo, Kalingalan Caluang, Luuk, Maimbung, Old Panamao, Pandami, Panlima Estino, Pangutaran, Parang, Pata, Patikul, Siasi, Talipao, Tapul; Isabela City, Lamitan City, Lantawan, Sumisip, Tipo-tipo, Tuburan	Leatherback turtle <i>Dermochelys coriacea</i> (CR); Giant Clam <i>Tridacna gigas</i> (EN); Green turtle <i>Chelonia mydas</i> (EN); Humphead wrasse <i>Cheilinus undulatus</i> (EN); Barramundi cod <i>Cromileptes altivelis</i> (VU); Southern Giant Clam <i>Tridacna gigas</i> (EN)	4,940,529.88
Turtle Islands Wildlife Sanctuary	Tawi-Tawi	Turtle Islands	Hawksbill turtle <i>Eretmochelys imbricata</i> (CR); Green turtle <i>Chelonia mydas</i> (EN); Giant Clam <i>Tridacna gigas</i> (EN)	244,463.63

Notes: CR = critically endangered; EN = endangered; VU = vulnerable

Source: Prepared by the PRIMEX Survey Team based on DENR/PAWB data.

²² Conservation International Philippines, DENR-PAWB and Haribon Foundation for the Conservation of Nature, undated; *Priority Sites for Conservation in the Philippines: Key Biodiversity Areas*, Quezon City, Philippines.

Table 2.29 Classification and Number of Trigger Species by KBA in BCT

Name of KBA	Location		Area (ha)	Trigger Species					Threats to Biodiversity Areas and Resources
	Municipalities	Provinces		CR	EN	VU	RR	CC	
Basilan Natural Biotic Area	Lamitan, Isabela, Sumisip, Tipo-tipo	Basilan	4,497	1	3	18	77		Illegal logging, land conversion (agriculture, <i>kaingin</i>), human encroachment, collection of non-timber forest products, wildlife hunting
Munai/ Tambo	Karomatan, Kapatagan, Sapad, Nunungan, Salvador, Tangkal, Magsaysay, Maigo, Pantao Ragat, Munai, Maratao, Balindong, Tugaya, Bacolod-Kalawi, Madamba, Calanogas	Lanao del Sur, Lanao del Norte	69,836	1	1	4	1		Land conversion to agricultural lands
Lake Lanao	Marawi City, Ditsaan Ramain, Buadipuso Buntong, Molundo, Taraka, Tamparan, Poona Bayabao, Masui, Lumbayanague, Lumbatan, Bayang, Binidayan, Pagayawan, Ganassi, Madamba, Madalum, Bacolod-Kalawi, Tugaya, Balindong, Marantao	Lanao del Sur	36,351	14	1	7	9		Illegal logging, Small-scale mining, soil erosion leading to siltation, introduction of exotic fish species, overfishing, pollution (domestic, use of fertilizer in agricultural areas)
Mt. Piagayungan	Lumba Bayabao, Bumbaran, Wao, Maguing, Poona Bayabao, Masui, Butig, Marogong, Tubaran, Lumbayanague, Matanog, Barira, Buldon, Alamada	Lanao del Sur, North Cotabato, Maguindanao	154,340	1		2	7		Illegal logging, small-scale mining, conversion of forests to agricultural lands
Liguasan Marsh	Pikit, M'lang, Tulunan; Pagalungan, Gen. S.K. Pendentun, Sultan sa Barongis; Don Mariano Marcos	Maguindanao, North Cotabato, Sultan Kudarat	39,424	2	1	3		1	Illegal logging, land conversion (<i>kaingin</i> , agricultural land (rice fields) and fishponds)
Mt. Daguma	Ampatuan, Esperanza, Isulan, Bagumbayan	Maguindanao, Sultan Kudarat	32,360	1		1	5		Logging, human encroachment, land conversion (permanent agriculture, <i>kaingin</i>), wildlife hunting
Mt. Dajo National Park	Patikul, Talipao	Sulu	3,304	3		3	12		
Tawi-Tawi Island	Languyan, Bungao	Tawi-Tawi	5,851	4	2	6	33		
Simunul and Manuk Manka Islands	Simunul	Tawi-Tawi	19,402	2	1		6		Illegal logging, land conversion (agriculture), wildlife hunting
Sibutu and Tumindao Islands	Sitangkai	Tawi-Tawi	116,763	1	2	4	16		

Notes: CR = critically endangered; EN = endangered; RR = restricted range; VU = vulnerable

Source: Prepared by the PRIMEX Survey Team based on DENR/PAWB data.

2.8 KBAs and Protected Areas (PAs)

A total of 14 KBAs were identified within the BCT with a total area of 726,000 ha. These KBAs are potential protected areas, once the biodiversity resources are validated (Table 2.30). There are 13 PAs covering 489,000 ha have been established in the BCT. Of these, Mt. Apo Natural Park has fully complied with the processes required under the National Integrated Protected Areas System (NIPAS) Act and established through a Republic Act. Four other PAs have been established through Presidential Proclamation based on the NIPAS Act. These are Turtle Island Wildlife Sanctuary, Mt. Dajo National Park, Basilan Natural Biotic Area, and Mt. Inayawan Range National Park.

The rest were established prior to the enactment of the NIPAS Act, which means that they have to undergo PA suitability assessment and other steps before they can be proclaimed and legislated. These PAs are considered initial components of the NIPAS until such time that they are established by Presidential Proclamation and, eventually, through an RA. One PA, the Bud Bongao Local Conservation Area (LCA), was established through a local ordinance. It should be noted that there is no one-to-one correspondence between the identified KBAs and PAs. Ten KBAs have not yet been established as PAs, while nine PAs were established in areas where there were no identified KBAs. According to DENR-EMB Memorandum Circular No. 5 dated July 2014, PAs and KBAs are categorized as environmentally critical areas (ECCs) and, therefore, all development activities should comply with the EIS requirements.²³

Only Turtle Island Wildlife Sanctuary has an existing PA Management Plan and a PA Management Board (PAMB). Basilan Natural Biotic Area and Mt. Inayawan Range National Park have initial Management Plans and existing PAMBs. The rest of the PAs do not have PAMBs and Management Plans. Figures 2.26 and 2.27 shows the KBAs and PAs in the BCT, while Figures 2.28 through 2.38 show the important PAs in the BCT.

Table 2.30 Profiles of KBAs and PAs in BCT

Province	KBAs	Location/ Municipality	Area (ha)	PAs	Location	Area	Legal Status
Basilan	Basilan Natural Biotic Area	Lamitan, Isabela, Sumisip, Tipo-tipo,	4,497	Basilan Natural Biotic Area	Lamitan, Isabela, Sumisip, Tipo-tipo,	4,497	Presidential Proclamation 321, May 31, 2000
Lanao del Sur	Lake Lanao	Marawi City, Ditsaan Ramin, Buadipuso Buntong, Molundo, Taraka, Tamparan, Poona Bayabao Masui, Lumbayanague, Lumbatan, Bayang, Binidayan, Pagayawan, Ganassi, Madamba, Madalum, Bacolod-Kalawi, Tugaya, Balindong, Marantao	36,351	Lake Lanao Watershed Reserve		180,460	Proclamation 871, February 23, 1992
				No KBA	Sacred Mountain		

²³ EMB Memorandum Circular No. 5 dated July 2014. *Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System.*

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Province	KBAs	Location/ Municipality	Area (ha)	PAs	Location	Area	Legal Status
				National Park			
				Salikata National Park	Lumba Bayabao	undetermined	RA 4190, May 5, 1965
				Rungkunan National Park	Ramain	undetermined	RA 4190, May 5, 1965
				Pantuwaraya Lake	Saguiran	20	RA 4190, May 5, 1965
				Lake Dapao National Park	Pualas	1,500	RA 4190, May 5, 1965
				Lake Butig National Park	Butig	68	RA 4190, May 5, 1965
Lanao del Sur, Maguindanao, and Cotabato	Mt. Pinagayungan	Lumba Bayabao, Rumbaran, Wao, Maguing, Poona Bayabao, Masui, Butig, Marogong, Tubaran, Lumbayanague, Matanog, Barira, Buldon, Alamada	154,340	No PA			
Lanao del Sur and Lanao del Norte	Munai/Tambo	Karamatan, Kapatagan, Sapad, Nunungan, Salavador, Tangkal, Magsaysay, Maigo, Pantao Ragat, Munai, Maratao, Balindong, Tugaya, Bacolod-Kalawi, Madamba, Calanogas	69,836	No PA			
	Olangui River	Saguiaran, Pantao, Ragat, Pantar, Balo-I, Matungao, Iligan City	4,674	No PA			
Maguindanao	Mt. Daguma	Ampatuan, Esperanza (also include Isulan and Bagumbayan in Sultan Kudarat)	32,260	No PA			
		No KBA		South Upi, Watershed Forest Reserve	South Upi, Maguindanao	1,894	Proclamation 65, Feb 20, 1987
Maguindanao and North Cotabato	Pulangui River (Candidate KBA)	Kabacan, Midsayap, Pikit, Pigcawayan, Matalam, Antipas, Carmen, Pagalungan, Datu Piang, Sultan	131,002				

Province	KBAs	Location/ Municipality	Area (ha)	PAs	Location	Area	Legal Status
		Kudarat, Kabuntalan, Cotabato City, Maramag, Don Carlos, Kitaotao, Dancagan, Damulog, Kibawe (also covers Impasug-ong, Cabanglasan, San Fernando, Quezon, Malaybalay, Valencia, Loreto in Bukidnon province)					
Sulu	Turtle Islands Protected Landscapes and Seascapes	Turtle Islands municipality	No data	Turtle Island Wildlife Sanctuary	Turtle Islands municipality	242,967	Presidential Proclamation 171, 1999
	Mt. Dajo National Park	Patikul, Talapao	3,304	Mt. Dajo National Park	Patikul and Talisay, Sulu	213	Proclamation 261, February 28, 1938
Tawi-Tawi	Tawi-Tawi Island	Languyan, Bongao	5,851	Bud Bongao Local Conservation Area	Bongao, Tawi- Tawi	103	Established through LGU Ordinance
	Simunul and Manuk Manka Islands	Simunul	19,402	No PA			
	Sibutu and Tumindao Islands	Sitankai	116,763	No PA			
	Cagayan de Tawi-Tawi (Candidate KBA)	Cagayan de Tawi-Tawi	7,550	No PA			
Lanao del Norte		No KBA		Mt. Inayawan Range Natural Park	Nunungan	3,120	Presidential Proclamation 1344, July 30, 2007
Noth Cotabato	Liguasan Marsh	Pikit, M'lang, Tulunang, Pagalungan, Gen. S.K. Pendatun, Sultan sa Barongis, Don Mariano Marcos (also covers Maguindanao and Sultan Kudarat)	39,424	No PA (Candidate PA)			
TOTAL			726,094				489,958

Source: DENR/BMB (formerly PAWB) data.

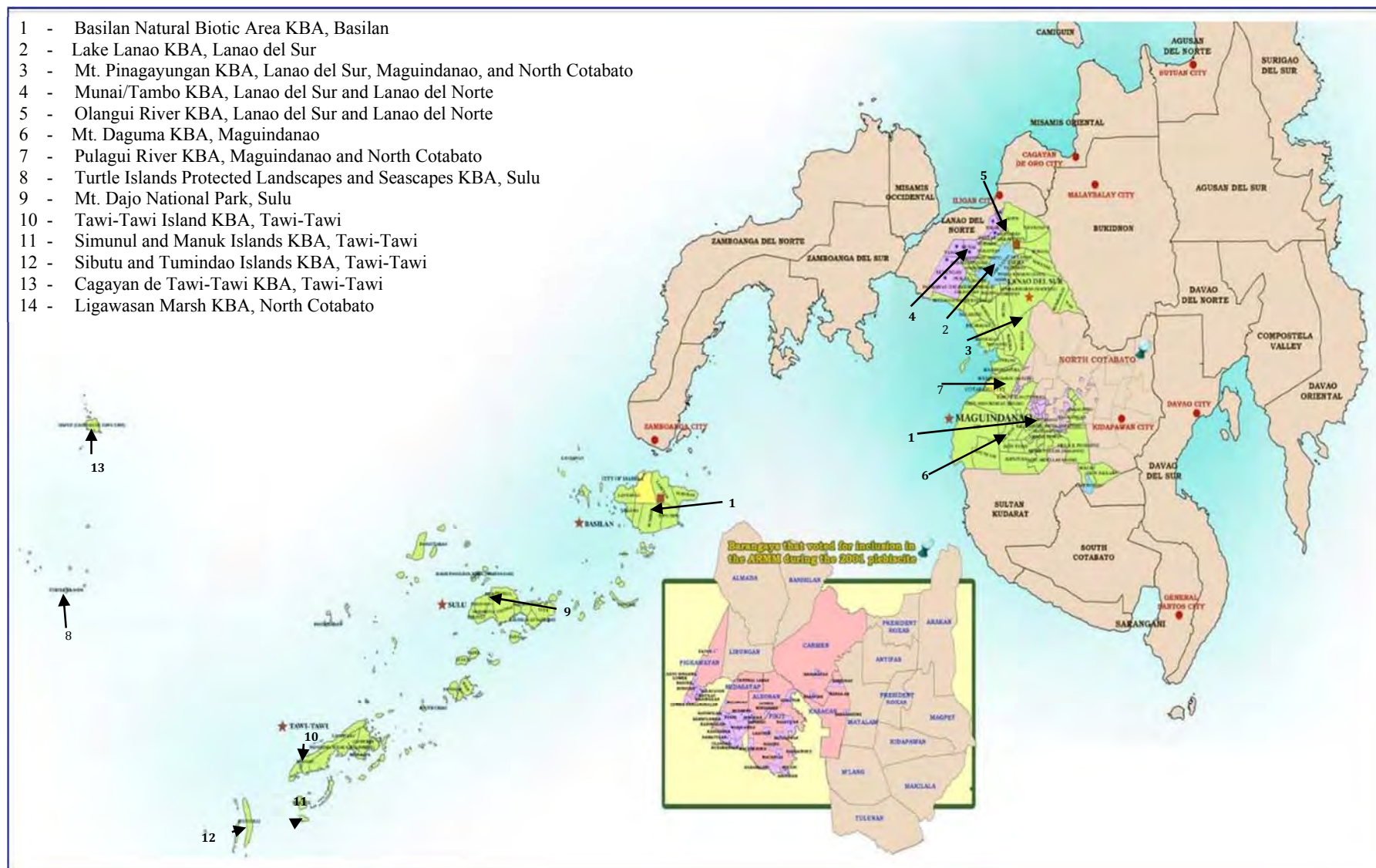


Figure 2.26 Map of Key Biodiversity Areas (KBAs) in BCT

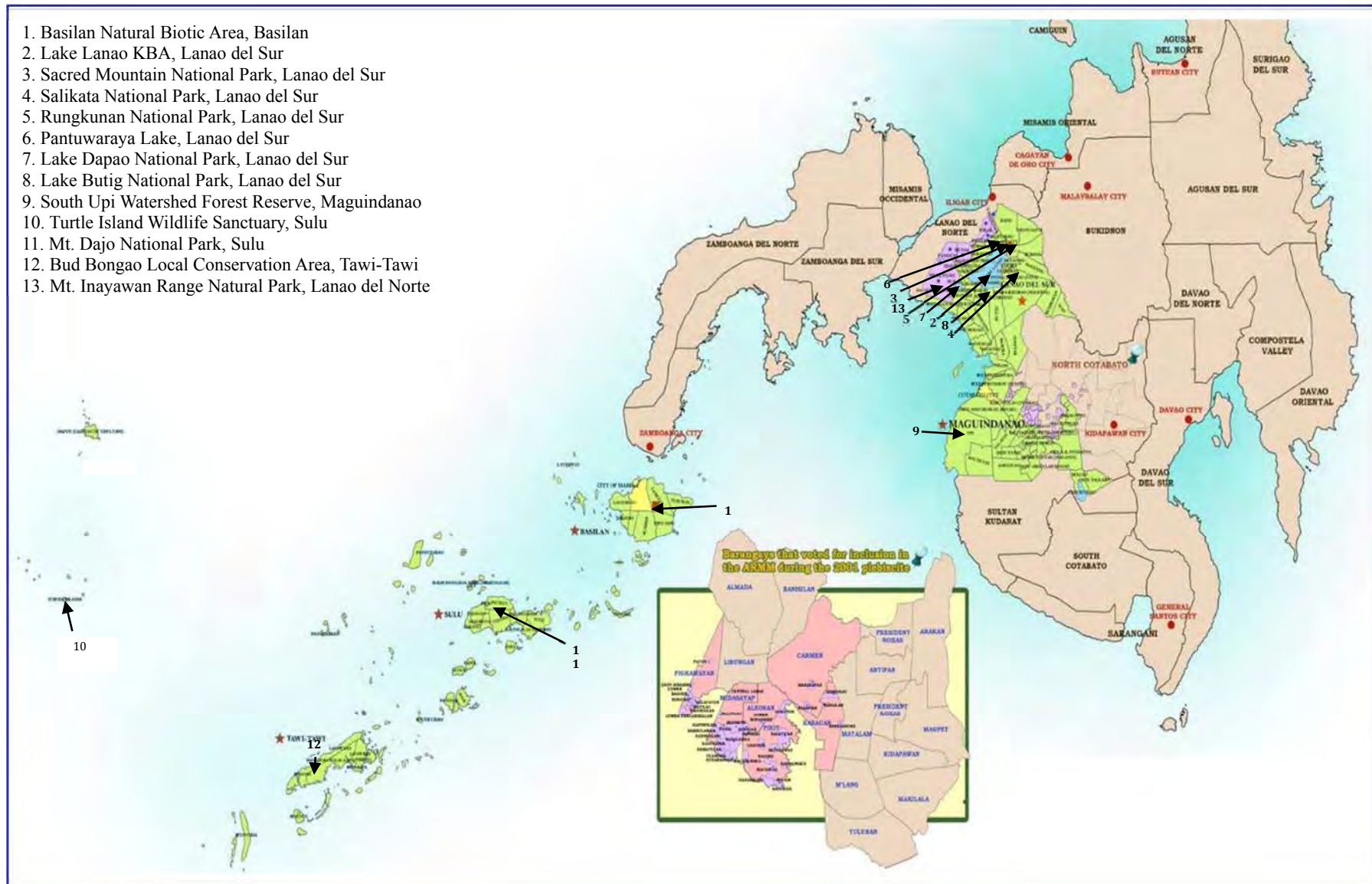


Figure 2.27 Map of Protected Areas (PAs) in BCT

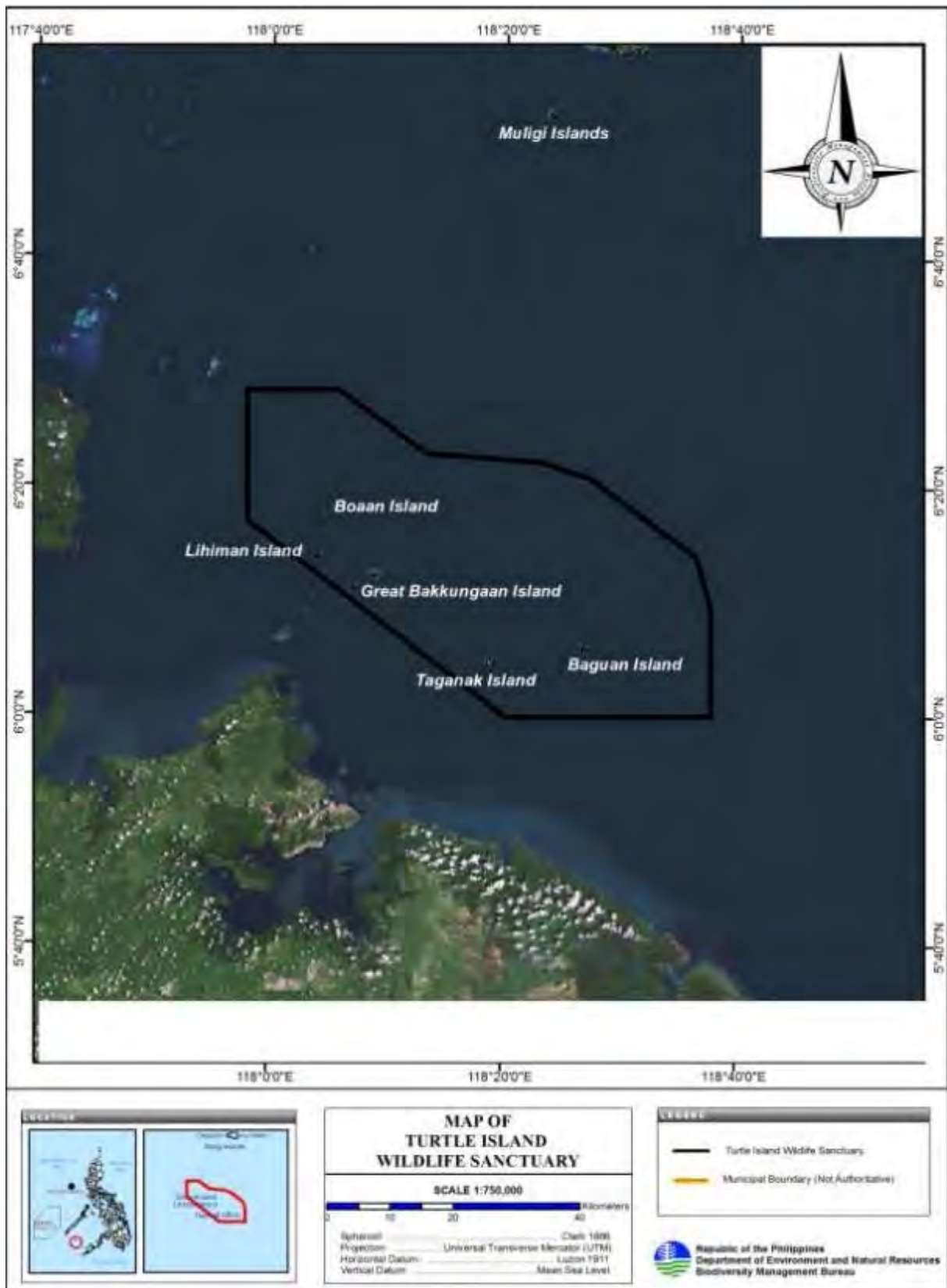


Figure 2.28 Map of Turtle Island Wildlife Sanctuary

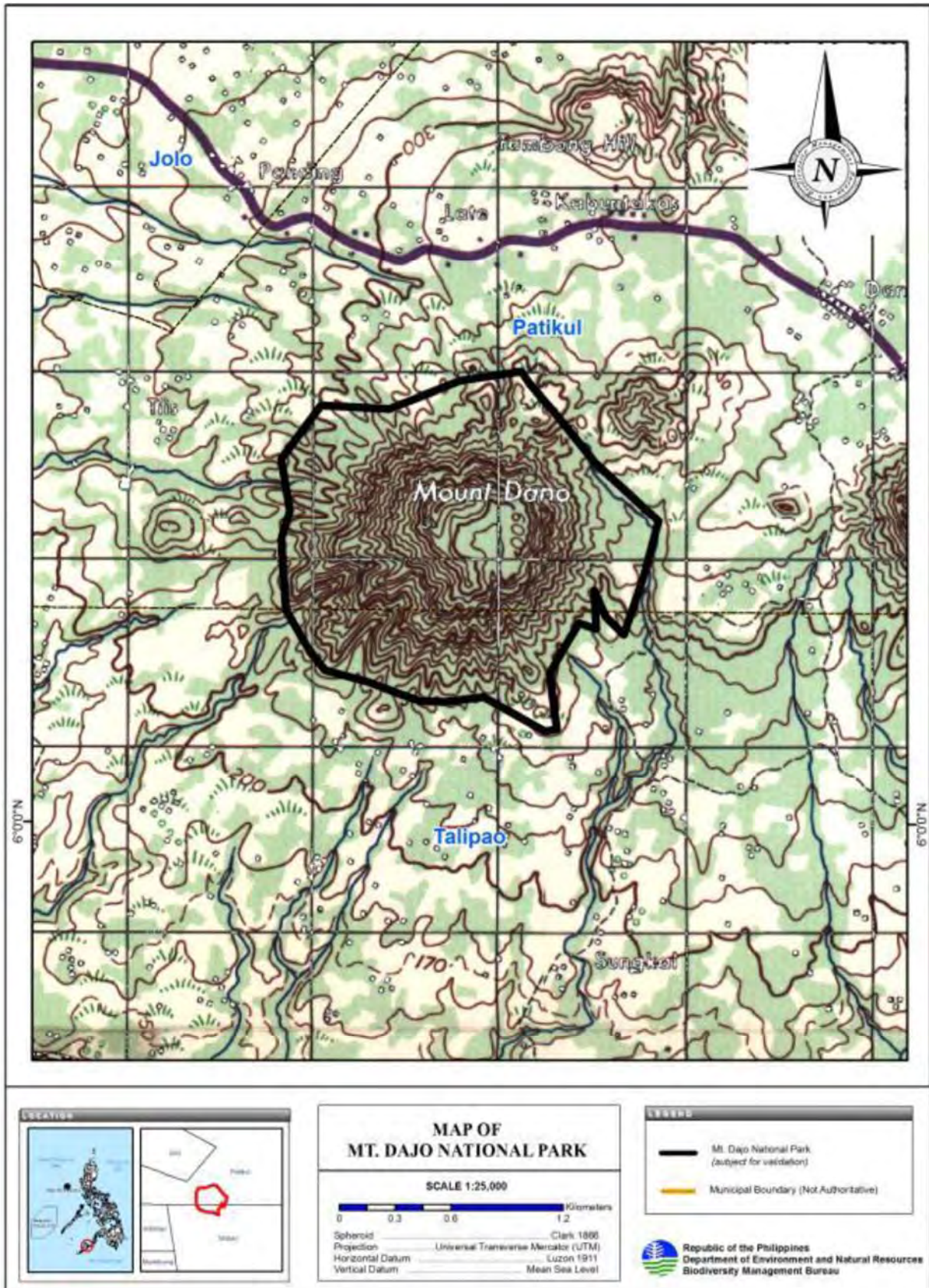


Figure 2.29 Map of Mount Dajo National Park



Figure 2.30 Map of Basilan Natural Biotic Area

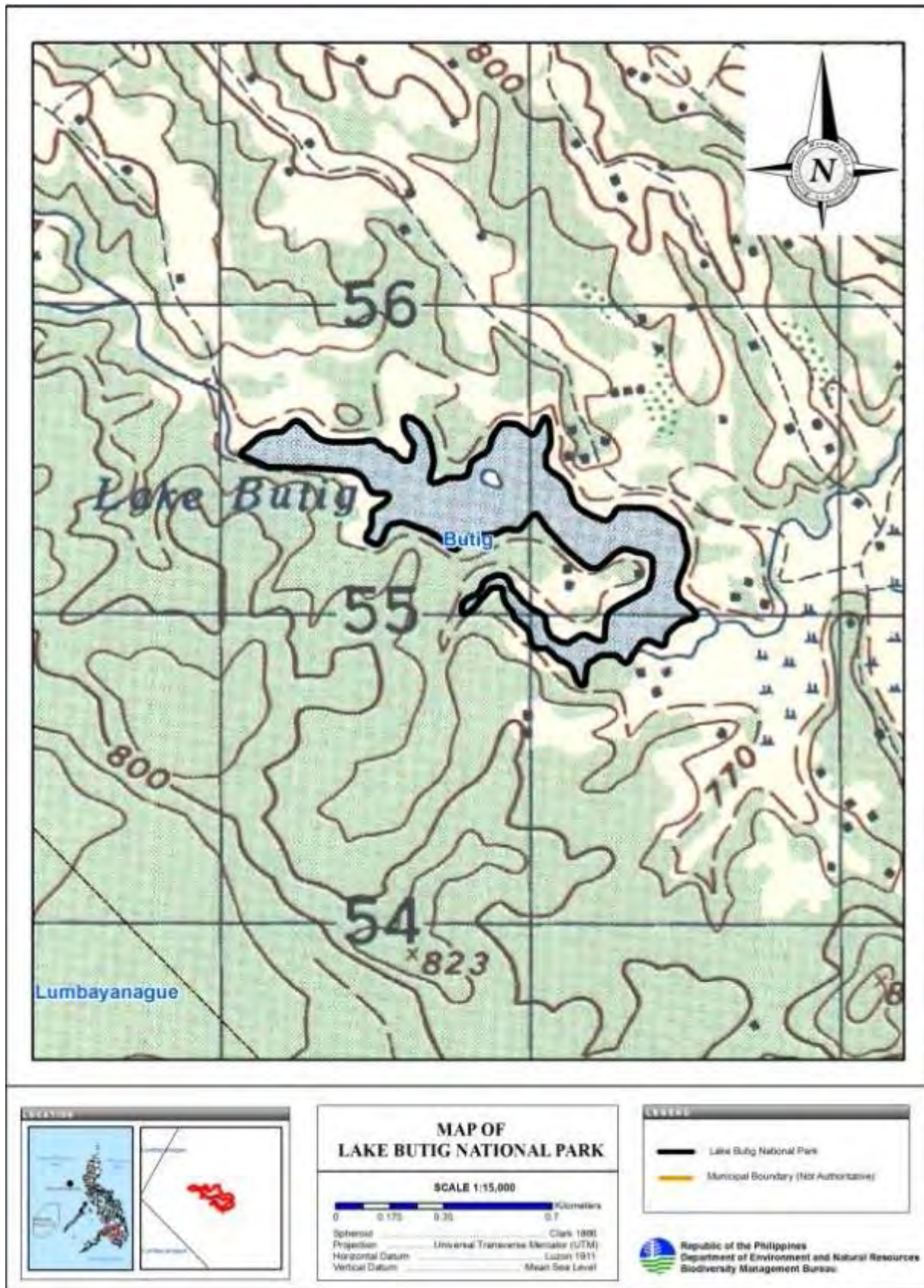


Figure 2.31 Map of Lake Butig National Park

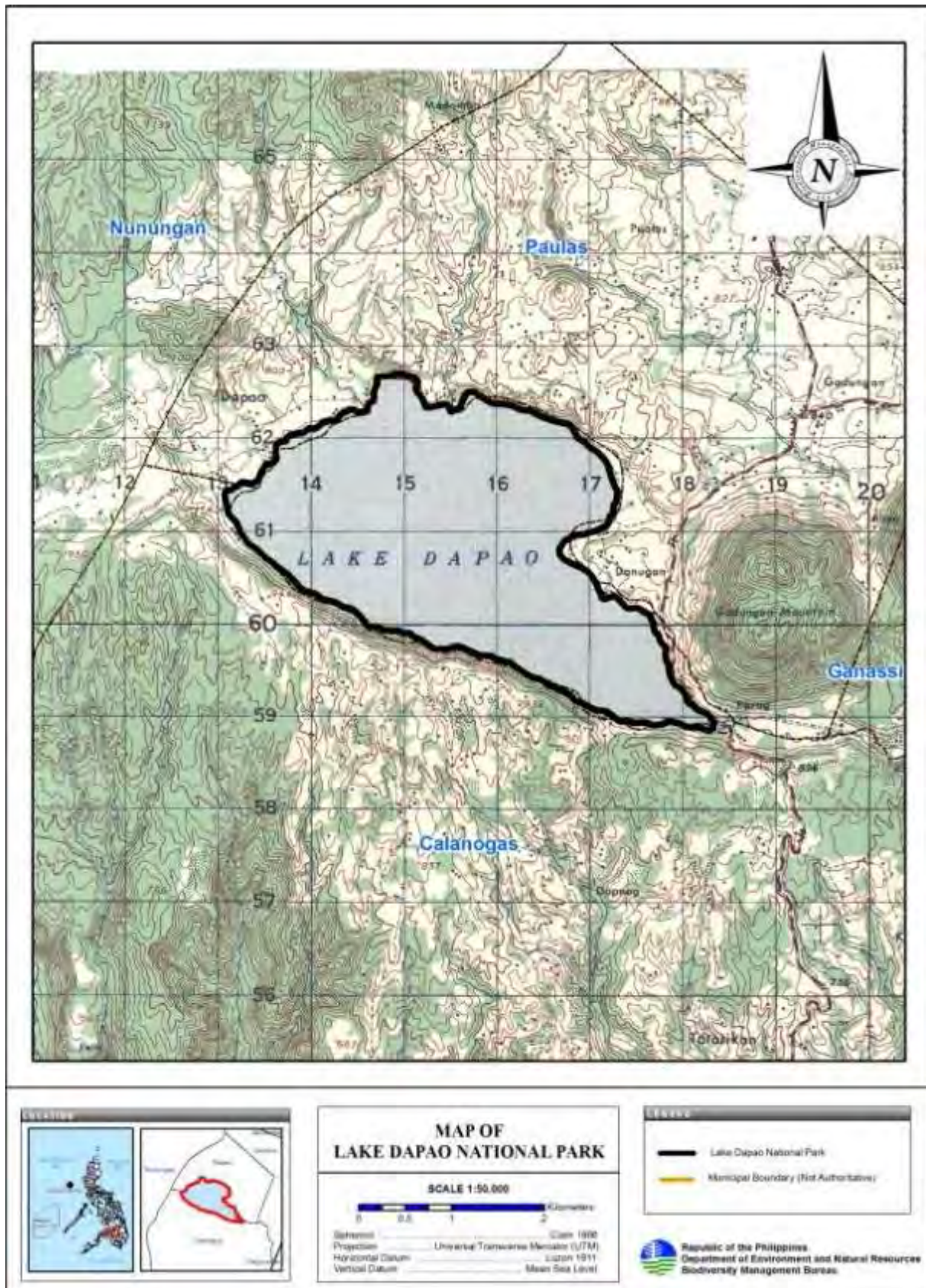


Figure 2.32 Map of Lake Dapao National Park

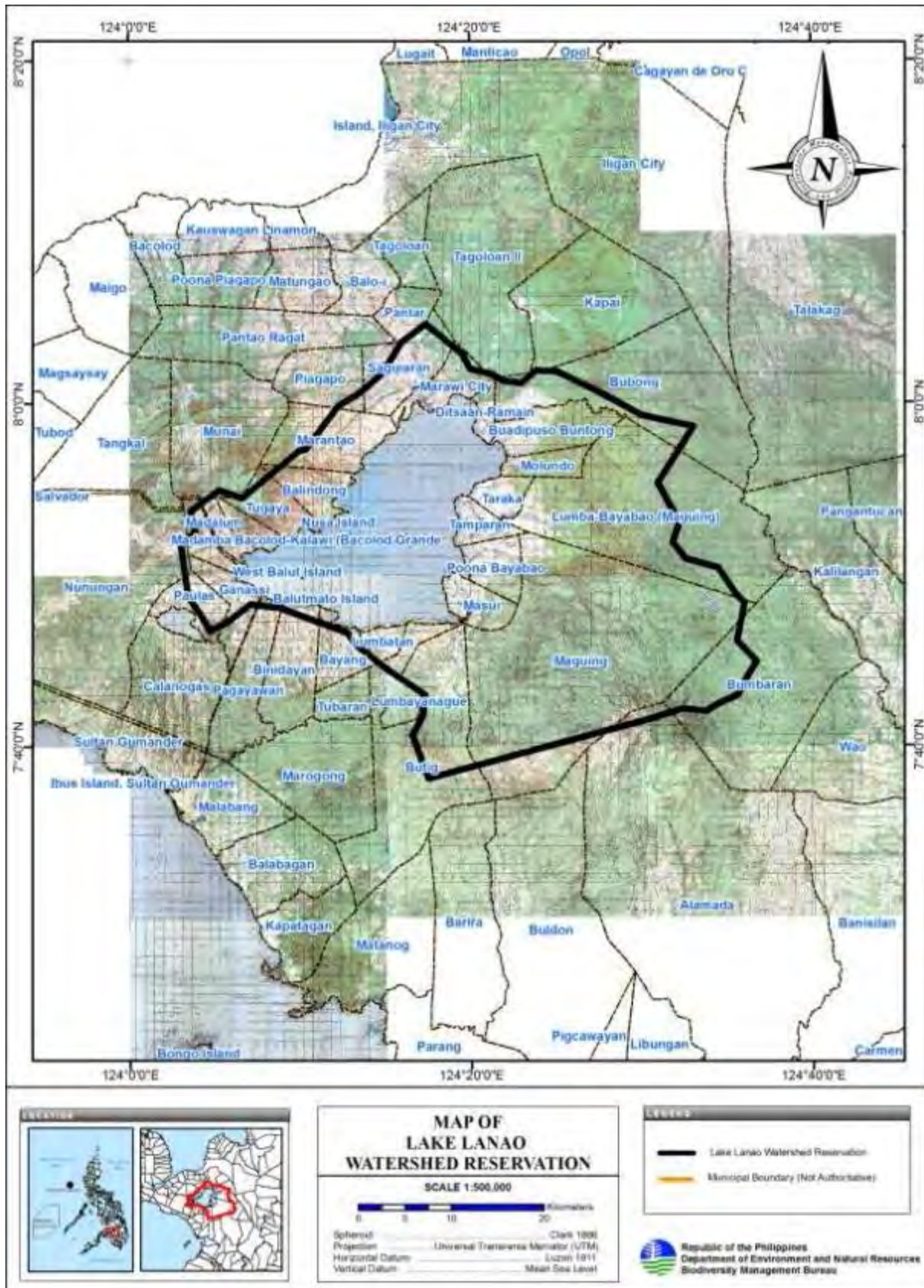


Figure 2.33 Map of Lake Lanao Watershed Reservation

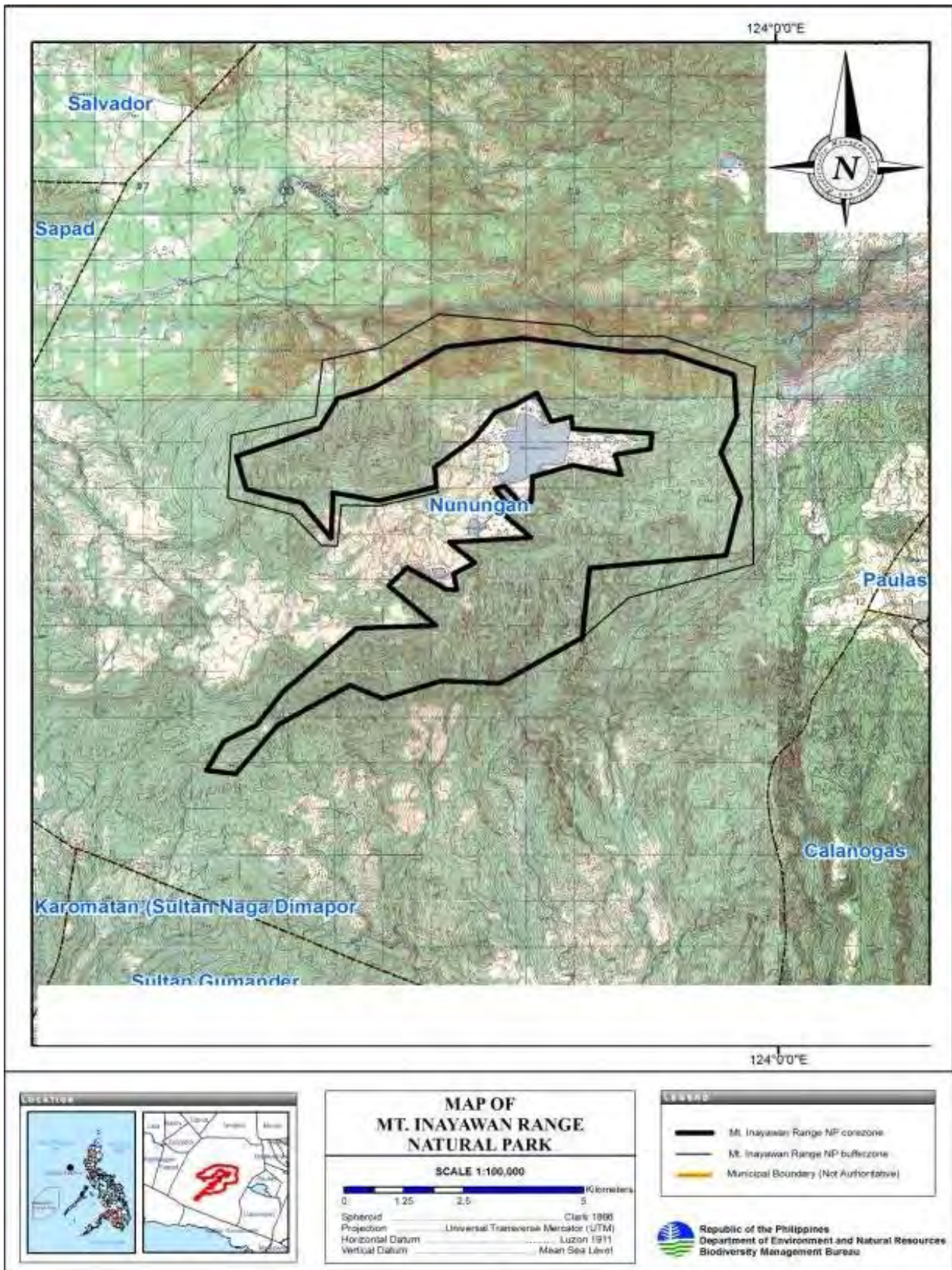


Figure 2.34 Map of Mt.Inayawan Range Natural Park



Figure 2.35 Map of Pantuwaraya Lake National Park

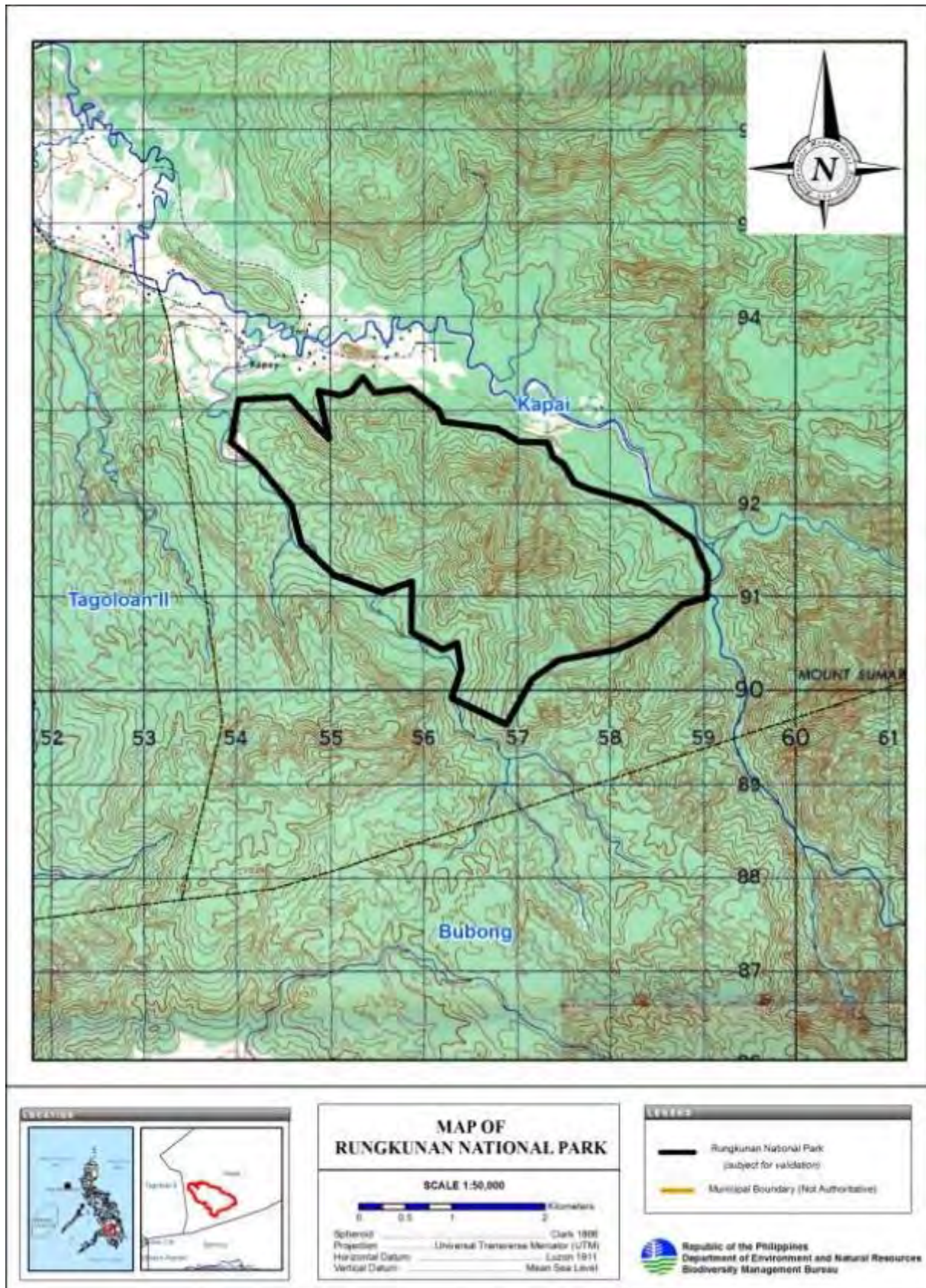


Figure 2.36 Map of Rungkunan National Park

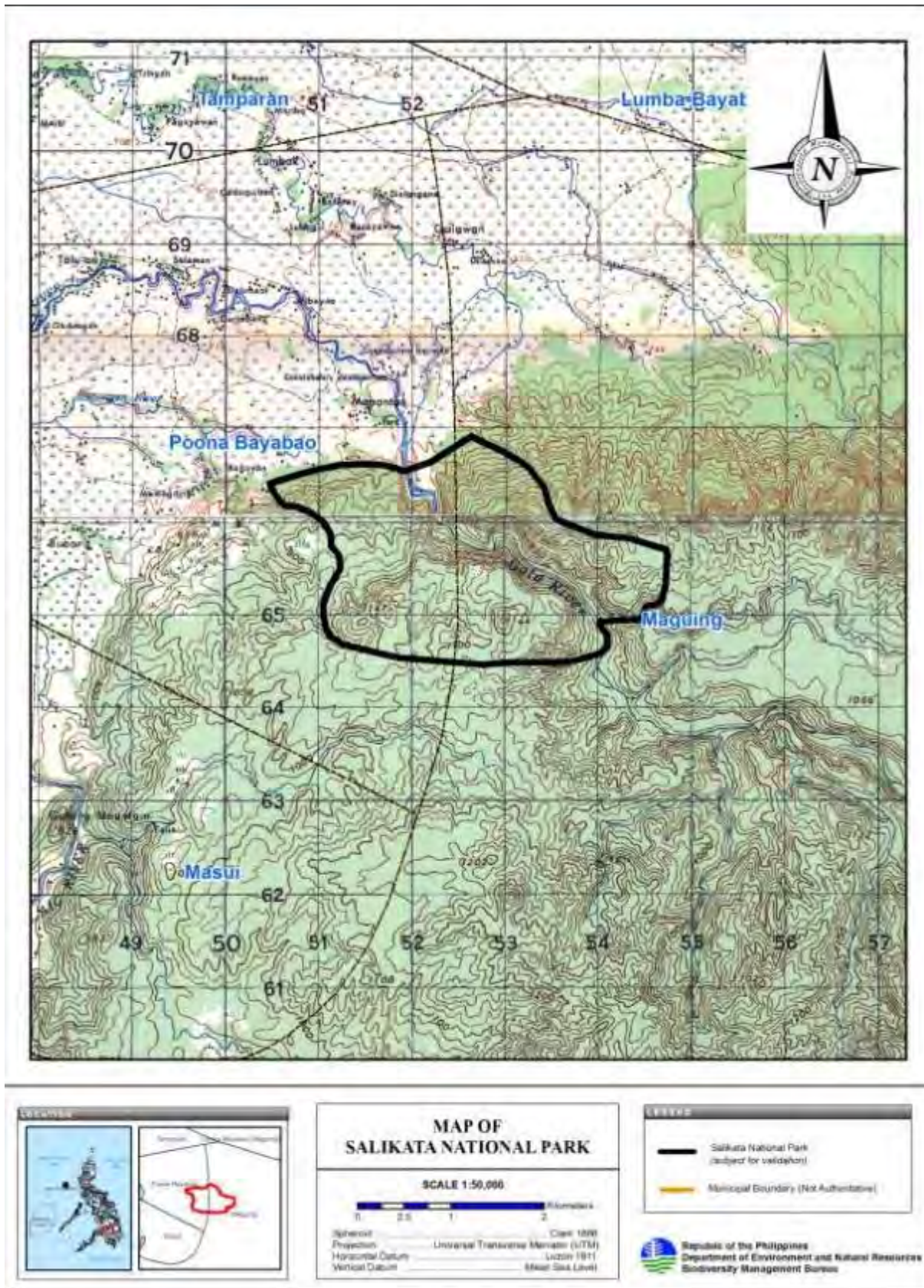


Figure 2.37 Map of Salikata National Park

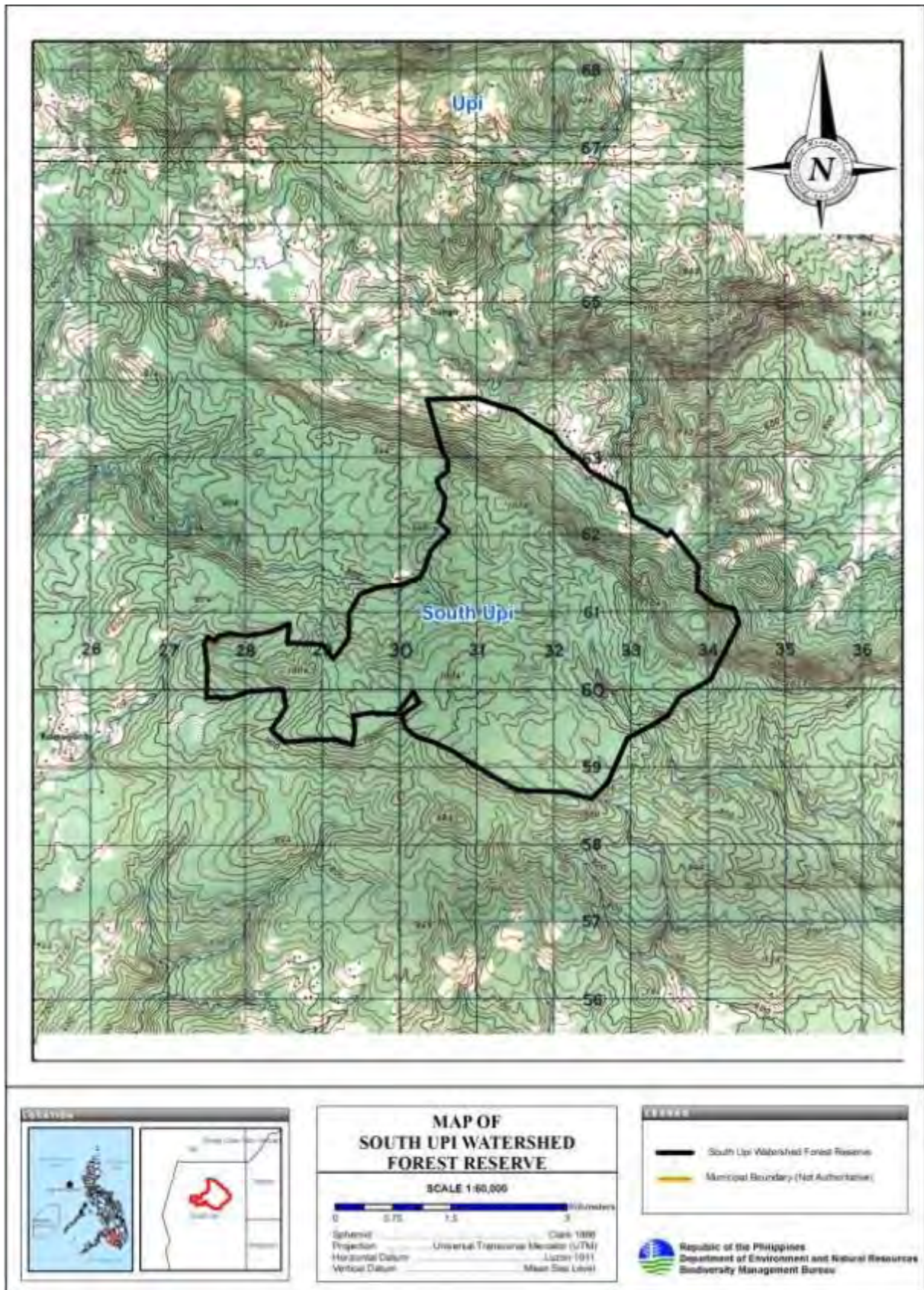


Figure 2.38 Map of South Upi Watershed Forest Reserve

CHAPTER 3 SOCIAL ENVIRONMENT

3.1 Demographic Characteristics

3.1.1 Present population and population density

As of the 2010 census, the expanded administrative coverage of the BCT had an estimated total population of 3,482,282. In the 2000 census, the population was 2,888,461, indicating an increase of 593,821 over the 10-year period. The total population and population density in the BCT by province and municipality in 2000 and 2010 are shown in Table 3.1. The two most populous provinces in 2010 were Maguindanao and Lanao del Sur, accounting for about 54% of the population of the BCT. These provinces, including Sulu, showed a sharp increase in the total population between 2000 and 2010 (Figure 3.1).

Table 3.1 Total Population and Population Density by Province/Municipality, 2000 and 2010

Province/Municipality	Population		Population density (/km ²)	
	2000	2010	2000	2010
BCT	2,888,461	3,482,282	208	251
Basilan	257,796	293,322	194	221
Lanao del Sur	800,162	933,260	207	241
Maguindanao	801,102	944,718	159	187
Sulu	619,668	718,290	387	449
Tawi-Tawi	322,317	366,550	296	337
Lanao del Norte, BCT	87,416	136,993	124	194
North Cotabato, BCT		89,149		397

Source: Prepared by the PRIMEX Survey Team based on PSA, 2014, QuickSTAT.

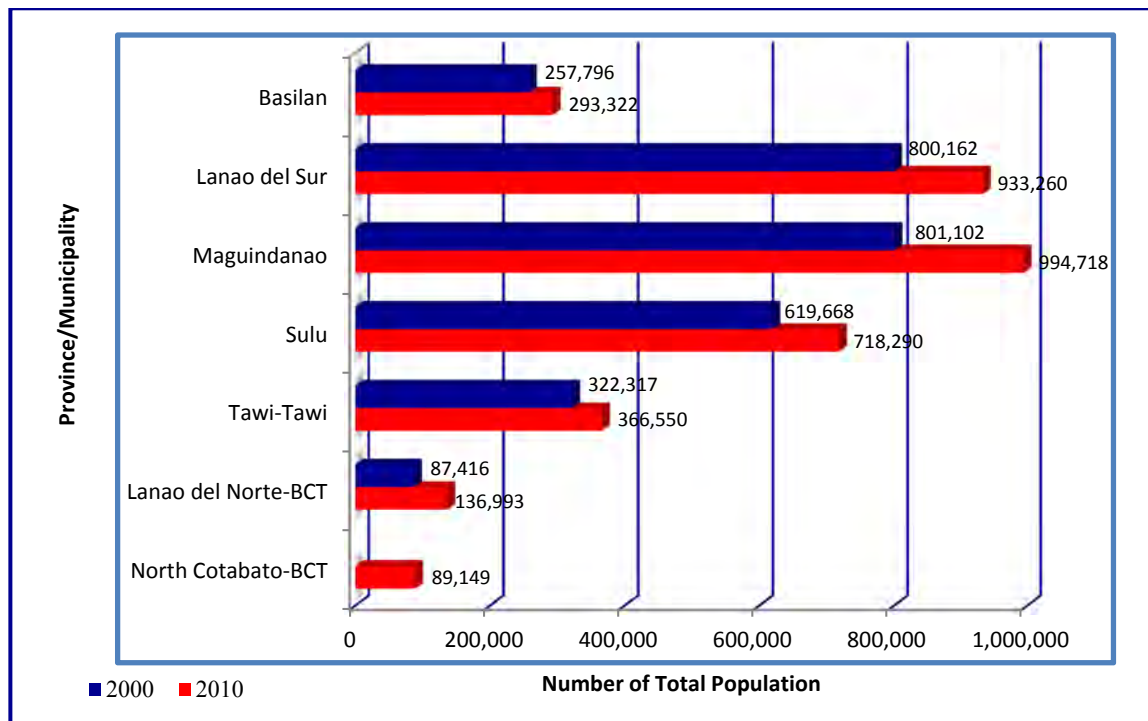


Figure 3.1 Total Population of BCT, 2000 and 2010

The population density in the BCT has also increased from 208/km² in 2000 to 251/km² in 2010 (Table 3.2). The largest increases were registered in Sulu and Tawi-Tawi at 449 and 337/km², respectively, higher than the regional average in 2010.

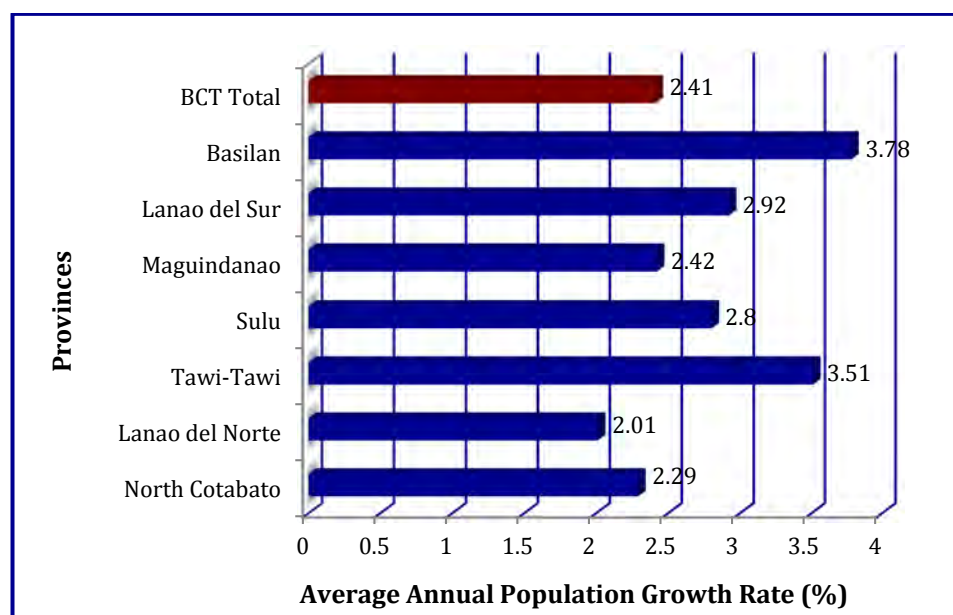
Table 3.2 Total Population in the BCT Expansion Area, 2000 and 2010

	Total Population	
	2000	2010
Six municipalities of Lanao del Norte	87,416	136,993
Balo-i	32,063	50,387
Munai	15,972	27,600
Nunungan	12,205	16,304
Pantar	12,826	18,440
Tagoloan	8,233	11,674
Tangkal	6,117	12,588
39 barangays of 6 municipalities of North Cotabato	No data	89,149
<i>Kabacan (3 of 24 barangays) (2007)</i>	4,490	5,242 (of 81,282)
Barangay Nanga-an	2,363	2,847
Barangay Simbuhay	1,542	1,685
Barangay Sanggadong	585	710
<i>Carmen (2 of 28 barangays)</i>	3,637	4,939 (of 82,469)
Barangay Manarapan	1,823	2,268
Barangay Nasapian	1,814	2,671
<i>Aleoson (3 of 19 barangays)</i>	5,918	5,488 (of 35,746)
Barangay Dungan	3,025	2,570
Barangay L. Mingading	1,266	1,117
Barangay Tapondoc	1,627	1,801
<i>Pigkawayan (8 of 40 barangays) (2007)</i>	9,913	10,553 (of 59,975)
Barangay Lower Baguer	712	912
Barangay Balacayon	1,354	967
Barangay Buricain	1,987	2,072
Barangay Datu Binasing	984	1,646
Barangay Kadingilan	1,596	1,357
Barangay Matilac	1,433	1,298
Barangay Patot	1,847	1,680
Barangay L. Pangalari	-	621
<i>Pikit (11 of 42 barangays)</i>	21,053	32,779 (of 113,014)
Barangay Bagoenged	1,667	1,993
Barangay Balatican	1,183	2,320
Barangay Barangay S. Balong	739	2,082
Barangay S. Balungis	2,030	3,714
Barangay Batulawan	2,869	4,804
Barangay Buliok	2,203	2,222
Barangay Gokoton	3,143	3,801
Barangay Kabasalan	2,695	3,470
Barangay Lagunde	1,704	2,375
Barangay Macabual	1,498	3,316
Barangay Macasendeg	1,322	2,682
<i>Midsayap (12 of 57 barangays)</i>		30,148 (of 134,170)
Barangay Damatulan		2,543
Baragay Kadigasan		3,494
Barangay Kadingilan		2,594
Barangay Kapinpilan		2,361
Barangay Kudarangan		2,723
Barangay Central labas		1,698
Barangay Malingao		2,765
Barangay Mudseng		1,810
Barangay Nabalawag		2,388
Barangay Olandang		3,253
Barangay Sambulawan		2,080
Barangay Tugal		2,439

Source: Prepared by the PRIMEX Survey Team based on PSA data and LGU profiles.

3.1.2 Population growth (male/female and urban/rural)

Population growth data disaggregated by gender (male and female) and by urban and rural settings were not completely and readily available in the BCT expansion areas for 2000 and 2010. Hence, the population growth data, as presented in this section, included mainly the five provinces with the four cities of the BCT. Overall, the average annual population growth rate in the BCT from 2000–2010 was estimated at 2.41% compared to the national average of 1.90% for the same period (Figure 3.2). The fastest growing provinces during the period were Basilan, Tawi-Tawi, and Lanao del Sur, with estimated annual population growth rates of 3.78%, 3.51%, and 2.92%, respectively, which were relatively higher than the regional average.



Source: PSA data and *Provincial Profiles*.

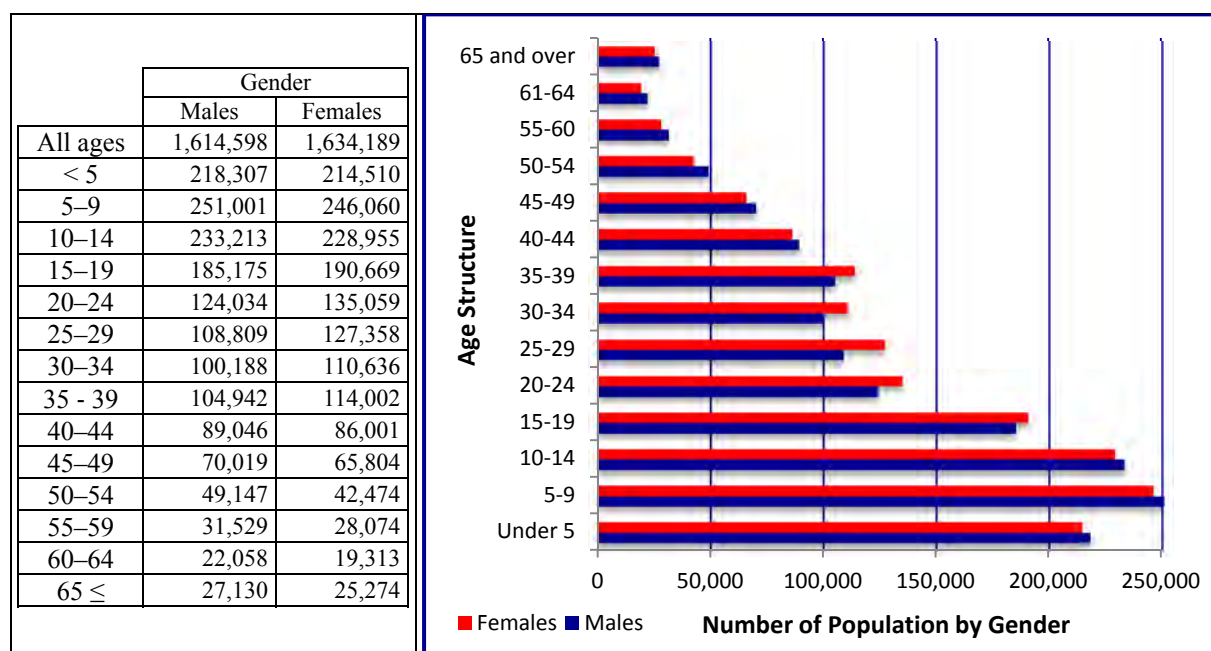
Figure 3.2 Average Annual Population Growth Rates by Province in BCT, 2000–2010

The population was almost equally divided between men and women in 2010. Available gender disaggregated data showed that females accounted for 50.3% of the total regional population and males, 49.7%.²⁴ The population showed a rural-urban ratio of of 2:1, reflecting the predominant agricultural and rural character of a large part of the BCT. The urban centers are mainly located in the cities of Marawi, Cotabato, Lamitan, and Isabela. In the five provinces of BCT (i.e., excluding the expansion areas), 72% of the population was found in the rural areas compared to only 28% in the urban areas in 2010.

3.1.3 Population by age group (male/female and urban/rural)

As shown in Figure 3.3, the BCT area had a young population in 2010, with 55.4% (1,767,890) in the under 5–19 years age group. Of this total, males accounted for 50.2% (887,696) and females, 49.8% (880,194). Another 44.0% (1,428,493) of the population fell in the age range, 20–64 years old. In this age group, 49% were males and 51%, females. Only 1.6% (52,404) of the population belonged to the age range, 65 years old and above, of whom males comprised 51.8% and females, 48.2%.

²⁴ Disaggregated data on population by gender (male and female) in the 39 barangays of North Cotabato, Cotabato City, and the six municipalities of Lanao del Norte were not available.



Source: PSA data.

Figure 3.3 Population of BCT by Age and Gender, 2010

Available data on population by age and gender at the provincial and city levels are shown in Tables 3.3 through 3.6.

Table 3.3 Provincial Population of Lanao del Sur (Including Marawi City) by Age and Gender, 2000

Ages	Total	Male	Female
All	928,384	451,257	477,127
< 5	131,319	64,874	66,445
5-9	146,489	72,105	74,384
10-14	130,763	63,952	66,811
15-19	107,028	50,901	56,127
20-24	73,845	34,466	39,379
25-29	67,473	30,400	37,073
30-34	59,953	28,072	31,881
35 - 39	59,516	28,275	31,241
40-44	47,665	23,762	23,903
45-49	37,096	19,216	17,880
50-54	24,100	12,768	11,332
55-59	24,100	12,768	11,332
60-64	11,386	6,022	5,364
65-69	7,166	3,607	3,559
70-74	4,326	2,294	2,032
75-79	2,061	1,003	1,058
80-84	1,000	497	503
85 ≤	605	297	308

Source: PSA data and *Provincial Profiles*.

Table 3.4 Provincial Population of Maguindanao by Age Group and Gender, 2000

Ages	Total	Male	Female
All	943,486	481,106	462,380
< 5	129,631	67,062	62,569
5-9	148,072	77,293	70,779

Ages	Total	Male	Female
10–14	138,703	71,974	66,729
15–19	106,535	54,515	52,020
20–24	75,334	37,127	38,207
25–29	65,604	31,053	34,551
30–34	61,845	29,745	32,100
35 - 39	62,413	30,022	32,391
40–44	50,526	26,415	24,111
45–49	37,590	19,772	17,818
50–54	25,241	13,608	11,633
55–59	16,093	8,632	7,461
60–64	11,507	6,173	5,334
65–69	6,969	3,648	3,321
70–74	4,042	2,254	1,788
75–79	1,841	1,006	835
80–84	974	512	462
85 ≤	566	295	271

Source: *ibid.*

Table 3.5 Provincial Population of Sulu by Age Structure and Gender, 2000

Ages	Total	Male	Female
All	718,277	351,866	366,411
< 5	78,764	38,678	40,086
5–9	102,742	50,838	51,904
10–14	103,397	51,477	51,920
15–19	89,464	43,613	45,851
20–24	58,348	27,660	30,688
25–29	52,394	23,857	28,537
30–34	45,963	21,426	24,537
35 - 39	53,061	25,277	27,784
40–44	42,606	21,306	21,300
45–49	33,968	17,084	16,884
50–54	23,093	12,526	10,567
55–59	14,075	7,300	6,775
60–64	9,574	5,197	4,377
65–69	5,502	2,793	2,709
70–74	2,998	1,654	1,344
75–79	1,282	645	637
80–84	682	344	338
85 ≤	364	191	173

Source: *ibid.*

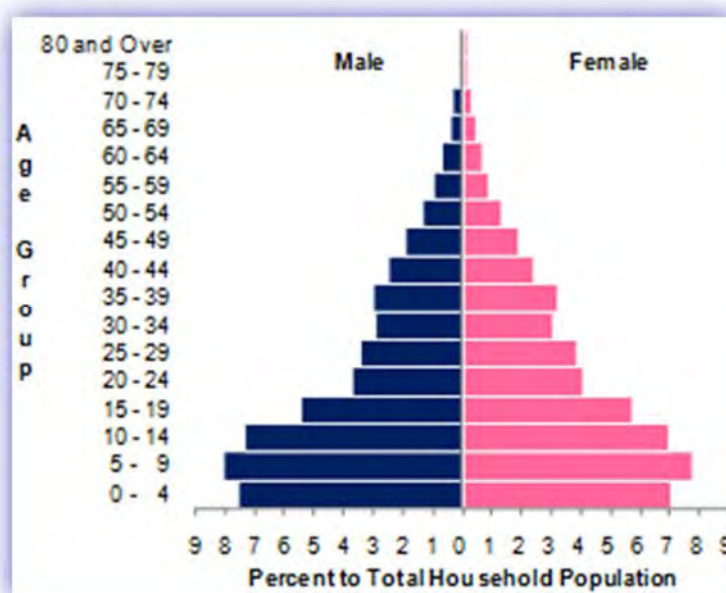
Table 3.6 Provincial Population of Tawi-Tawi by Age Group and Gender, 2010

Ages	Total	Male	Female
All	365,436	183,578	181,858
< 5	50,441	25,596	24,845
5–9	53,528	27,165	26,363
10–14	47,374	24,233	23,141
15–19	39,905	20,027	19,878
20–24	28,575	13,759	14,816
25–29	29,161	13,339	15,822
30–34	25,596	12,422	13,174
35 - 39	25,765	12,575	13,190
40–44	19,876	10,250	9,626
45–49	15,802	8,229	7,573
50–54	11,267	6,174	5,093

Ages	Total	Male	Female
55–59	7,354	4,036	3,318
60–64	4,937	2,678	2,259
65–69	2,760	1,459	1,301
70–74	1,727	938	789
75–79	736	379	357
80–84	378	197	181
85 ≤	254	122	132

Source: Prepared by PRIMEX Survey Team based on PSA data and *Provincial Profiles*.

In Basilan, the median age of the population of Basilan in 2010 was 17.4 years, which means that half of the population was younger than 17.4 years (Figure 3.4). This is lower than the median age of 18.1 years recorded in 2000. Moreover, 44.6% of the household population was under 15 years old. Children aged 5–9 years (15.8%) comprised the largest age group, followed by those in the age groups 0–4 years (14.6%) and 10–14 years (14.3%). Males outnumbered females in the age groups 0–14 years, 40–64 years, and 70–74 years. On the other hand, there were more females than males in the age groups 15–39 years, 65–69 years, and 75 years and over.



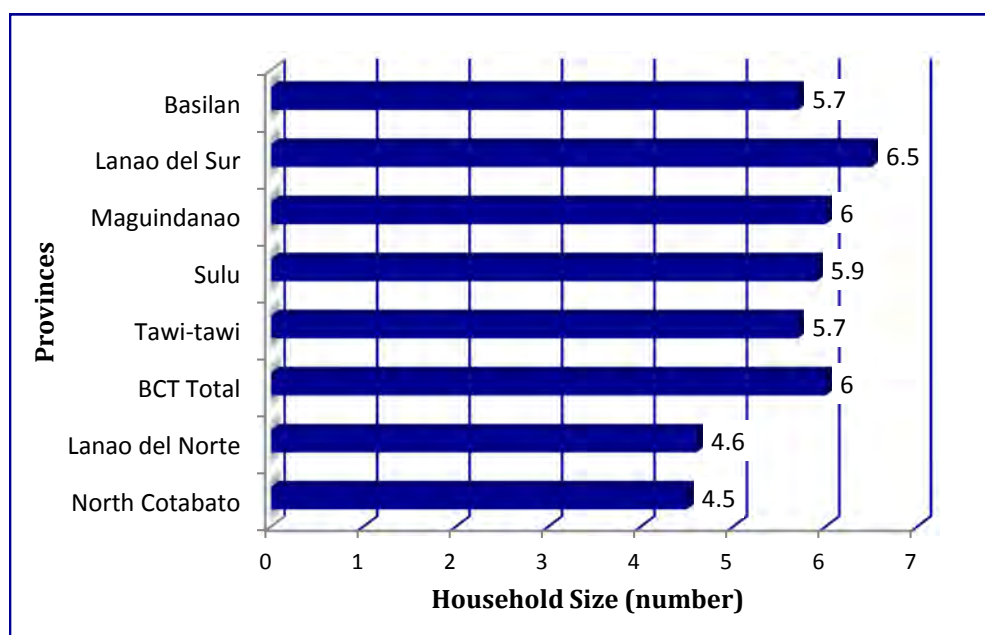
Source: PSA.

Figure 3.4 Provincial Population of Basilan by Age Structure and Gender, 2000

3.1.4 Household size

In 2010, the average household²⁵ size in the BCT was 6, compared to the national average of 4.6, as shown in Figure 3.5. The province of Lanao del Sur had a household size of 6.5, which was bigger than the regional average, while Lanao del Norte and North Cotabato, where the expansion areas of the BCT are situated, had smaller household sizes estimated at 4.6 and 4.5, respectively, in the same period (2010).

²⁵ Household refers to an aggregate of persons, generally but not necessarily bound by ties of kinship, who live together under the same roof and eat together or share in common the household food. Members comprise the head of the household, relatives living with him/her and other persons who share the community life for reasons of work or other consideration. A person who lives alone is considered a separate household.



Source: PSA data and *Provincial Profiles*.

Figure 3.5 Household Size by Province in BCT, 2010

3.1.5 Ethnic composition

The BCT has a multi-ethnic population. The ARMM RFPF, 2000–2030 states that there were 12 major ethnic groups identified in the region in 1995. Of these groups, the most dominant are Maguindanaon, Maranao, Tausug, and Samal. Table 3.7 presents the ethnic composition in each province/area of BCT in recent years, including the dominant ethnic groups. In the mainland, Maguindanaon, Iranon, and Tiduray are the dominant ethnic groups in the province of Mindanao. Tiduray are indigenous people (IPs) found in North Upi and South Upi. In Lanao del Sur, the dominant ethnic group is the Maranao. In the island provinces of Basilan, Sulu, and Tawi-Tawi, the dominant ethnic groups are Yakan, Tausug, Sama, Chavacano, Cebuano, Bisaya, and Badjao. In the BCT expansion areas, the dominant ethnic groups are composed of Maranao, Cebuano and Binisaya in Lanao del Norte and Maguindanaon, Cebuano, and Hiligaynon/Ilonggo in North Cotabato.

Table 3.7 Ethnic Composition in BCT

Province/ Municipality	Ethnic composition	
	Existing ethnic groups	Dominant ethnic groups
Basilan	Yakan, Tausug, Zamboangueno/Chavacano, Samal, Bajao, Cebuano, Ilonggo, Tagalogs, Ilocanos, Waray, Bicolanos, Maranaos, Iranons and Maguindanaos	Yakan, Tausug
Lanao del Sur	Maranao, Hiligaynon/Ilonggo, Cebuano, Ibanag, Iranon, Bisaya/Binisaya, Tagalog, Maguindanaon, others (not specified)	Maranao
Maguindanao	Maguindanaon, Iranon, Tiduray	Maguindanaon, Iranon, Tiduray
Sulu	Tausug, Sama (Samal)/Abaknon, Badjao (Sama Dilaut), Ibanag, Kiniray-a, others (not specified)	Tausug, Sama (Samal)/Abaknon
Tawi-Tawi	Sama Daliya, Tausug, Sama (Sama Akanon), Jama Mapun, Badjao (Sama Dilaut), others (not specified)	Sama Daliya, Tausug
Lanao del Norte, BCT	Maranao, Cebuano, Binisaya, Boholano, others (not specified)	Maranao, Cebuano, Binisaya
North Cotabato, BCT	Maguindanaon, Cebuano, Hiligaynon/Ilonggo, Ilocano, Manobo/Manubo, Tausug, Maranao, Iranons, Kapampangan, Bicolano, Boholano, others (not specified)	Maguindanaon, Cebuano, Hiligaynon/Ilonggo

Sources: Prepared by the PRIMEX Survey Team based on Basilan Comprehensive Development Plan, 2011–2013; Lanao del Sur Provincial SEP, 2007; Sulu PDPFP, 2008–2013; Tawi-Tawi PDPFP, 2008–2013; Lanao del Norte Enhanced PDPDP, 2013–2018; Midsayap Municipal SEP, Pigcawayan Municipal CLUP, 2011–2020; Pikit Municipal SEP.

3.1.6 Migration patterns/trends

Data on migration patterns/trends are not available in most provinces and cities in the BCT. Existing regional and provincial plans have identified migration as one of the key variables of planning, particularly in population projections and urbanization strategy, but there has been no detailed description of migration patterns/trends and triggering *push* and *pull* factors. In the Sulu PDPFP, 2008–2013, the “very minimal number of people (*who*) migrated to Sulu during the last five years” was noted from the 1990 NSO Population Census, indicating that only a fraction of 1% migrated to the province from other provinces and countries. However, the same Plan indicated that “out-migration could be significant considering the peace and order situation and the limited opportunities for economic and professional growth”²⁶ in the province at that time. However, the temporary movement of families and people in conflict-affected municipalities, barangays, or pockets of city settlements has become a common coping mechanism in the BCT, which sometimes results in permanent out-migration of some members, if not all, of the affected families.

3.2 Income and Employment

3.2.1 Employment by major industry group

PSA reported the 2013 total employment in the BCT at 1,229,000 persons, of which the agriculture sector accounted for 68.3% (840,000 persons) and the other sectors, 31.7% (389,000 persons).²⁷ In 2012, the agriculture sector provided employment to 70% of the total employed persons in the BCT (Table 3.8). Next to agriculture, the wholesale and retail trade sector (including repair of motor vehicles and motorcycles) contributed 13% and 14% to the total employment in the BCT in 2012 and 2013, respectively. A distant third is the transportation and storage sector, which contributed 6% to the total employment in both years. The other sectors contributed only from 1%-4% to the total employment in both years. All these data underscore the importance of the agriculture sector, both farm-level and enterprise-level agribusiness enterprises, in the long-term development of BCT.

Table 3.8 Employment (%) by Industry in BCT and Other Parts of Mindanao, 2012–2013

Sector	BCT/ARMM		Northern Mindanao		Central Mindanao	
	2012	2013	2012	2013	2012	2013
Agriculture, Hunting and Forestry	53	53	41	38	47	46
Fishing and Aquaculture	17	15	2	2	3	3
Manufacturing	1	1	5	6	5	5
Construction	1	1	5	6	3	3
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	13	14	17	18	16	17
Transportation and Storage	6	6	6	6	6	6
Accommodation and Food Service Activities	1	1	3	3	3	2
Public Administration and Defense; Compulsory Social Security	4	3	5	5	5	5
Education	3	3	3	3	3	3
Activities of Households as Employers; Undifferentiated Goods	1	1	5	5	4	4
Activities of Households for Own Use	0	0	1	1	1	1

Source: Prepared by the PRIMEX Survey Team based on PSA data.

The actual number of employed people by industry and gender in the BCT areas in 2012 and 2013 is presented in Table 3.9.

²⁶ Sulu Provincial Development and Physical Framework Plan, 2008-2013, p. 21.

²⁷ PSA, Regional Profile: ARMM. CountrySTAT Philippines. <http://countrystat.bas.gov.ph/?cont=16&r=15>. Accessed February 2015.

Table 3.9 Number of Employed People in BCT by Industry and Gender, 2012–2013

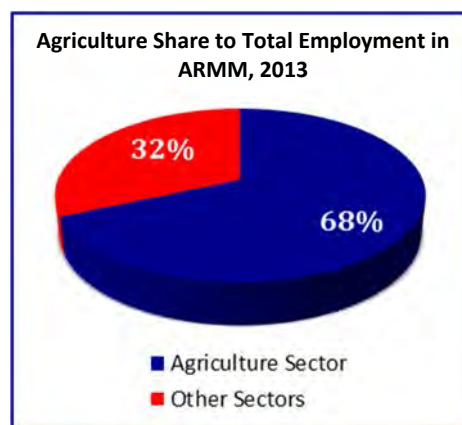
Major Industry	2012			2013		
	Total	Male	Female	Total	Male	Female
Total (in '000)	1,229.0	867.0	361.0	1,229.0	877.0	352.0
Agriculture	861.0	649.0	212.0	841.0	651.0	190.0
Agriculture, hunting, and forestry	652.0	474.0	177.0	655.0	488.0	167.0
Fishing	209.0	175.0	35.0	186.0	163.0	23.0
Industry	33.0	25.0	9.0	34.0	25.0	9.0
Mining and quarrying	*	*	-	*	*	-
Manufacturing	18.0	10.0	9.0	17.0	7.0	10.0
Electricity, gas, steam, and air conditioning supply	1.0	1.0	-	*	1.0	-
Water supply; sewerage, waste management and remediation activities	*	*	-	*	*	-
Construction	14.0	14.0	-	17.0	17.0	*
Services	335.0	193.0	140.0	354.0	201.0	153.0
Wholesale and retail trade; repair of automobiles and motorcycles	156.1	68.5	87.7	173.0	74.0	100.0
Transportation and storage	70.1	68.5	1.1	75.0	74.0	1.0
Accommodation and food service activities	7.4	1.6	6.0	7.0	2.0	7.0
Information and communication	*	*	-	*	*	-
Financial and insurance activities	1.2	0	0.4	1.0		0.7
Real estate activities	1.2	0.8	-	-	-	-
Professional, scientific and technical activities	*	*	*	*	*	-
Administrative and support service activities	3.7	4.3	0.4	5.0	4.0	1.0
Public administration and defense; compulsory social security	44.2	32.9	11.9	42.0	30.0	11.3
Education	34.4	10.4	23.8	36.0	11.0	24.0
Human health and social work activities	1.2	0.8	0.7	4.0	1.0	2.0
Arts, entertainment and recreation	*	*	*	*	*	*
Other service activities	12.3	5.2	7.6	10.0	5.0	5.3
Activities of households as employers; undifferentiated goods and service	1.2	*	0.7	1.0		0.7
Activities of extra-territorial organizations and bodies	*	*	*	*	*	*

* < 0.05%; unlike the preliminary table that excluded 4th quarter round LFS result due to Typhoon Yolanda, this final table included October 2013 LFS results.

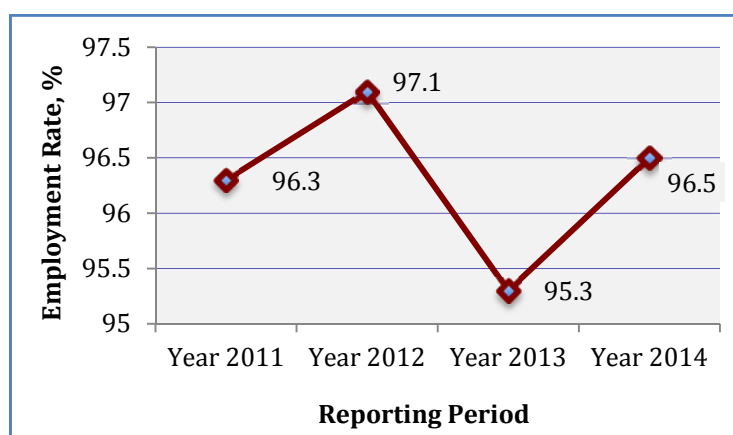
Source: Prepared by the PRIMEX Survey Team based on PSA, January to October 2012 Labor Force Survey and January to October 2013 Labor Force Survey Annual Labor and Employment Estimates.

The majority of the agricultural workers (77.4% or 650,000) in ARMM in 2013 were male; females constituted only 22.6% (190,000). Nominal daily wage rates of agricultural workers were reported at PHP 220.65 in 2013, with females receiving PHP 232.48 and males, PHP 222.15.

Over the past four years (2011-2014), the employment rate in the BCT has remained high compared to other regions in the Philippines, but it showed unsteadiness in growth, as reflected in Figure 3.6. This employment pattern reflected the seasonality of agriculture-related activities, which accounted for majority of the total employment in the BCT for the same period.



In Northern Mindanao, where the province of Lanao Norte is situated, the employment rate was at 94.3% in 2013, slightly lower than the 95.8% achieved in 2009. In Central Mindanao, where North Cotabato and Cotabato City are located, the employment rate was recorded at 95.6% in 2013, slightly higher than the 94.3% posted in 2009. In these two regions, however, the share of the agriculture sector in total employment was relatively lower than that of the BCT. For instance, the share of agriculture in the total employment in Northern Mindanao was reported at 41.0% in 2012 and 38.0% in 2013. In the same period, the share of agriculture in total employment stood at 47.0% and 46.0% in 2012 and 2013, respectively.



Source: LABSTAT, Updates (Vol. 16, No. 17), Bureau of Labor and Employment Statistics.

Figure 3.6 Employment Rate in BCT, 2011–2014

3.2.2 Income levels

Data on family income by income bracket/class were available only at the regional (BCT/ARMM) level in 2012, as presented in Table 3.10. About 86.5% (456) of the families reported incomes under two income brackets: PHP 100,000–249,999 and PHP 60,000–99,999, which accounted for about 78.4% (PHP 51.991 million) of total family income in the region (Figure 3.7). Families belonging to these income brackets earned an average income of PHP 139,866.67 and PHP 81,218.90, respectively, in 2012. However, an annual family income of PHP 81,218.90 placed the family below the poverty threshold of PHP 94,680.00 in the same year.²⁸

Table 3.10 Family Income in Major Sectors in BCT, 2012

Income group	BCT/ARMM		Agriculture		Industry		Services	
	Income (PHP mil.)	Families (1,000)	Income (PHP mil.)	Families (1,000)	Income (PHP mil.)	Families (1,000)	Income (PHP mil.)	Families (1,000)
< 40,000	140	4	106	3			34	1
40,000–59,999	1,843	35	1,575	30	45	1	223	4
60,000–99,999	16,325	201	13,114	163	792	10	2,417	28
100,000–249,999	35,666	255	22,468	165	1,566	11	11,632	79
250,000 ≤	12,316	32	3,242	10	231	1	8,843	22
Total	66,290	527	40,504	372	2,634	22	23,149	134

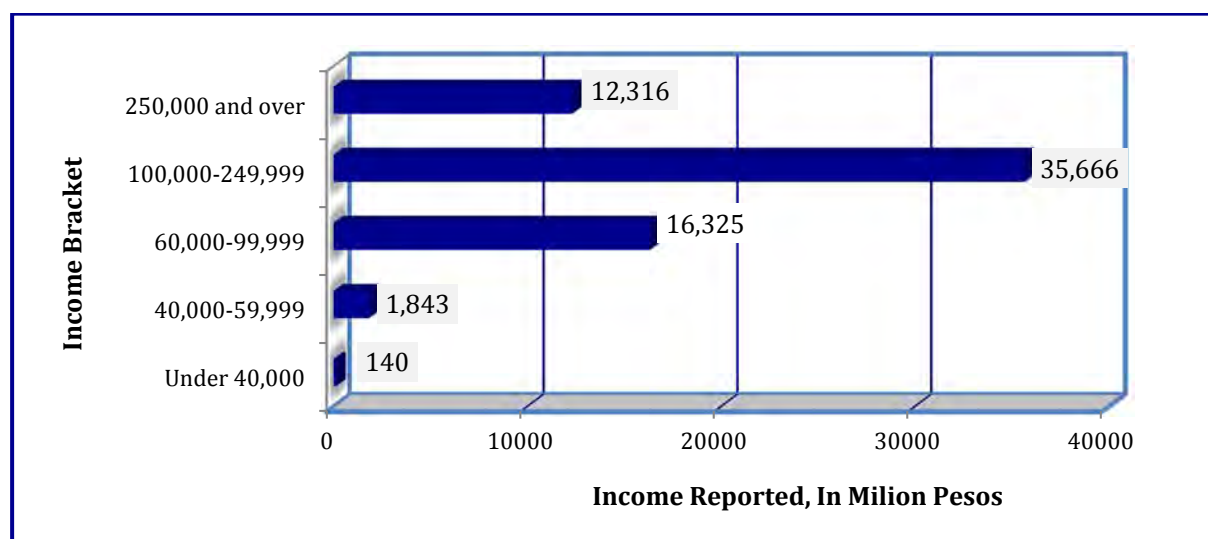
Source: Prepared by the PRIMEX Survey Team based on PSA, 2014, *2012 Family Income and Expenditure Survey* (Additional Tables).

The lowest two income brackets (i.e., under PHP 40,000 and PHP 40,000–59,999) comprised only 7.4% (39) of the total number of families who reported their incomes in 2012 and accounted for 3.0% (PHP 1.983 million) of the total family incomes in the region. Here, families earned an annual average income of PHP 35,000 and PHP 52,657, respectively, which were also below the poverty threshold. The highest income bracket comprised 2.2% of the total number of families who reported their incomes, and each family in this group earned an average income of PHP 384,875. Table 3.10 also shows the family incomes that were earned from three major sectors (agriculture, industry and services) by income bracket. Agriculture was the main source of family income for the households in the lowest three income brackets. In comparison, a significant number of families in the upper two income brackets obtained their family income from the industry and services sectors.

Data on annual family income, by province, were available for years 2006 and 2009. As shown in Table 3.11, Tawi-Tawi showed the highest growth rate in annual family income (52.7%) from 2006 to

²⁸ In 2012, the monthly poverty threshold for a family of five members was estimated at PHP 7,890 or PHP 94,680 for the whole year. Source: National Statistics Coordination Board (NSCB). 2013. *2012 Full Year Official Poverty Statistics*. Makati City, Philippines.

2009, while Basilan registered the lowest growth rate at 11.7% in annual family income in the same period.



Source: *ibid.*

Figure 3.7 Family Incomes by Income Bracket in BCT, 2012

Table 3.11 Annual Family Income in BCT by Province, 2006 and 2009

Province	2006 (PHP)	2009 (PHP)	Growth (%)
Basilan	98,893	110,455	11.7
Lanao del Sur	102,476	131,981	28.8
Maguindanao	76,185	95,946	25.9
Sulu	90,685	109,666	20.9
Tawi-Tawi	80,692	123,225	52.7

Source: NSO, 2006 and 2009 Family Income and Expenditure Survey.

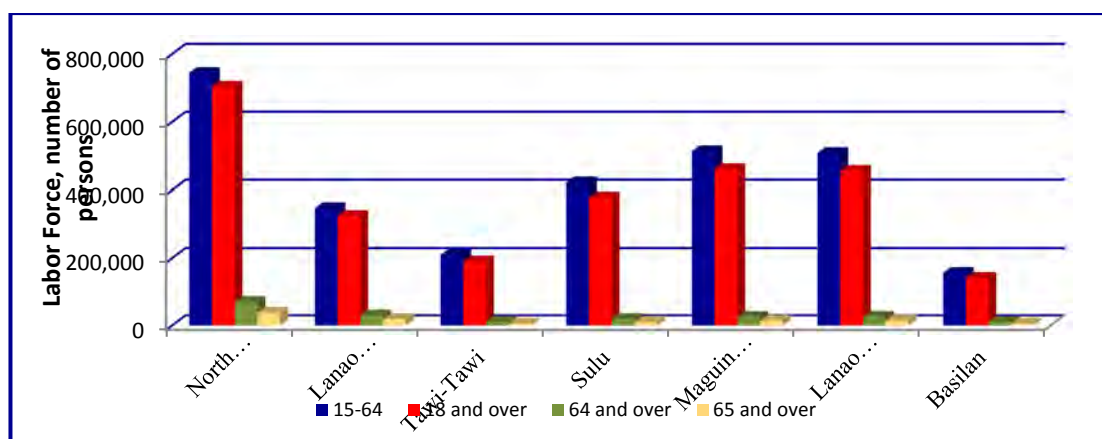
3.2.3 Labor force by age structure

Data on labor force, by age structure and province, in four major age groups, are presented in Table 3.12. In 2010, the labor force in the BCT (consisting mainly of the five provinces of Basilan, Lanao del Sur, Maguindanao, Sulu, and Tawi-Tawi) comprised those in the age groups 15-64 years old and 65 years old and over (based on PSA classification), with an aggregate number of 1,862,452 persons. This figure translates to a labor force participation rate of 57.2% in BCT for the same year. About 56.5% (1,051,657 persons) of the 2010 total labor force in the region was located in Lanao del Sur and Maguindanao. In the provinces of Lanao del Norte and North Cotabato, where the expansion areas of BCT are located, the labor force was estimated at 366,574 and 782,512 persons, respectively. The numbers of persons in the labor force in 2010, according to the four age groups, by province, are shown in Figure 3.8.

Table 3.12 Labor Force by Age Structure and by Province in BCT and Other Provinces in Mindanao, 2010

Age group	ARMM	Basilan	Lanao del Sur	Maguindanao	Sulu	Tawi-Tawi	Lanao del Norte	North Cotabato
15-64	1,810,550	156,341	508,627	513,927	422,355	209,300	347,729	744,490
18 ≤	1,628,851	141,968	456,364	461,022	379,257	190,240	324,628	704,016
64 ≤	93,013	10,266	26,131	25,507	20,112	10,997	29,788	69,911
65 ≤	51,902	6,160	14,932	14,171	10,774	5,865	18,845	38,022

Source: Prepared by the PRIMEX Survey Team based on PSA, *2010 Census of Population and Housing*.



Source: Prepared by the PRIMEX Survey Team based on *LABSTAT Updates* (Vol. 16, No. 17), Bureau of Labor and Employment Statistics

Figure 3.8 Labor Force by Age Structure in the BCT and Other Provinces in Mindanao, 2010

In October 2014, the total labor force in the BCT (mainly in the five provinces) was reported at 2.377 million, for an increase of about 566,450 economically productive persons from 2010. This latest figure translated to a labor force participation rate of 56.9%. While the labor force has increased from 2010 to 2014, the labor force participation rate declined slightly by 0.3% from 57.2% to 56.9%. In Northern and Central Mindanao, where Lanao del Norte and North Cotabato are located, the labor force was recorded at 3.026 million in April 2014 and 2.757 million in October 2014, respectively. These figures translate to labor force participation rates of 70.6% in Northern Mindanao and 65% in Central Mindanao.

In recent years, PSA started to include in the Labor Force Survey, employed children aged 5–14. Over the four-year period, 2010–2013, about 79,500 children aged 5–17 were employed in the BCT (Table 3.13). Although the annual trend declined slightly from 2010 to 2012, it went up again in 2013, suggesting that a bigger number of children were out of school during the period. In comparison, the magnitude of working children in neighboring Northern and Central Mindanao regions was much higher than in the BCT in the period under review.

Table 3.13 Working Children of Age 5–17 in BCT and Other Provinces in Mindanao, 2010–2013

Age of working children	ARMM				Northern Mindanao				Central Mindanao			
	2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
5–9	3	2	3	5	27	26	21	19	9	9	9	7
10–14	23	20	18	22	106	116	101	77	37	50	51	46
15–17	57	54	55	56	113	116	120	107	77	87	90	87
Total	93	76	66	83	246	258	222	203	123	146	150	140

Source: Prepared by the PRIMEX Survey Team based on PSA data.

3.3 Poverty Situation

3.3.1 General condition and nature of poverty

Poverty in the Philippines is usually measured in terms of poverty incidence, which is defined by PSA as “the proportion of families/individuals with per capita income/expenditure less than the per capita poverty threshold to the total number of families/individuals.”²⁹ Poverty threshold is defined as “the minimum income/expenditure required for a family/individual to meet the basic food and non-food

²⁹ PSA/NSCB. 1997 *Philippine Poverty Statistics*.

requirements.”³⁰

The general condition and nature of poverty in the BCT and in selected regions in Mindanao, where the expansion areas of BCT are located, in the period, 2009 and 2012 are shown in Table 3.14. Annual per capita poverty threshold in the main BCT areas of the current ARMM was PHP 20,517 in 2012, or 23% higher than the 2009 poverty threshold level of PHP 16,683. This means that about 271,355 families in the whole region lived below the poverty threshold, or an estimated 1.854 million of the regional population.

Table 3.14 Poverty Threshold and Incidence in BCT and Other Regions in Mindanao, 2009 and 2012

Poverty threshold (PHP)/Poverty incidence (%)	ARMM		Northern Mindanao		Central Mindanao	
	2009	2012	2009	2012	2009	2012
Annual per capita poverty threshold	16,683	20,517	16,878	19,335	16,405	18,737
Poverty incidence among families	39.9	48.7	33.3	32.8	30.8	37.1
Poverty incidence in population	47.4	55.8	40.1	39.5	38.3	44.7
Poor families	212,494	271,355	298,472	320,113	274,043	366,169
Poor population	1,507,868	1,854,188	1,661,208	1,759,570	1,511,050	1,895,820

Source: Prepared by the PRIMEX Survey Team based on PSA data.

In the neighboring Northern Mindanao and Central Mindanao regions, annual per poverty thresholds were estimated at PHP 19,335 and PHP 18,737, respectively, in 2012. These figures were equivalent to poverty incidence rates among families and the population of 32.8% and 39.5%, respectively, in Northern Mindanao and 37.1% and 44.7% in Central Mindanao, respectively. In these regions, the corresponding number of families and population who lived below poverty thresholds were 320,113 families and 1,759,570 persons in Northern Mindanao and 366,169 families and 1,895,820 persons in Central Mindanao in 2012.

Food threshold³¹ is another measure of poverty used by the Government, particularly for identifying beneficiaries of health and nutrition programs. Annual per capita food threshold in the main BCT areas was PHP 11,725 in 2009 and PHP 14,747 in 2012.

3.3.2 Population and geographical distribution of people under poverty line

Overall, poverty incidence showed an increasing trend in all provinces, except Tawi-Tawi, which showed a general declining trend. In Maguindanao, poverty incidence had contrasting outcomes: the percentage of families living under the poverty threshold shrank from 46.4% in 2009 to 40.2% in 2012, but the percentage of population in the same poverty line swelled from 52.2% to 63.7% in the same period. The geographical distribution of families and persons under the poverty threshold in 2006, 2009, and 2012 is shown in Table 3.15 and Figure 3.9.

In neighboring Lanao del Norte and North Cotabato, where the expansion areas of the BCT are located, the poverty threshold in 2012 was estimated at PHP 18,907 and PHP 18,340, respectively, with corresponding poverty incidence rates of 49.1% and 52.4%. The figures translate to an estimated 46,714

³⁰ Basic food requirements are currently based on 100% adequacy for the recommended energy and nutrient intake (RENI) for protein and energy equivalent to an average of 2000 kilocalories (kcal) per capita and 80% adequacy for other nutrients. On the other hand, basic non-food requirements, indirectly estimated by obtaining the ratio of food to total basic expenditures from a reference group of families, cover expenditures on clothing and footwear; housing; fuel, light, water; maintenance and minor repairs; rental of occupied dwelling units; medical care; education; transportation and communication; non-durable furnishings; household operations; and personal care and effects. Source: PSA/NSCB. *1997 Philippine Poverty Statistics*.

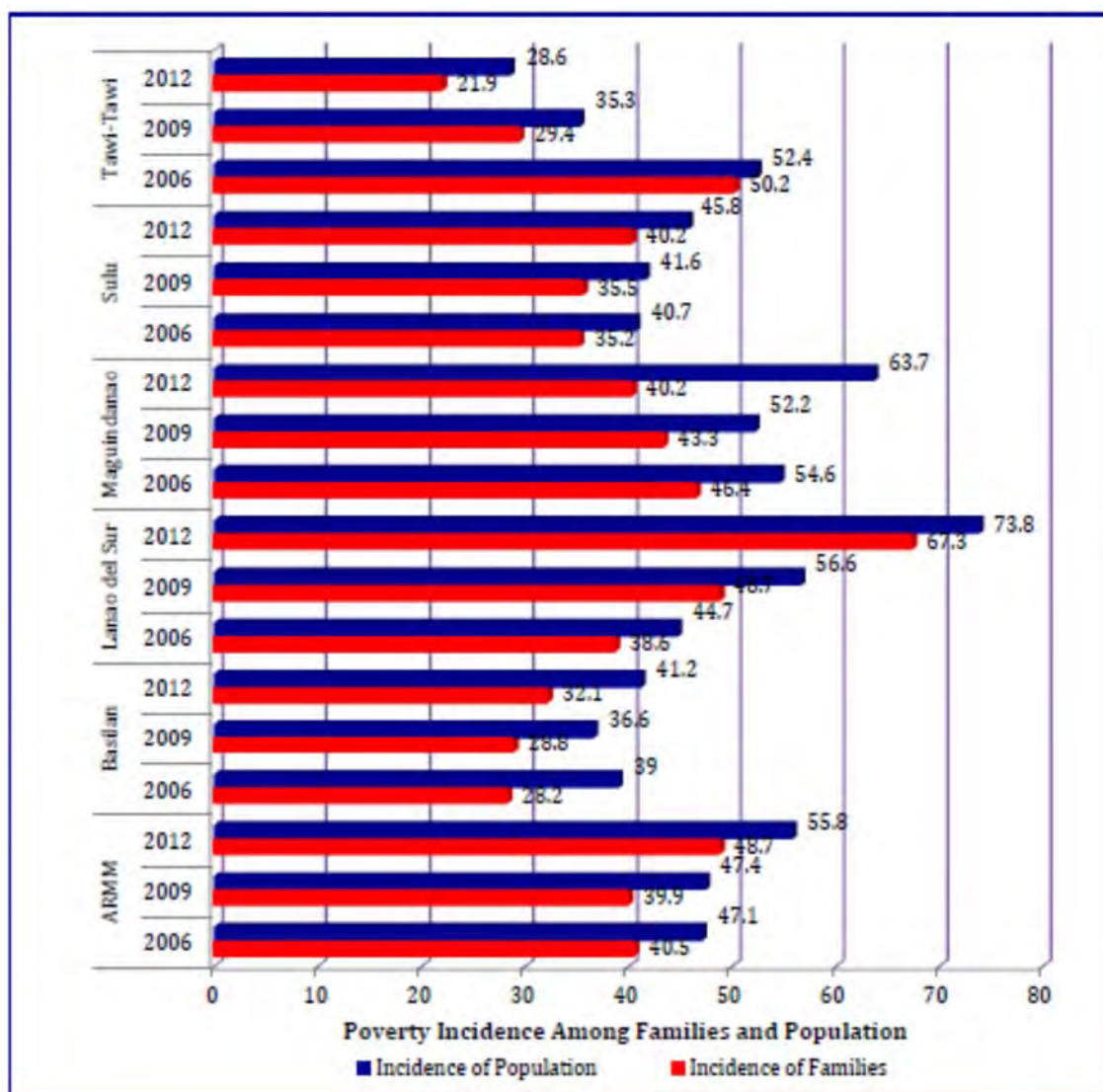
³¹ Food threshold is defined as the cost of the food required to satisfy nutritional requirements for economically necessary and socially desirable physical activities. The nutritional requirements are determined by the Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology (DOST). Currently, these are based on 100% adequacy for the recommended dietary allowances (RDAs) for protein and energy equivalent to an average of 2000 kcal per capita and 80% adequacy for the other nutrients. Source: PSA. 2003. *Notes on the Official Poverty Statistics in the Philippines*.

persons under the poverty threshold in the BCT barangays in North Cotabato.

Table 3.15 Number of Families and Population under Poverty Threshold in BCT and Other Regions in Mindanao, 2006, 2009, and 2012

Region/Province	No. of families			Population		
	2006	2009	2012	2006	2009	2012
Basilan	14,137	14,781	16,832	108,642	94,660	110,711
Lanao del Sur	51,408	68,770	100,946	367,996	501,993	687,138
Maguindanao	70,665	67,899	87,800	471,762	460,209	571,223
Sulu	39,478	42,530	51,278	280,457	299,785	358,144
Tawi-Tawi	30,146	18,514	14,499	221,612	151,220	126,971
ARMM	205,834	212,494	271,355	1,450,467	1,507,868	1,854,188
Lanao del Norte	57,196	74,184	83,640	335,571	411,901	443,271
North Cotabato	60,532	61,568	131,744	331,158	361,554	708,062
Cotabato City	12,206	15,754	21,555	77,779	94,347	130,477
Isabela City	5,940	4,226	3,429	35,302	25,950	21,518

Source: PSA data.



Source: PSA statistics and *Provincial Profiles*.

Figure 3.9 Geographical Distribution of Poverty Incidence in BCT, 2006, 2009, and 2012

Using NSCB's small area poverty estimates, 83 (or 63%) of the 132 cities and municipalities (including the municipalities of North Cotabato) had poverty incidence rates that were below or equal to the regional poverty incidence of 39.9% in 2009. The bulk of these LGUs were in Lanao del Sur (16 of 40 LGUs), Sulu (18 of 19 LGUs), and Maguindanao (35 of 36 LGUs). Among the basic sectors, poverty incidence was highest among children (at 64.1%) in 2012, which was 8% higher than the 56.1% poverty incidence in 2009, particularly in the current configuration of the main BCT areas. This was followed by farmers at 58.0%, women at 55.0%, self-employed at 51.7%, and employed persons at 48.9% in the same year (Table 3.16).

Table 3.16 Poverty Incidence in Basic Sectors in BCT and Other Regions in Mindanao, 2009 and 2012

Poverty Incidence in Basic Sectors	ARMM		Northern Mindanao		Central Mindanao	
	2009	2012	2009	2012	2009	2012
Women	47.1	55.0	38.9	39.9	37.4	43.3
Youth	40.4	48.8	35.8	35.0	32.9	37.9
Children	56.1	64.1	49.3	50.6	46.7	54.1
Senior citizens	32.6	36.8	29.5	26.2	24.4	32.1
Individuals in urban areas	28.5	40.1	18.7	24.8	28.5	33.1
Migrant and formal sector workers	24.4	36.2	27.4	28.7	27.5	33.8
Farmers	48.8	58.0	54.9	55.1	39.7	47.9
Fishermen	40.3	42.9	b	b	b	b
Self-employed and unpaid family workers	44.4	51.7	45.9	44.5	38.4	41.5
Employed persons	41.7	48.9	36.8	35.9	32.4	37.4

Source: PSA data.

3.3.3 Gini coefficient

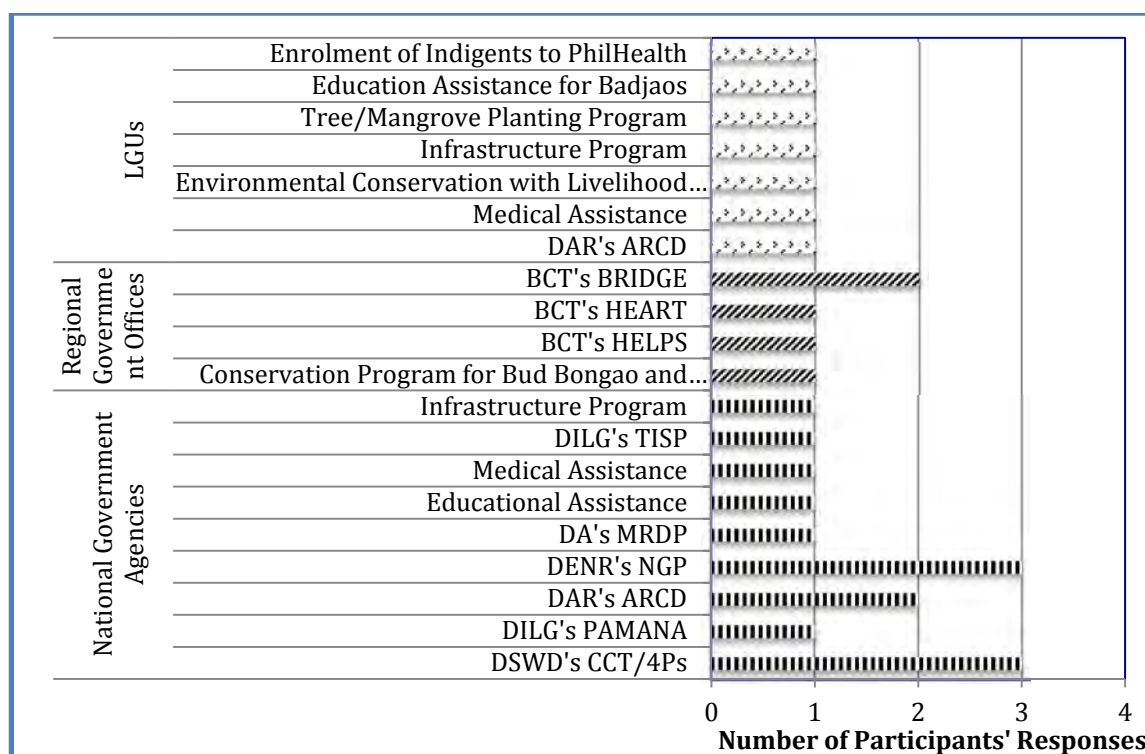
No data on the Gini coefficient were readily available for the BCT. Even at the national level, the latest Gini coefficient estimate was published in 2009. In a technical note on other measures of poverty, PSA presented a list of the Top 10 provinces with lowest and highest Gini coefficient estimates, indicating the level of inequality of income distribution among the provinces in the Philippines in 2000.³² Of the Top 10 provinces with the lowest Gini coefficients, Sulu, Lanao del Sur, and Basilan were ranked the Top 3, with estimates of 0.2444, 0.2709, and 0.2826, respectively. On the other hand, the neighboring province of Lanao del Norte, with a Gini coefficient of 0.5109, was ranked No. 4 of the Top 10 provinces with highest Gini coefficients.

However, based on existing data, the level of inequality of income distribution in a province is not necessarily indicative of its poverty incidence level. One example is the province of Sulu, with the lowest Gini coefficient in 2009, indicating a low level of inequality of income distribution, but it was also ranked 1 of the 10 poorest provinces in the same year. Similarly, the province of Lanao del Sur was ranked 7th of the 10 poorest provinces despite its No. 2 ranking in the list with lowest Gini coefficients.

3.3.4 Government policy or remedial measures for poverty reduction

The poverty reduction program that was most frequently cited by key stakeholders in the BCT during the KII and FGD sessions is the Pantawid Pamilya Program or the Conditional Cash Transfer (CCT) Program (Figure 3.10). This is a national program managed by the Department of Social Welfare and Development (DSWD) and implemented by the DSWD regional offices in partnership with LGUs. Each LGU has its own programs, projects, and activities to address poverty. In some LGUs, the programs are linked with the CCT Program for better results. National government support is also a major contributor to LGUs' poverty reduction projects, particularly those implemented under the Grassroots Participatory Planning and Budgeting (GPPB) Program.

³² PSA/NSCB. Poverty Statistics - Highlights: Other Measures of Poverty, Gini Coefficient. http://www.nscb.gov.ph/poverty/2000/ot_gini.asp. Accessed February 2015.



Source: Results of FGDs at the provincial level and with women groups.

Figure 3.10 Major Poverty Alleviation Programs in BCT

Other poverty reduction programs that are being implemented by national, regional, and local government agencies in the five BCT core provinces, which are perceived by stakeholders to be significant in addressing rural poverty, include the following.

National government programs:

- National Greening Program (NGP) of DENR;
- Agrarian Reform Communities Development Program (ARCDP) of the Department of Agrarian Reform (DAR);
- Payapa at Masaganang Pamayanan (PAMANA)/Program for Peace and Development and Transition Investment Support Program (TISP) of the Department of the Interior and Local Government (DILG);
- Mindanao Rural Development Program (MRDP) of DA; and
- Other programs on rural infrastructure, education, and medical assistance.

BCT/regional government programs:

- BRIDGE (Bangsamoro Regional Inclusive Development Growth and Empowerment);
- HELPS (Health, Education, Livelihood, Peace/Security and Synergy);
- HEART (Humanitarian Emergency Action and Response Team);
- Conservation of Bud Bungao and Bud Kabugan in Tawi-Tawi.

Local government programs:

- Medical assistance;
- Environmental conservation with livelihood development;
- Rural infrastructure;
- Mangrove tree planting;
- Education assistance for Badjaos;
- Enrollment of indigents with PhilHealth insurance; and
- LGUs' involvement in ARCDP project of DAR.

Among the women’s groups who participated in the FGD sessions, the CCT/4Ps program of DSWD was highly recognized for supporting poor communities and families.

3.4 Education

3.4.1 Literacy rate

The simple literacy rate statistics from PSA/National Statistics Office (NSO) for the main BCT areas and other regions in Mindanao in 1990 and 2000 are shown in Table 3.17. The lowest literacy rate was recorded in the province of Sulu at 58.29% in 2000, followed by Maguindanao (66.27%), Basilan (72.23%), and Tawi-Tawi (73.48%). Lanao del Sur, Lanao del Norte, and North Cotabato recorded functional literacy rates of 80.12%, 85.04%, and 86.69%, respectively. It is quite disturbing to note that literacy rate in the main BCT provinces, except Basilan, declined from 1990 to 2000.

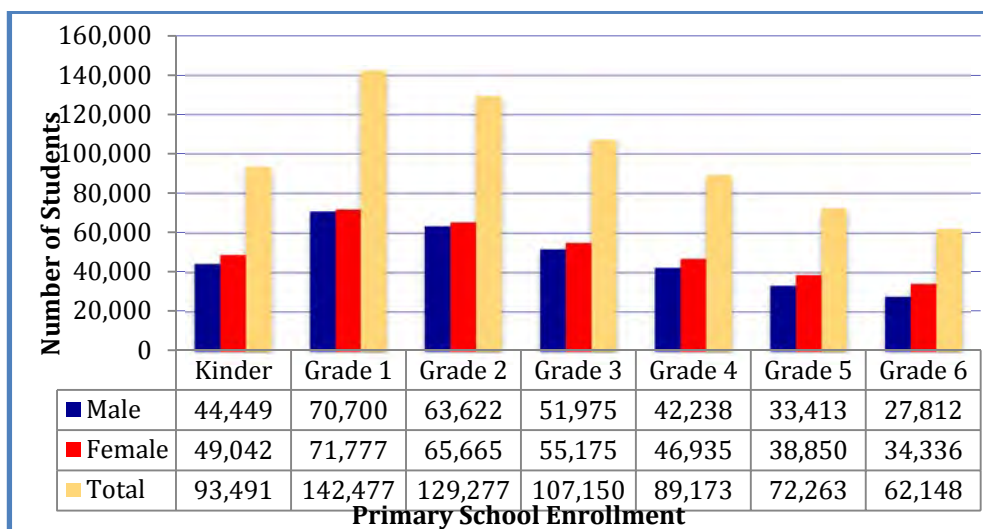
Table 3.17 Literacy in BCT and Other Regions in Mindanao, 1990 and 2000

Provinces	Literacy (%)	
	1990	2000
Basilan	66.00	72.23
Sulu	59.77	58.29
Tawi-Tawi	79.79	73.48
Lanao del Sur	82.53	80.12
Maguindanao	69.28	66.27
Lanao del Norte	90.88	85.04
North Cotabato	88.80	86.69

Source: PSA data.

3.4.2 Enrollment rates at primary and secondary schools

As shown in Figure 3.11, estimated 695,979 students consisting of 333,992 boys and 359,653 girls were enrolled in primary school in the five BCT provinces in schoolyear (SY) 2013–2014. The same bar chart shows a declining trend in the number of students from Grade 1 to Grade 6.



Source: Department of Education database.

Figure 3.11 Primary School Enrollment in BCT, SY 2013-2014

The total number of enrollees in primary school represents 66% of the primary school age children, 5–14 years old, as of the 2010 census. The enrollees were almost equally divided among male and female students at 333,992 (48%) and 359,653 (53%), respectively (Table 3.18). Tables 3.19A through 3.19D represent primary and secondary school enrollment in the BCT.

Table 3.18 Primary School Enrollment in BCT by Gender and Province, SY 2013–2014

Province	Enrollment		
	Male	Female	Total
BCT/ARMM	333,992	359,653	695,979
Basilan	28,549	29,066	57,615
Sulu	56,332	58,663	114,995
Tawi	33,994	34,021	69,894
Lanao del Sur	119,722	140,044	260,091
Maguindanao	95,395	97,859	193,384

Source: Basic Education Information System (BEIS) database.

Table 3.19A Primary School Enrollment in Isabela City and Cotabato City

Index	Isabela City			Cotabato City		
	Total	Male	Female	Total	Male	Female
Ages 5–14	23,401	12,045	11,356	65,414	32,936	32,478
Enrollment	16,318	8,197	8,212	32,821	16,354	16,467
Enrollment rate (%)	69.73	68.05	72.31	50.17	49.65	50.70

Notes: The number of 5–14 children from 2010 population census data (no population census data for 2013); primary and secondary school enrollment for SY 2013–2014 based on Department of Education data.

Table 3.19B Secondary School Enrollment in Isabela City and Cotabato City

Index	Isabela City			Cotabato City		
	Total	Male	Female	Total	Male	Female
Ages 15–19	11,028	5,326	5,702	32,261	15,379	16,882
Enrollment	8,226	3,812	4,414	13,355	5,945	7,410
Enrollment rate (%)	74.59	71.57	77.41	41.40	38.66	43.89

Table 3.19C Primary School Enrollment in BCT by Gender and Province

Index	Basilan (w/ Lamitan City)			Lanao Sur (w/ Marawi City)			Maguindanao		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Ages 5–14	88,161	45,177	42,984	277,252	136,057	141,195	286,775	149,267	137,508
Enrollment	49,826	24,693	25,133	220,871	101,877	118,994	173,280	85,506	87,774
Enrollment rate (%)	56.52	54.66	58.47	79.66	74.88	84.28	60.42	57.28	63.83

Index	Sulu			Tawi-Tawi		
	Total	Male	Female	Total	Male	Female
Ages 5–14	206,139	102,315	103,824	100,902	51,398	49,504
Enrollment	100,244	49,250	50,994	58,267	28,434	29,833
Enrollment rate (%)	48.63	48.14	49.12	57.75	55.32	60.26

Table 3.19D Secondary School Enrollment in BCT by Gender and Province

Index	Basilan (w/ Lamitan City)			Lanao Sur (w/ Marawi City)			Maguindanao		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Ages 15–19	32,912	16,119	16,793	107,028	50,901	56,127	106,535	54,515	52,020
Enrollment	9,906	4,104	5,802	82,800	33,626	49,174	36,934	16,439	20,495
Enrollment rate (%)	30.10	25.46	34.55	77.36	66.06	87.61	34.67	30.16	39.40

Index	Sulu			Tawi-Tawi		
	Total	Male	Female	Total	Male	Female
Ages 15–19	89,464	43,613	45,851	39,905	20,027	19,878
Enrollment	20,917	8,664	12,253	10,848	5,038	5,810
Enrollment rate (%)	23.38	19.87	26.72	27.18	25.16	29.23

Among the BCT provinces, Lanao del Sur accounted for 37% of the total primary school enrollees, followed by Maguindanao (28%), Sulu (16%), Tawi-Tawi (10%), and Basilan (8%). At the secondary school level, total enrollment in SY 2013-2014 was 162,266 students (Table 3.20). Of that total, female students comprised 58% (94,011) and male students, 42% (68,255). The total enrollment in SY 2013-

2014 represented 39% of the 15-19 year old population of 419,133 in the BCT as of 2010 census. Lanao del Sur again recorded the highest number of enrollees among the BCT provinces with over half (51%) of the total enrollees in SY 2013-2014, followed by Maguindanao (23%), Sulu (13%), Tawi-Tawi (7%), and Basilan (6%).

Table 3.20 Secondary School Enrollment in BCT by Gender and Province, SY 2013–2014

Province	Number of Enrollees		
	Male	Female	Total
	68,255	94,011	162,266
Basilan	4,104	5,802	9,906
Sulu	8,664	12,253	20,917
Tawi-Tawi	5,038	5,810	10,848
Lanao Sur	33,626	49,174	82,800
Maguindanao	16,823	20,972	37,795

Source: BEIS database.

3.5 Social Infrastructure

3.5.1 Hospitals and clinics

The most common health facilities available in the BCT are the rural health units (RHUs) in the municipalities and the barangay health centers (BHCs) in the barangays (Table 3.21). In Basilan (excluding Isabela City), there are 10 RHUs in the 12 municipalities/city and 75 BHCs serving the 210 barangays. Public and private hospitals, as well as provincial hospitals, are available in the province, particularly in Lamitan City and Isabela City. In Sulu, there are 19 RHUs in the 19 municipalities and 43 BHCs serving the 410 barangays. In addition, the province has eight hospitals with a total capacity of 380 beds. Isabela City in Basilan is reported to have four hospitals with a total capacity of 185 beds and operates 31 BHCs for the 45 barangays.

Tawi-Tawi has nine RHUs to serve the 11 municipal LGUs. There are also 39 BHSs serving the 203 barangays. It has seven hospitals, of which five are government-owned and two are privately-owned, with a reported total capacity of 130 beds. In Lanao del Sur, there are 26 RHUs and 63 BHSs for the 1,159 barangays. There are also six government hospitals with a combined total capacity of 295 beds. In addition, there are 10 private hospitals, but there is no information on their bed capacity.

Maguindanao has 23 operational RHUs in the 36 municipalities, 194 BHSs for the 508 barangays, and six hospitals. In addition, the Regional Hospital located in Cotabato City provides services to the people of Maguindanao and other neighboring provinces including North Cotabato and Lanao del Sur.

Table 3.21 Health Facilities in BCT by Province/City

Province/City	RHUs	BHCs	Hospitals
Basilan	10	75	1. Provincial District Hospital* (25 beds) 2. Torres Hospital (private, 21 beds)
Sulu	19	43	1. Sulu Provincial Hospital* (100 beds) 2. Lutuk Hospital (65 beds) 3. Parang Hospital (53 beds) 4. Siasi Hospital (69 beds) 5. Pangutaran Hospital (41 beds) 6. Panamao Hospital (no data) 7. Tapul Hospital (52 beds) 8. Tongil Hospital (no data)
Tawi-tawi	11	39	Five (5) Government Hospitals (one Provincial District Hospital in Bongao* and other hospitals in Languyan, Mapun, Sapa-sapa, Sitangkai) Two (2) Private Hospitals located in Bongao with 130 beds in total
Lanao del Sur	26	63	Six (6) Government Hospitals: 1. Amai Pakpak General Hospital* (100 beds) 2. Tamparan District Hospital* (25 beds) 3. Balindong Municipal Hospital (10 beds)

Province/City	RHUs	BHCs	Hospitals
			4. Dr. Serapio B. Montaner Memorial Hospital (25 beds) 5. Unayan Municipal Hospital (10 beds) 6. Wao District Hospital (25 beds) Ten (10) Private Hospitals
Maguindanao†	23	194	1. Buluan District Hospital* 2. Dinaig Municipal Hospital 3. Maguindanao Provincial Hospital 4. Iranon District Hospital 5. Datu Blah Sinsuat District Hospital 6. South Upi Municipal Hospital 7. Regional Hospital*‡
Isabela City (Basilan)	NA	31	1. Basilan General Hospital* (100 beds) 2. JS Alano Hospital (private, 25 beds) 3. Basilan Community Hospital (private, 35 beds) 4. Infant Hospital (private, 25 beds)

*Top referral hospitals in the respective provinces; †Catabato City included in this table though not included in BCT; ‡located at Catabato City

Sources: Prepared by the PRIMEX Survey Team based on data from the Basilan Comprehensive Development Plan-Executive Legislative Agenda, 2011–2013, Lanao del Sur PDPFP, 2009–2014; Sulu PDPFP, 2008–2013; Tawi-Tawi PDPFP, 2008–2013; Isabel City SEP, 2013.

3.5.2 Schools

Data from DepEd-ARMM indicate the availability of 12,436 primary school buildings in the region, which are distributed among the five provinces as shown in Table 3.22. On the other hand, there are 2,687 secondary school buildings in the region. However, there is no breakdown as to the number of classrooms available to school children and students. In addition, there are about 1,629 day care centers in the region.

Table 3.22 Number and Geographical Distribution of Primary and Secondary Schools and Daycare Centers in BCT

Province	Primary school buildings	Secondary school buildings	Daycare centers
Total	12,436	2,687	1,629
Basilan	1,169	211	136
Sulu	2,051	325	162
Tawi-Tawi	1,467	225	173
Lanao Sur	4,388	1,250	494
Maguindanao	3,361	676	620
Isabela City			44
Cotabato City	No data	No data	No data
Lanao de Norte	No data	No data	No data
North Cotabato	No data	No data	No data

Source: Prepared by the PRIMEX Survey Team based on BEIS database.

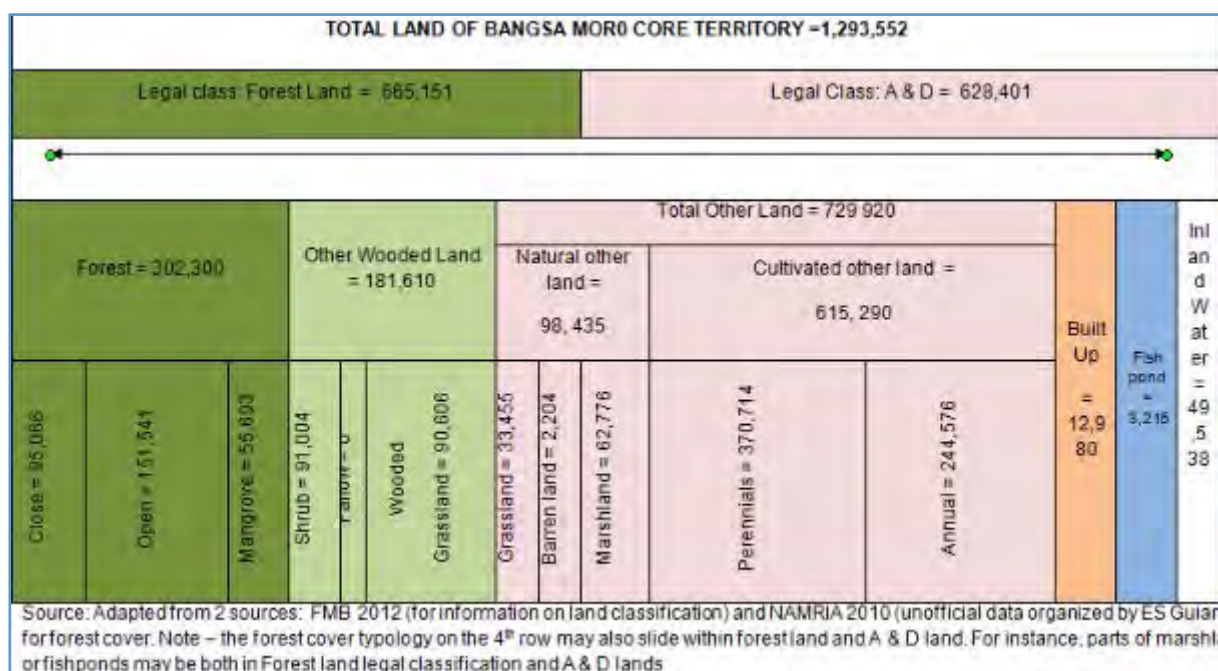
3.6 Land Use and Ownership Situation

3.6.1 Land area by land use

Figure 3.12 shows the breakdown of the BCT land area under forest land and A&D land into more specific land use types. The uses of forestland are (i) strict forest use/forest reserve; (ii) other wooded land/timberland; and (iii) national parks. In contrast, A&D land includes: (i) built-up areas; (ii) cultivated lands; (iii) other natural lands; and (iv) fishponds. In addition, inland waters also occupy certain land areas, but cannot be easily classified under either of the two main land classifications. Some of the land use types (i.e., fishponds, marshlands) may slide from forestland to A&D land. Cultivated land, estimated at 615,290 ha, comprises 47.6% of the total regional land area. Closed, open, and mangrove areas account for 23.4% (302,300 ha) of the total. The other land use types including built-

up areas covered the remaining 29.0% of the total land area of BCT in 2013.

Under the forestland classification, the land area and geographical distribution of the different forest land use types are presented in Table 3.23. Lanao del Sur and Maguindanao have the largest timberland areas, estimated at 240,628 ha and 152,050 ha in 2013, respectively. In comparison, the Basilan has the smallest timberland at 18,153 ha. However, Basilan maintains a relatively bigger forest reserve than Lanao del Sur and Maguindanao, while Sulu and Tawi-Tawi have no more forest reserves. Maguindanao has the largest national parks, including KBAs and PAs, estimated at 30,048 ha. About 15% (100,626 ha) of the classified forestland remains unclassified as to their proper land uses. These lands are largely concentrated in the provinces of Sulu and Tawi-Tawi and are located in the small islands and islets in these two provinces. There are also fishponds in the three island provinces of Basilan (2,049 ha), Sulu (958 ha), and Tawi-Tawi (385 ha), which make the region the leading producer of seaweeds in the Philippines.



Source: UNDP (2014), *Bangsamoro Core Territory Forests and Watershed Theme Report*

Figure 3.12 Land Area in BCT by Land Use Type, 2013

Table 3.23 Land Area and Geographical Distribution of Forestland Use Types in BCT, 2013

Province	Forest land (ha)	Classified forest land (ha)				Unclassified forest land (ha)
		Forest reserve	Timberland	National parks/GRBS*	Fishpond	
Basilan	47,149	18,397	18,153	2,597	2,049	5,953
Lanao del Sur	254,154	11,844	240,628	1,682	0	0
Maguindanao	198,138	12,515	152,050	30,048	0	3,525
Sulu	112,353	0	44,898	213	958	66,284
Tawi-Tawi	53,357	0	28,108	0	385	24,864
Total	665,151	42,756	483,837	34,540	3,392	100,626

*Game Refuge and Birds Sanctuary

Source: Prepared by the PRIMEX Survey Team based on 2013 *Philippine Forestry Statistics*, DENR-FMB.

3.6.2 Land area by land ownership

Data on land area by land ownership type are available only for privately owned farms in the BCT, Lanao del Norte, and North Cotabato. In these areas, the expansion areas of the BCT are located as presented in Table 3.24. In general, the number of farms increased from 142,430 in 1975 to 248,528 in 2002, particularly in Basilan and Sulu. However, the number of farms in Lanao del Sur, Maguindanao,

and Tawi-Tawi decreased in 2002 compared to 1991. In Lanao del Norte and North Cotabato, the trend of increase in land ownership continued from 1975 to 2002.

Farms in the BCT also increased from 438,833 ha in 1975 to 533,410 ha in 2002. A similar trend occurred in Basilan. However, in the other four provinces of BCT, the total area of farms decreased over time. The area of farms shrank by over 5,000 ha in Lanao del Sur, Maguindanao, and Sulu in 2002 compared to 1991. In Tawi-Tawi, the area of farms decreased by 35.4% from 1975 to 1991 and then increased by 3.4% from 1991 to 2002. At the regional level, the change in farm area between 1991 and 2002 showed an increase of 55,472 ha (Table 3.25). This increase may be largely due to the shift in agricultural land use towards cultivation of permanent crops (e.g., rubber and oil palm plantations) and partly to the slight increase in farm area utilized for arable land and permanent meadows and pastures in 2002. The significant increase in the area of land used for permanent crops could be derived from other lands, which recorded a decline in land area by 1,352 ha in 2003 and possibly from the conversion of open forestland into the particular land use.

Table 3.24 Number and Farm Areas in BCT and Other Provinces in Mindanao, 1975–2002

Province	Number of farms				Area of farms (ha)			
	1975	1980	1991	2002	1975	1980	1991	2002
Basilan	7,894	12,006	16,137	25,344	42,520	60,459	75,374	82,480
Lanao del Sur	56,242	50,701	56,438	54,813	152,254	151,892	149,660	140,111
Maguindanao	43,319	56,317	98,223	95,089	134,599	174,789	230,371	221,174
Sulu	23,491	25,389	38,769	49,382	64,132	95,384	68,709	59,501
Tawi-Tawi	11,484	7,627	14,038	13,890	45,128	31,500	29,157	30,144
BCT Total	142,430	152,040	223,605	248,528	438,833	514,124	553,301	533,410
Lanao del Norte	32,885	39,260	60,445	64,586	104,453	132,802	148,948	174,332
North Cotabato	59,447	72,906	112,992	126,731	170,711	255,149	305,231	275,536
Total	234,762	264,206	397,042	439,845	713,997	902,075	1,007,480	983,278

Source: Prepared by the PRIMEX Survey Team based on data from *Agriculture and Fisheries: Philippine Yearbook 2011*, DA/BAS.

Table 3.25 Change in Farm Areas by Land Use in BCT, 1991 and 2002

Farmland use	1991 (ha)	2002 (ha)	(+/-)
Total farm area	477,938	533,410	+55,472
Arable land	324,187	328,649	+4,462
Land under permanent crops	150,304	235,761	+85,457
Land under permanent meadows and pastures	507	922	+415
All other lands	2,930	1,578	-1,352

Source: *ibid.*

3.7 Water Rights Situation

3.7.1 Water rights for drinking water

There are no complete and updated data on water rights for potable/drinking water in the BCT, but some of the existing plans of the LGUs provide limited information on water right holders and the type and extent of their services, as summarized in Table 3.26. In the island province of Basilan, local water districts are reported to be providing Level III (individual household connection) water supply to the cities of Isabela and Lamitan and the municipality of Maluso. In 2012, about 66.64% of the total households of 84,506 had access to safe drinking water. Of this, 22.40% are connected to Level III water supply system, while 26.11% get water from Level II (communal faucets) and 18.14% from Level I (point source). The rest of the households fetch water from unsafe sources (i.e., open and shallow wells). Ongoing potable water supply projects are reportedly being undertaken in the municipalities of Tuburan, Lantawan, Sumisip, Tipo-Tipo, and Ungkaya Pukan.

Table 3.26 Indicative Water Rights Holders for Drinking Water in BCT

Province	Water Right Holders	Type and Extent of Services
Basilan	Local water district	Level III water supply to the cities of Isabela and Lamitan and the municipality of Maluso
Lanao del Sur	Marawi City Water District	Level III water supply to city residents only; in 2005, only 28 of the city's 96 barangays, mostly in urban areas, were fully served by the water district.
Maguindanao	No data	
Sulu	Jolo Mainland Water District	Level III water supply to the municipality of Jolo and some barangays of the municipalities of Patikul and Indanan.
Tawi-Tawi	Bongao Water District	Level III water supply to the capital (Bongao), but the supply has been insufficient for residents.

In Lanao del Sur, a local water district provides Level III water supply to some city residents. Most of the municipalities and barangays have relied on Lake Lanao and natural springs, as well as the government-sponsored spring development and deep/shallow tubewell construction projects.

In Sulu, a local water district provides Level III water supply to households in the municipality of Jolo and some barangays in other two municipalities. Based on the 2000 census, about 26% of households had access to potable water. Of this number, the local water district served 14%, while another 12% had access to a Level II water supply system. The other households drew water from dug wells and other sources. The water supply system in Tawi-Tawi is the same as that in other provinces, where Level III water supply is limited to residents of the capital municipality (Bongao), and its present supply is insufficient for city residents.

3.7.2 Water rights for irrigation water

There are three types of irrigation systems in the BCT, which have been constructed by, or with assistance of, the National Irrigation Administration (NIA), as shown in Tables 3.27 through 3.29, covering a total service area of 35,279.97 ha. Of this total, 95 existing communal irrigation systems (CISs) account for 34.6% (12,315 ha), while seven national irrigation systems (NISs) comprise 65% (22,956.97 ha). The seven pump irrigation systems (PISs) comprise a mere 0.31% (108 ha) of total. As of December 2013, the NISs have operated at 70.3% of the firmed-up service area (FUSA) provided with irrigation water. In the CISs and PISs, operational coverage was quite low at 34.0% and 29.6% in the same year. The devolution of CIS management from NIA to the LGUs, based on the Local Government Act of 1997, has resulted in poor operation and maintenance (O&M) due to lack of technical and financial capacity of LGUs.

Table 3.27 Existing Communal Irrigation Systems in BCT, 2013

Province/Municipality	Number of CISs	Total service area (ha)	Firmed-up service area (FUSA)			
			Total FUSA (ha)	Operational FUSA (ha)	Non-operational FUSA (ha)	Operational FUSA (%)
Existing ARMM Areas	87	12,215	12,215	4,151	8,064	33.98
Basilan	3	145	145	84	61	57.99
Lanao del Sur	30	5,970	5,970	1,752	4,218	29.35
Maguindanao	36	5,454	5,454	2,001	3,453	36.69
Sulu	7	435	435	236	199	54.25
Tawi-Tawi	11	211	211	78	133	36.97
Expansion Areas	8	108	108	22	86	20.37
Baloi, Lanao del Norte	1	6	6	1	5	16.67
Munai, Lanao del Norte	4	61	61	21	40	34.43
Tangkal, Lanao del Norte	2	31	31	0	31	100.00
Pigkawayan, North Cotabato	1	10	10	0	10	100.00
Total	95	12,323	12,323	4,173	8,150	33.86

Source: Prepared by the PRIMEX Survey Team based on NIA database as of December 2013.

Table 3.28 Existing National Irrigation Systems in BCT, 2013

Province/Municipality	No. of PIS	Total service area (ha)	Firmed-up service area (FUSA)			
			Total FUSA (ha)	Operational FUSA (ha)	Non-operational FUSA (ha)	Operational FUSA (%)
Existing ARMM Areas	7	22,956.97	22,459.72	15,788.09	7,166.63	70.30
Lanao del Sur	3	6,275.00	6,275.00	2,885.00	3,865.00	38.41
Maguindanao	4	16,681.97	16,184.72	12,903.09	3,301.63	79.60

Source: *ibid.*

Table 3.29 Existing Pump Irrigation Systems (PIS) in BCT, 2013

Province/Municipality	No. of PIS	Total service area (ha)	Firmed-up service area (FUSA)			
			Total FUSA (ha)	Operational FUSA (ha)	Non-operational FUSA (ha)	Operational FUSA (%)
Expansion areas	7	108	108	32	76	29.63
Baloi, Lanao del Norte	1	6	6	1	5	16.67
Munai, Lanao del Norte	5	92	92	21	71	22.83
Pigkawayan, North Cotabato	1	10	10	10	0	100.00

Source: *ibid.*

3.8 Heritage Sites and Tourism

3.8.1 Types, locations, and characteristics of heritage sites

Among the acknowledged heritage sites in the BCT area are the following:

- **House on stilts** or the typical fishermen's village of Sama and Tausugs in the municipality of Sapa-Sapa in Tawi-Tawi.
- **Sheikh Makdum Mosque**, a poignant reminder of the very beginnings of Islam in the Philippines, declared as a National Historical Landmark by virtue of House Bill No.99, which recognizes the contribution of Islam to the development of culture and civilization in the country;
- **Torogan**, the ancestral house of upper-class Maranao in the Lanao region of Mindanao. It is the dwelling place of the *datu* (chieftain) along with his wives and children. No house should be larger than the Torogan of the Datu within the sultanate, for this signifies rank, prestige, and wealth.

3.8.2 Tourism/ecotourism

(1) Area and location of tourist sites

Various tourist sites, both natural and man-made, are found in the BCT as presented in Table 3.30. The sites are in various degrees of development and potential, particularly for community-based tourism.

Table 3.30 Tourist Sites in BCT

Location	Tourist sites
Basilan	Balagtas Falls, Malawani Island; Balas Beach, Lamitan; Block 35 Falls, Menzi Plantation; Bulingan Falls, Lamitan; Kumalarang Waterfalls, Maluso; Malamaui Island; Palm Beach, Lamitan; Tabiawan and Busay Waterfalls, Malamaui Island; White Beach, Malamaw Island
Lanao del Sur	Agus River, Marawi City; Angoyao Hills; Bagang Beach, Marawi City; Barurao Springs, Balabagan; IgaBai Waterfalls, Balabagan; Islets Balindong, Tugaya, B. Kalawi, and Binidayan in Lake Lanao; Kanapnapan Falls, Marawi City; Lake Dapao, Pualas; Sacred Mountain National Park, Marawi City; Signal Hill, Arumpac Hill, and Mt. Mupo, Marawi City; Sumpitan Falls, Balindong; The Sleeping Lady
Maguindanao	Barurao Springs, Balabagan; Blue Lagoon (Margues Lagoon), Datu Odin Sinsuat; Bongo Diving Spot, Parang; Hot Springs, Benolen, Datu Odin Sinsuat; IgaBai

Location	Tourist sites
	Waterfalls, Balabagan; Kanapnapan Falls, Marogong; Kiga Falls, Sapalan Falls, and Tubuan Falls, North Upi; Lake Balut, Sultan Kudarat; Lake Dapao, Pualas; Limpongo Hot Springs, Shariff Aguak; Mabul Beach, Malabang; Maputi na Lupa, Masiu; Mt. Magaturing, Butig; Punta Beach, Parang; Sapalan Waterfalls and Hot Springs, Sapalan, Datu Odin Sinsuat; Sumpitan Falls, Balindong; Tumingay Lake, Sultan Kudarat
Sulu	Bangas Island, Panglima Tahil; Jikiri Cave, Patian Island, Pata; Kabingaan Island, Siasi; LahatLahat Island, Jolo; Lake Panamao, Talipao; Lake Seit, Talipao; Laminusa Island, Siasi; Maubuh Beach, Jolo; Mount Datu, Indanan; Mt. Bud Daho, Patikul; Mt. Bud Tumantangi, Jolo; Pala River, Talipao; Quezon Beach; Tandub Beach, Patikul; Tapaan Island, Pandami; Tara Island, Siasi
Tawi-Tawi	Biraddali Waterfalls, Languyan; Bolobok Cave, Bongao; Bongao Peak, Bongao; Gusong Reef, Cagayan de TawiTawi (Mapun); KabanKaban Natural Swimming Pool, Simunul; La Island Beach, La Island; La Island Beach, Tubig, Indangan; ManukMangkaw Floating Island; Marlboro Beach, Cagayan de TawiTawi (Mapun); Panampangan Island Beach, Sapasapa; Pearl Farm, Languyan; Salaug Island Beach, Sitangkai; Sangay Siapo Island, Simunul; Sibutu Natural Wildlife Sanctuary, Sibutu; Sikulan Island Beach, Sitangkai; Sukarno Beach, Simunul
Kabacan, North Cotabato	Pisan Caves natural attraction, Waterland resort, Pagdigosan resort, University of Southern Mindanao (USM) campus
Carmen, North Cotabato	Municipal Building, Carmen Garden Transport Terminal, Lilongan Cave, Sawmill Spring, Bentanga Cave, Bentangan Shrine, Malmar Lake
Pigkawayan, North Cotabato	Saljay Integrated Farm, Tigbawan Resort, Nating Hill Resort, Isla Vista Resort, Helen Orchid Farm, Rapurapu Falls, Kaguiringan Falls, Shrine of Virgin of Lourdes, Falls and Caves of PayongPayong
Isabela City, Basilan	Rizal Park, Chapel of Peace Religious at Hill Top, White Beach, Sumagdang Beach, Kumalarang Cave and Water Falls, Isawad Resort, rubber plantations
Lamitan City, Basilan	Datu Kalun Park, Lamitan Museum, Bulingan Falls, Maloong Falls, Calugusan Falls

The features of some of the above tourist sites are presented in Table 3.31. Figure 3.13 shows some of the tourist sites in the BCT.

Table 3.31 Features of Selected Tourist Sites in BCT by Province

Name of Spot	Main Features	Location*
Basilan		
Kalun's Park/Shrine	This park/shrine was purposely built as a tribute to a known Yakan wily and fearless leader Datu Kalun (a.k.a. Pedro Cuevas a native of Cavite). It is a favored spot for meetings, resting and town walk.	Lamitan C.
Museum of Lamitan	It serves as an information center for the development of Lamitan Municipality. It also showcases the colorful and highlights of the traditional Yakan festival called <i>Lamilamihan</i>	Lamitan C.
Malamaui Island	The gateway to Basilan. Here, the parola of the lighthouse guides ships and vintas to the Channel. Here can also be found the traditional final resting place of the nomad sea-faring Badjaos, Samals, Luans and Banguigui. Traditional final resting place of the nomad sea-faring Badjaos, Samals, Luans and Banguigui can also be found in this island. It also boasts of the only lake in the province with wild ducks.	Malamaui M.
Kumalarang Waterfall	This has a 14 m drop waterfall and a proposed site for hydroelectric plant. Picturesque natures preserve soon to be altered by industrial modernization; a time limited scenic opportunity.	
White Beach	A fine white sandy beach suitable for recreation, swimming, snorkeling, and fishing.	Malamaui M.
Palm Beach	A beach where most local frequently visit, about 5 km away from the town hall of Lamitan, offers a site suitable for snorkeling, sand bathing.	Lamitan C.
Block 35 Falls	Located at Menzi Plantation. This offers a picturesque magnificent wonder of nature. The sight is also ideal for spiritual upliftment.	
Balagtas Falls	The largest waterfall where the Basila Hydroelectric Plant is situated.	

Name of Spot	Main Features	Location*
Lanao del Sur		
Tomb of Jose Abad Santos	Tomb of a great Filipino whose love of the country offered himself to be sacrificed to the political power of the WW II. His courage and determination in facing the muzzles of deadly guns of the firing squad proved once more the Filipinos love for freedom from foreign domination.	Malabang M.
Japanese Fort	Now accommodates the Municipality's Philippine National Police Headquarters. The barracks is self-sustaining with potable crystal-clear spring water where local residents flock for their drinking water, have their bath and wash their clothes.	Malabang M.
Mabul Beach	It is a mile long glistening sandy beach being splashed upon by dashing dark blue seawater. The beach is perfect for fishing and sailing.	Malabang M.
Lake Lanao and its Twin Islets	The most breath-taking scene in the region noted for its lust countryside is the area fringing Lake Lanao.	Marawi C.
Lake Dapao	A picturesque body of clear water situated above a foggy range of rolling hills.	Pualas M.
The Sleeping Lady	Gazing toward the Southwest from the western side of Lake Lanao, one can behold a delicately formed sleeping lady out of the natural curvature of Lanao Sur's mountain ranges.	Lanao del Sur P.
Sumpitan Falls	It could be reached through a heavy rugged terrain about 3 km away from the National highway. The spot is composed of seven levels of falls ranging from 5 to 40 feet elevation with natural swimming pool.	Balindong M.
Century-Old Torogan	Old royal houses of hard wood with posts made up of whole tree-trunks. Torogans are usually dominated with artistically carved designs.	Marawi C.
Kanapnapan Falls	Located at the heartland of a 400 ha forest reservation dwarfs at its towering height of 400 ft. It rumbles river water at great gallop showering flora and fauna with vapors that also form cycles of eye captivating rainbows.	Marawi C.
Iga-Bai Waterfalls	Located about a mile west of the growth center of Barangay Iga-Bai. It brags of tiny streams of mineral water, which gushes out from the several breaks of hill-sized boulder shrouded by outgrowth of brushes and towering trees.	Balabagan M.
Barurao Springs	Located in Balabagan about 300 m west of National highway. It is about 1000 m of crystalline water briskly emerging from many outlets of various sizes from underneath the pool.	Balabagan M.
Maguindanao		
Camp Gen. Salipada K. Pendatun	The reputed camp, which was renamed after the great statesman, soldier, and gentleman, has been the barracks of many Filipino noble gentlemen-in-arms.	Parang M.
Tombs of Sultan Kudarat and Datu Mastura	The tomb of Sultan Kudarat, one of the most highly hailed Maguindanao heroes, the namesake of the municipality, and located in the heart of the municipality.	Sultan Kudarat M.
Blue Lagoon (Marguez Lagoon)	It is named after the heavily hued water that tries to fill the brim of the pond. It is a natural enclosure of body of warmth and polarity whispering on of the beauties and splendid ness too rare to be found anywhere else.	Dinaig M.
Limpongo Hotspring	The warm water that gushes forth from the spring provides wholesome pleasure and relaxation for Cotabato City dwellers and people from the hinterlands.	Shariff Aguak M.
Punta Beach	The northern counterpart of Kusiong Beach with Cotabato City as point of reference. City people, and nearby dwellers flock to this beach especially during weekends they get the relaxing breath of sea breeze.	Parang M.
Our Lady of Lourdes Grotto	Owned and operated by the Oblates of Mary Immaculate, the holy place with its aura of peace and contentment is a venue where the Cotabatenos find their way if solace and spiritual revival.	Datu Odin Sinsuat M.
Lake Balut	Lake has 11 ha area about 2 km from the Cotabato Malabang National Highway with naturally grown tilapia, catfish, and other freshwater creatures.	Sultan Kudarat M.

Name of Spot	Main Features	Location*
Tumungay Lake	An 11 ha lake nested on the group of hills, which hereto preserve its virginity and natural sceneries. Surrounded by naturally growing trees and groups of islands of water lilies, the lake offers a very comforting breathtaking.	Sultan Kudarat M.
Kiga Falls, Sapala Falls and Tabuan Falls	This magnificent wonder of nature is a sight to behold where cool, clear water gushes down from top of the mountain. Aside from its nature preserved sceneries, the site is also ideal for spiritual upliftment.	Upi M.
Bogo Diving Spot	Noted for its splendid ness for swimming, recreation, fishing and scuba diving	
Sulu		
The Walled City	In the midst of the town is the smallest walled city in the world. What has become now of this once historically Majestic City is the deteriorating aftermath caused by age, and neglected and abused by modernity. The walled City justified the bravery of the people of Sulu in appraising foreign control over the archipelago.	Jolo M.
American Cavalry Monument	This bespeaks the Americans direct foreign intervention in the internal affairs of the Filipino in the first half of the 20th century.	Jolo M.
Fort Asturias	It is also a legacy foreign interference in a fort Asturias which now serves as abode to the local PNP Command of Jolo.	Jolo M.
Provincial Capitol	A capitol which construction is credited to Gov. Murphy Sankula (1968–72), and draws the eyes of visitors for its Moorish inspired architectural design. It is here where we can find the great glasswork Sarimanok of Abdulmari Imao, a renowned Tausug artist.	Jolo M.
Tomb of Rajah Baguinda	At Bud Datu or the mountain of Prince lays the tomb of Rajah Baguinda, a Muslim prince from Manangkaw, Sumatra, who in the year 1390 brought the wisdom of the Islam religion in Sulu. Numerous followers of the faith flock to the tomb for local pilgrimage.	Jolo M.
Sulu Provincial Museum	This Lone Museum in Sulu contains artifacts, relics and other works on historical and archeological value of great worth to the people inhabiting the island.	Jolo M.
White Sandy Beaches	Sulu is very proud of its short and long stretches of White Sandy Beaches that illuminate the shores of its islands and islets.	Sulu P.
Princess Tarhata Shrine	Located at Maubuh, Patikul in memory of the 1st Tausug Muslim Scholar to Harvard University, U.S.	Patikul M.
Mount Datu	Demand as satellite destination providing access to the legendary Rajah Baguinda Tomb where tourists/visitors will be excited to see the panoramic views of Jolo town and Marungas Islands (now Hadji Panglima Tahil Municipalities). Its cool and impressive climate can be a substitute for Tagaytay or Baguio in the North.	Indanan M.
Darul Jambangan (Palace)	Located at Darul Maimbung, Sulu. Noted for its legendary past and grandeurs where several succeeding Sultanate made the area as the Capitol.	Maimbung M.
Pala River	Longest river in Sulu. It originated from Municipality of Talipao crosses the Municipality Indanan and ends at Maimbung Higad (Shoreline).	Talipao M.
Jikiri Cave	The cave was used by the famous Moro Freedom Fighter Jikiri and his men as safe haven during their insurrection against American injustices.	Patian I., Pata M.
Bangas Island	The Island has splendid crystalline white sand, clear and calm seawater splashing to the shoreline and with naturally preserved coral reefs suitable for scuba diving. This site is also famously known for Abalone cultivation.	Panglima Tahil M.
Tapaan Island	The Island's feature is comparably similar to Bangas Island. But only in this island can we find abundance of a rare type of a certain seashell locally called <i>bussu</i> (Proudly valued by local residents as their delicacy due to its unique taste).	Pandami M.
Tawi-Tawi		
Sheik Makhdum Mosque	The mosque is situated at Tubig Indangan in Simunul Island is considered to be the first mosque ever built in Phil. Sail. This great work is credited to Sheik Karimmul Makhdum, an Arab missionary who in	Simunul M.

Name of Spot	Main Features	Location*
	1380 AD reached the shores of Simunol and propagated the Islam religion.	
Tomb of Sheik Makhdum	In the southern part of the Island of Sibutu lies in the peaceful harmony with nature of the Tomb of Sheik Makhdum.	Simunul M.
Gusong Reef	Gusong Reef equals no other reefs with its most covered colorful and beautiful squads of aquarium and non-aquarium fish of numerous varieties. The place is also top producer of highly priced turtle eggs.	Cagayan de Tawi-Tawi M.
Turtle Island	Also known as Taganak Island to the people of Tawi-Tawi. Turtle Island vaunt of its sea turtle which lay hundreds of eggs on its seashore. This island was also declared as Natural Wildlife Sanctuary.	Taganak M.
Kaban-Kaban Natural Swimming Pool	Tawi-Tawi cannot help offering its natural richness of elegant and beautification characters like the Kaban-Kaban pool with its crystalline water. The place is an excellent resource for picnic goers.	Simunul M.
Sibutu Natural Wildlife Sactuary	Here, black, reddish brown, white, and spotted black wild boars roaming in frenzy. Exotic birds like Oriole, Canaries, Lovebirds, and Parrots of various colors abound the treetops of Sibutu.	Simunul M.
Bongao Peek	The pride of Tawi-Tawi, projecting luscious outgrowths of green forests where hundreds of varied sized monkeys of white and brown varieties find their sanctuary. People who traverse the peak by nightfall speak of its spell sorcery. Going deeper into the peak one can almost touch the pretty heads of wild but tame looking monkeys which roam and acrobat on the well of tree branches.	Simunul
Manuk-Mangkaw	This island lies in the southern side of Simunul, and derived its name from the branches of an ancient tree which forms the image of a hen.	Simunul
Tahing-Tahing Beach	It is in this place where a group of American soldiers were inspired to compose the song Tawi-Tawi beach. The place offers a good sight for picnickers with its clear cool water and aura of contentment.	Tabawan, South Ubian:
Sangay Slapo Island	About 30 minutes by pump-boat from Bongao Island noted for its splendidness for swimming, fishing, and scuba-diving.	Simunul
Pearl Farm	Actual processing of artificial pearl.	Languyan M.
La Island Beach	A natural site, surrounded by white sand beach; ideal for scuba diving, swimming, fishing, boating and picnicking.	La I.
Panampangan Island Beach	A natural site, an oval shape, surrounded by white sand beach; ideal for scuba diving, swimming, fishing, boating and panicking. Rich in aquatic resources.	Sapa-Sapa M.
Biraddali Water Falls	This magnificent wonder of nature is a site to behold where cool, clear water gushes down from top of the mountain.	Languyan M.
Saluag Island Beach	A natural site, surrounded by white sand beach; ideal for scuba diving, fishing and rich in marine resources.	Sitangkai M.
Sikulan Island Beach	Gateway to the Municipality of Sitangkai. Here the <i>parola</i> or light-house guides ships and motor land <i>Kumpit</i> .	Sitangkai M.
Tai-Tai Beach	One of the best beaches with crystalline water shoreline, sandy beaches in the west side of Simunul Island.	Simunul
Sukarno Beach	A nearby beach at Bongao Simunul, crystal clear seawater and sandy beach.	Simunul
Bolobok Cave	Previously used as a fortress against foreign invader now converted into a tourist destination about 8 km from Bongao.	Bongao M.
Marlboro Beach	The most popular sandy beach in Mapun.	Cagayan de Tawi-Tawi
Tangu Beach	Island beach also noted as Paradise Beach of Panglima Sugala.	Panglima Sugala

*M. = Municipality; C. = City; I. = Island(s)

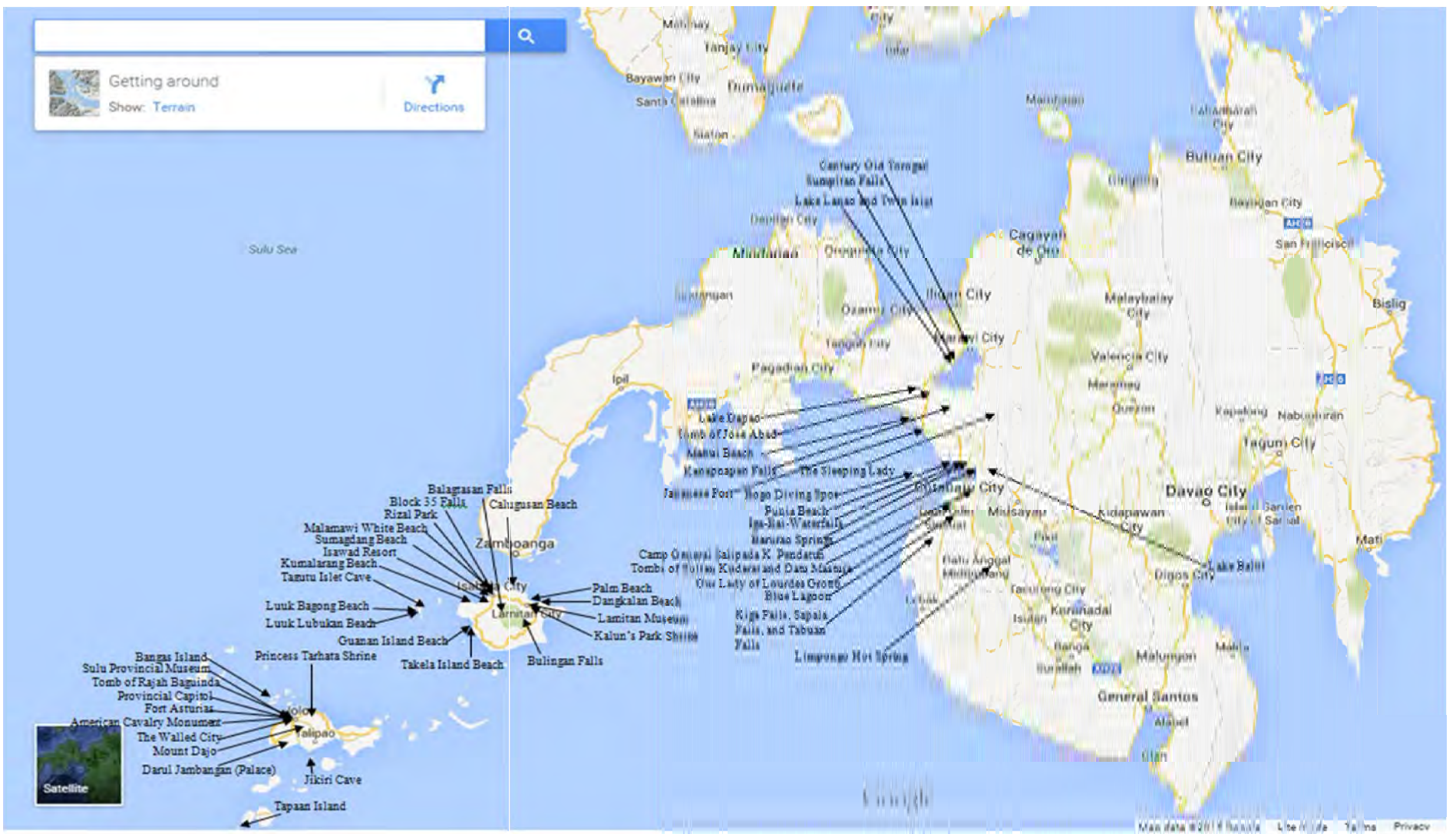


Figure 3.13 Map of Tourist Sites in BCT

Several festivals are observed in the region. Some of these are the following:

Kariyala Festival (Wao, Lanao Del Sur, on February 22): *Kalilang* and *kariyala* mean merrymaking and thanksgiving. It is a universal expression of thanksgiving for triumph, abundance, prosperity, or any form of blessing received. The celebration of this festival is similar to Lami-lamihan of Lamitan, Basilan and Meguyaya of Upi, Maguindanao.

Meguyaya Festival (Upi, Maguindanao, on December 19): *Meguyaya* is a Tiduray word for merrymaking and thanksgiving, used in a multi-cultural society wherein different expressions or ways of thanksgiving and merrymaking practices are recognized and honored. Amidst Upi's triumphs, abundance and prosperity is the conceptualization of the Meguyaya Festival, Upians' way of expressing gratitude for all the bounties received. Meguyaya is a three-week celebration which culminates on the 22nd of December.

Lami-Lamihan Festival (Lamitan, Basilan, on June 26, 27): *Lami-lamihan* is a Yakan word for merrymaking. Started in 1983, it is a yearly festival celebrated in the city of Lamitan in Basilan province, which showcases the traditional Yakan customs and traditions, music, dances, and crafts that have long been preserved.

Sheik Karimul Makdum Festival (Simunul, Tawi-Tawi, on November 7): This festival is celebrated in commemoration of the good deeds of Sheik Karimul Makdum, who brought Islam to the land. Sheik Makdum is a 13th century Muslim missionary from Malaysia, who established the first mosque in the Philippines. The mosque is located in Tubig Indangan in the municipality of Simunul in Tawi-Tawi. The festival is a display of Muslim religion, culture, and tradition, similar to the Shariff Kabunsuan Festival. This festivity is very popular among foreign and local tourists.

Kalilang sa Ranao (Marawi City, on April 15): A festival commemorating the Charter anniversary celebration of Marawi City, its highlights are Qur'an Reading Contest, presentation of colorful Muslim songs and dances, Islamic Quiz Bee, exhibits of Maranao crafts, native delicacies, traditional games, and musical instrument competition.

Shariff Kabunsuan Festival (Maguindanao, on December 19): This festival is a very significant event not only to Maguindanao people in Cotabato City and Region XII but to the whole of Muslim Mindanao. This colorful festival is a commemoration of the arrival of an Arab-Malay missionary from Johore, Malaysia in the 16th century, who landed along the banks of Pulangi River, now known as Rio Grande de Mindanao. Shariff Kabunsuan introduced Islam to the natives, which led to the establishment of the Sultanates of Maguindanao, Rajah Buayan, and Kabuntalan.

(2) Annual Number of Tourist Arrivals (Local/Foreign Visitors and Business/Leisure)

Table 3.32 shows the number of foreign and local tourists who visited the different provinces in the BCT from 2010–2013. Overall, the number of tourists, particularly locals, has increased in the past three years, and foreign tourists in 2013.

Table 3.32 Number of Foreign and Local Tourists in BCT, 2010–2013

Region/Province	Number of tourists/visitors							
	Local tourists				Foreign tourists			
	2010	2011	2012	2013	2010	2011	2012	2013
ARMM	122,618	144,543	141,266	147,697	2,551	2,452	2,688	3,366
Basilan	20,130	19,019	19,799	20,117	21	16	17	25
Sulu	13,763	15,636	14,067	14,690	11	8	14	17
Tawi-Tawi	33,755	37,067	36,025	38,244	215	280	380	185
Lanao del Sur	38,240	45,693	44,700	47,619	14	27	32	35
Maguindanao	14,720	25,117	24,663	25,014	280	110	233	1,091

Source: Table prepared by the PRIMEX Survey Team based on data in ARMM Regional Development and Investment Program.

(3) Policy on tourism

The Department of Tourism has listed 78 "existing and emerging tourism development areas" that the Aquino administration will be protecting from mining activities. According to the list, the protected areas are islands with known fragile ecosystems, and Basilan, Tawi-Tawi, and Jolo in the ARMM are among them.

The Investment Priorities Plan (IPP) 2014–2016 by the Department of Trade and Industry-Board of Investments (DTI-BOI) covers 11 categories including tourism. It says: This covers the establishment of tourism estate subject to guidelines developed jointly by RBOI-ARMM and the Department of Tourism-ARMM, tourist accommodation facilities, tourist transport facilities and development of retirement villages which shall include health and medical facilities including amenities required by the Philippine Retirement Authority (PRA) and subject to the guidelines to be approved by RBOI-ARMM in consultation with the PRA, the Department of Health (DOH), the Regional Planning and Development Office (RPDO), and other concerned agencies.

3.9 Influential Civil Society Organizations (CSOs)

A large number of CSOs have been operating in the BCT and are involved in the planning and implementation of development and environmental management projects. The CSOs are grouped into two categories: those with offices within the BCT, and those with offices in other parts of Mindanao.

3.10 Waste Management

3.10.1 General information on waste management in BCT

Respective LGUs are in charge of waste management, and the role of DENR-ARMM is to provide information to the LGUs and to supervise them. Open dumping of waste was prohibited in 2005, and sanitary landfill was made mandatory at 2007 at the national level, but open dumping is still common in the BCT. The general waste flow is: waste is conveyed to the open dumping areas in the respective LGUs without any treatment. Recyclables such as cans, bottles, paper and plastics are collected at household level or at the dumping areas, and sent to recycle factories in Davao via traders. The main issues in the BCT are lack of budget for waste management and opportunities of raising awareness. There is no factory that emits hazardous waste in the BCT.

A notable facility in the Philippines is a Material Recovery Facility (MRF). The implementing Rules and Regulations of the Philippine Ecological Solid Waste Management Act of 2000 is one of the most important rules to conduct waste management, and it stipulates that MRFs shall be designed to receive, sort, process and store compostable and recyclable material efficiently and in an environmentally sound manner, and MRFs will be established in every barangay or cluster of barangays (RULE XI, Section 1 Operations of a Materials Recovery Facility). The general design of a MRF is shown in Figure 3.14.

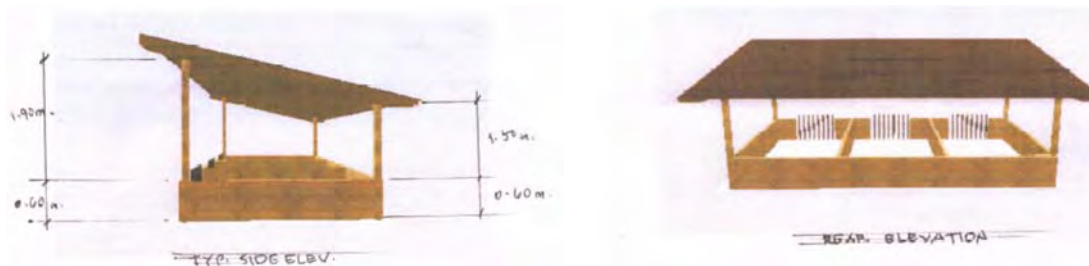


Figure 3.14 General Design of MRF

Wao municipality, in Lanao del Sur, is the only LGU that has a sanitary landfill. They made efforts to obtain fund from an organization outside, and constructed a sanitary landfill. In Wao, waste is collected at the roadside concrete receptacles, and conveyed to the MRF, which is located in the premises of the

landfill. Recyclables are picked up in the MRF, and the residue is conveyed to the landfill to be filled in a regulated sanitary way.

3.10.2 Waste management in Marawi City

One of the most critical cities in view of waste management is Marawi City, because it has a big population of 237,550 (2014), and may contribute to pollute Lake Lanao as located just north of Lake Lanao, if waste is not managed properly. The Solid Waste Management Board (SWM Board) was established chaired by the Mayor in February 2002 based on the Executive Order (EO) 21. The Board is responsible for all the matters related to waste in Marawi city. Generated waste in Marawi city is 113 tons/day (0.475 kg/day per capita). There are 192 staff involved in waste management including 78 street sweepers. Dump trucks, three units of 3.0 m³ and two units of 6.0 m³, are used to collect garbage, but they are not designed for waste collection, and therefore, collection cannot be done efficiently. The dumpsite with 5 ha, 20 years old, is located at Barangay Papandayan, 5 to 6 km from the city. It is not fenced and not covered with soil. There are scavengers at the dumpsite that collect recyclables (plastics, papers, metals, etc.). There are also groups of junk-collectors from Iligan city that buy scraps (5.00/kg for plastics, 3.00/kg for metals, etc.). Table 3.33 shows the solid waste characteristics, indicating that compostable waste occupies 77.0%.

Marawi city has a 10-year plan for waste management, called the Ecological Solid Waste Management Plan (ESWMP), which is formulated in consideration of the City's strategic directions as indicated in the Executive Agenda and the Capacity Development Plan, and in response to the timely enactment of RA 9003, known as the Ecological Solid Waste Management Act of 2000 which mandates local government units to address and manage their solid waste management concerns.

Table 3.33 Solid Waste Characteristics of Marawi City (2007)

Type of Solid Waste	Waste Source					Total	(%)
	Household	Market	School	Office	Hospital		
Compostable	98.44	1,108.20	120.56	39.90	27.49	1,394.59	77.0
Non-biodegradable	39.30	191.75	49.39	41.40	41.95	363.79	20.1
Special Waste	7.50	22.95	6.45	13.30	2.60	52.80	2.9
Total	145.24	1,322.90	176.40	94.60	72.04	1,811.18	100.0

Note: Special waste includes batteries, fluorescent tubes, bulbs, chemical containers, spent chemical/drugs, appliances, etc.

Source: Islamic City of Marawi, Ecological Solid Waste Management Plan.

The goal of the ESWMP is to establish a sustainable ecological solid waste management program through the institutionalization of a permanent SWM structure, generation of sufficient revenue and fund allocation, provision of adequate infrastructure and equipment support facilities for efficient delivery of SWM services complemented with the active cooperation and participation of the community as a result of effective education and enforcement campaign. The main factors of the ESWMP, of which only the education component has started, are presented in Table 3.34.

Table 3.34 ESWMP Components

Component	Contents
Engineering	<ul style="list-style-type: none"> - Practice of source reduction, reuse, and recycle or the 3Rs - Segregation of solid waste - Establishment of solid waste collection and transportation system - Operating of Materials Recovery Facility (MRF) and Composting Facility and establishment of Barangay Redemption Centers - Establishment of controlled dumpsite or sanitary landfill
Education	<ul style="list-style-type: none"> - Organization of Speaker's Bureau on ESWM (pool of resource persons who are responsible the ESWM program) - Conduct of Seminars, Orientation and Trainings on ESWM - Integration of ESWM in School Curricula - Promotion through Radio and TV

Component	Contents
Enforcement	Formulation and adoption of a comprehensive ESWM ordinance with supporting Implementing Rules and Regulations
Equity	<ul style="list-style-type: none">- Revenue generation such as collection of regular solid waste collection fees, to impose fines and penalties to violators, etc.- Specific budget allocation for ESWM- Establishment of ESWM trust fund

CHAPTER 4 FINDINGS FROM STAKEHOLDER FGDs AND KIIs

This section summarizes the major findings from the FGDs and KIIs conducted by the Survey Team with key stakeholders in the BCT during the data gathering period. Some of these findings were included in the interpretation of the description of the existing social and natural environmental conditions in the BCT. The main purpose of this section is to present the common themes of the responses by the FGD participants and KII respondents on the guide questions that were asked by the Survey Team, which provide “on-the-ground real stories” behind the collected secondary data related to the baseline conditions in the BCT.

4.1 Local Importance, Current Use Level, and Sustainability of Natural Resources

Among the FGD participants and KII respondents, the most important natural resources in the BCT are their remaining natural forests, minerals (sand and gravel, and gold), rivers, lakes, fertile soil (farmland), protected areas, waterfalls and natural springs, marshes, fisheries/coastal and marine resources, and water hyacinths (Figure 4.1). Local communities depend on these natural resources for various uses, such as construction materials, water and power supply, transport system, agricultural crop and livestock production, fish and other marine products, cultural and religious rites, and ecotourism activities. The importance of these resources to both livelihood and economic development of local communities highlights the highly agricultural base of the region.

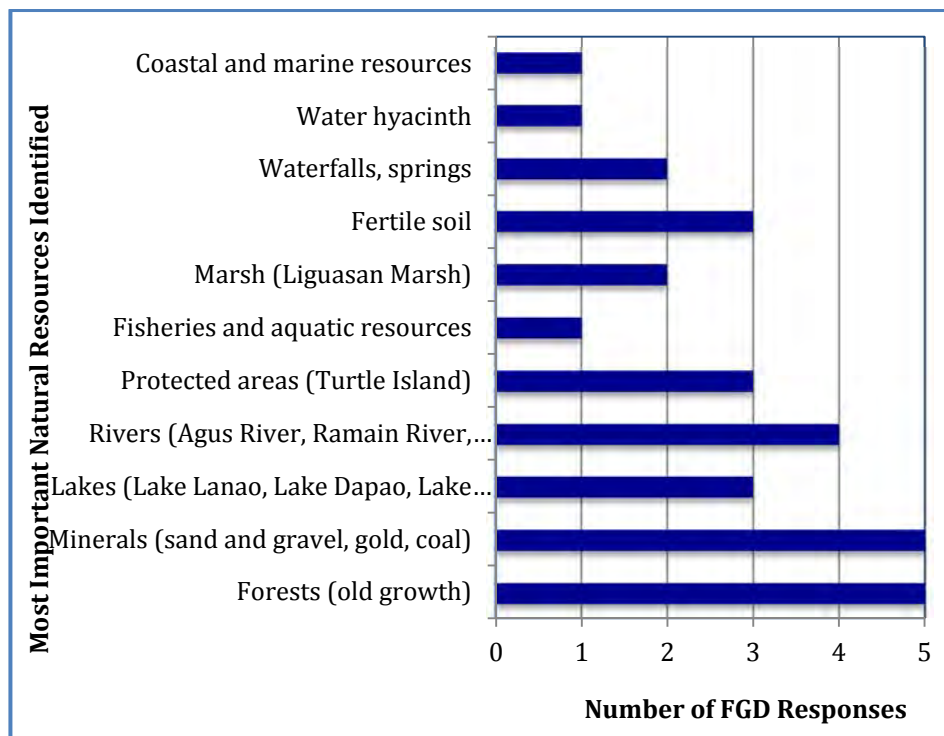


Figure 4.1 Major Important Natural Resources in BCT According to Local Communities

When asked about the current use level of these natural resources, only the FGD participants and KII respondents from Lanao del Sur and Lanao del Norte provided responses, as shown in Figure 4.2. A simple three-scale rating was adopted, where 1 signifies a low use level and 3 a very high use level. In Lanao del Sur, the stakeholders perceive the level of current use of forests and of Lake Lanao as very high, while that of minerals is relatively low. In Lanao del Norte, very high use level was associated with Agus River (which supports the existing power grid in Mindanao), minerals, and water resources from existing rivers, lakes, and springs.

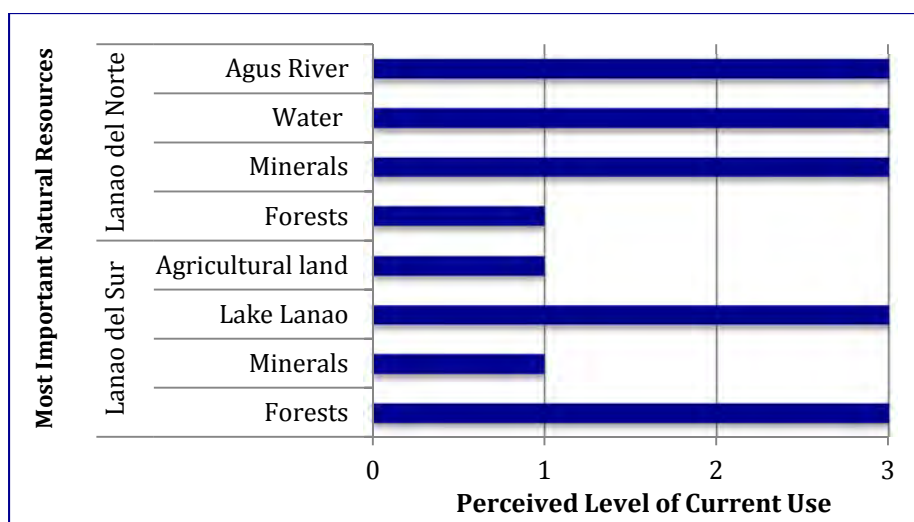


Figure 4.2 Current Use Level of Natural Resources Identified by Stakeholders in BCT

4.2 Threats to Ecosystems and Responses by Local Governments and CSOs

Stakeholders were asked about the existence of threats to local ecosystems, and their responses showed a wide range of perceived threats, generally anthropogenic in origin (Figure 4.3).

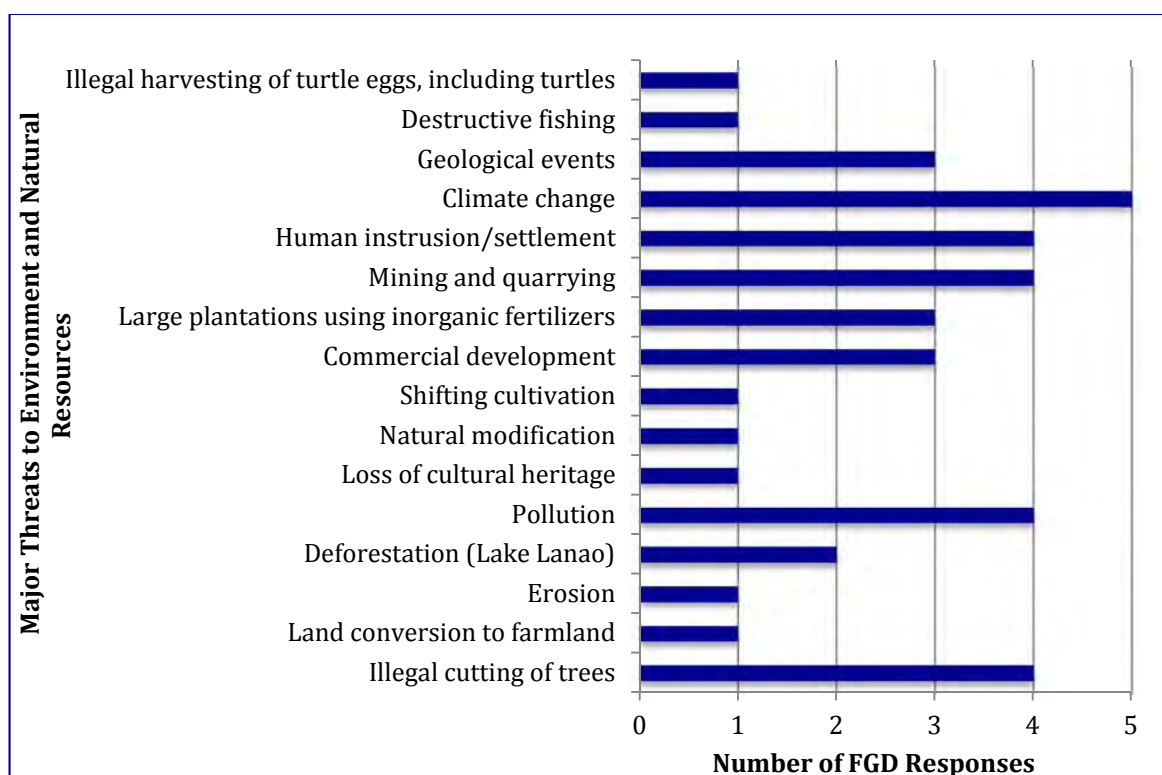


Figure 4.3 Major Threats to Ecosystems Identified by Stakeholders in BCT

Threats to forest ecosystems include illegal logging or cutting of trees, deforestation, land conversion to farmland, human intrusion and settlement, and the practice of shifting cultivation. Large plantations using inorganic chemicals, deforestation, soil erosion, human intrusion and settlement, pollution, and natural modification are identified as major threats to lakes, rivers and marshes, and other inland ecosystems. In coastal and marine ecosystems, the major threats identified are illegal/destructive fishing, human intrusion, and settlement. In protected areas, such as the Turtle Islands in Tawi-Tawi, the illegal gathering of turtles and turtle eggs is the main threat. In addition, the stakeholders have also identified

mining and quarrying, geological events (earthquake, landslide), loss of cultural heritage, and climate change as major threats to the ecosystem in general. Only the natural modification of ecosystems, geological events, and climate change are threats that could be considered as major effects of extreme natural weather condition or variability. In response to these perceived major threats, LGUs, particularly those at the provincial and municipal levels, have introduced a range of local policy and project initiatives (Figure 4.4).

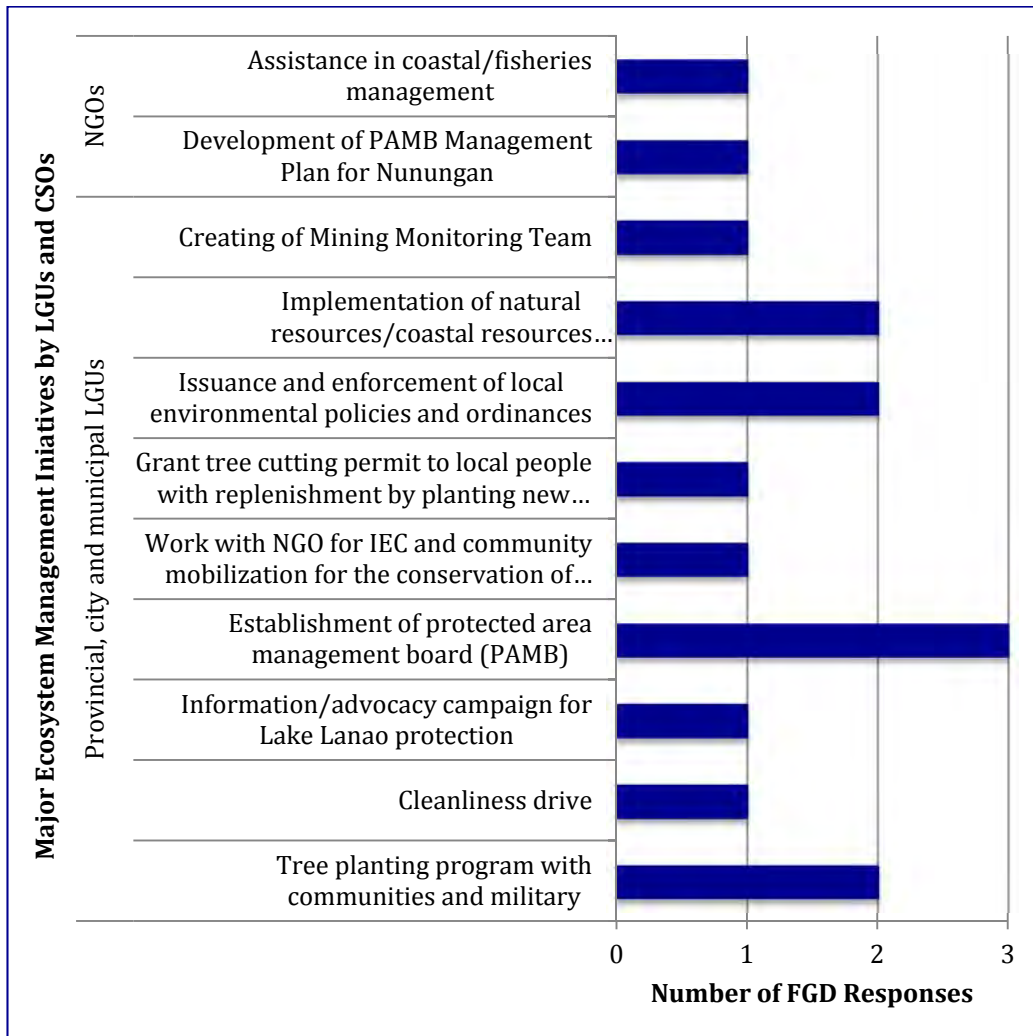


Figure 4.4 Present Management/Conservation Initiatives in BCT for Ecosystems of LGUs and CSOs

These initiatives include the issuance and enforcement of a local environmental code, establishment of local multisectoral structures such as Protected Area Management Boards (PAMBs) and Mining Monitoring Teams (MMTs), development and implementation of environmental management plans, conduct of tree planting activities, and conduct of information, education, and communication (IEC) activities including neighborhood cleanliness drive. At the local level, some LGUs have also granted restricted tree cutting and small-scale mining with mandatory replenishment pre-conditions. Most of these activities normally involve the local communities, other government agencies, and CSOs. The CSO representatives said that their CSOs have been providing support to local communities in the development of relevant coastal/fisheries management and the preparation of PAMB Management Plan, as in Nunungan in Lanao del Norte. Women groups from Cotabato City in Maguindanao have also reported that CSOs are assisting communities in the development of community/household-level vegetable gardening. They noted that women have also participated in tree planting activities.

4.3 Major Poverty Alleviation Policies, Plans, and Programs

Stakeholders have identified the major poverty alleviation policies, plans, and programs being implemented in the BCT by the national, regional and local government agencies/units. They also indicated the factors that facilitate or hinder the implementation of those policies, plans, and programs (Figure 4.5).

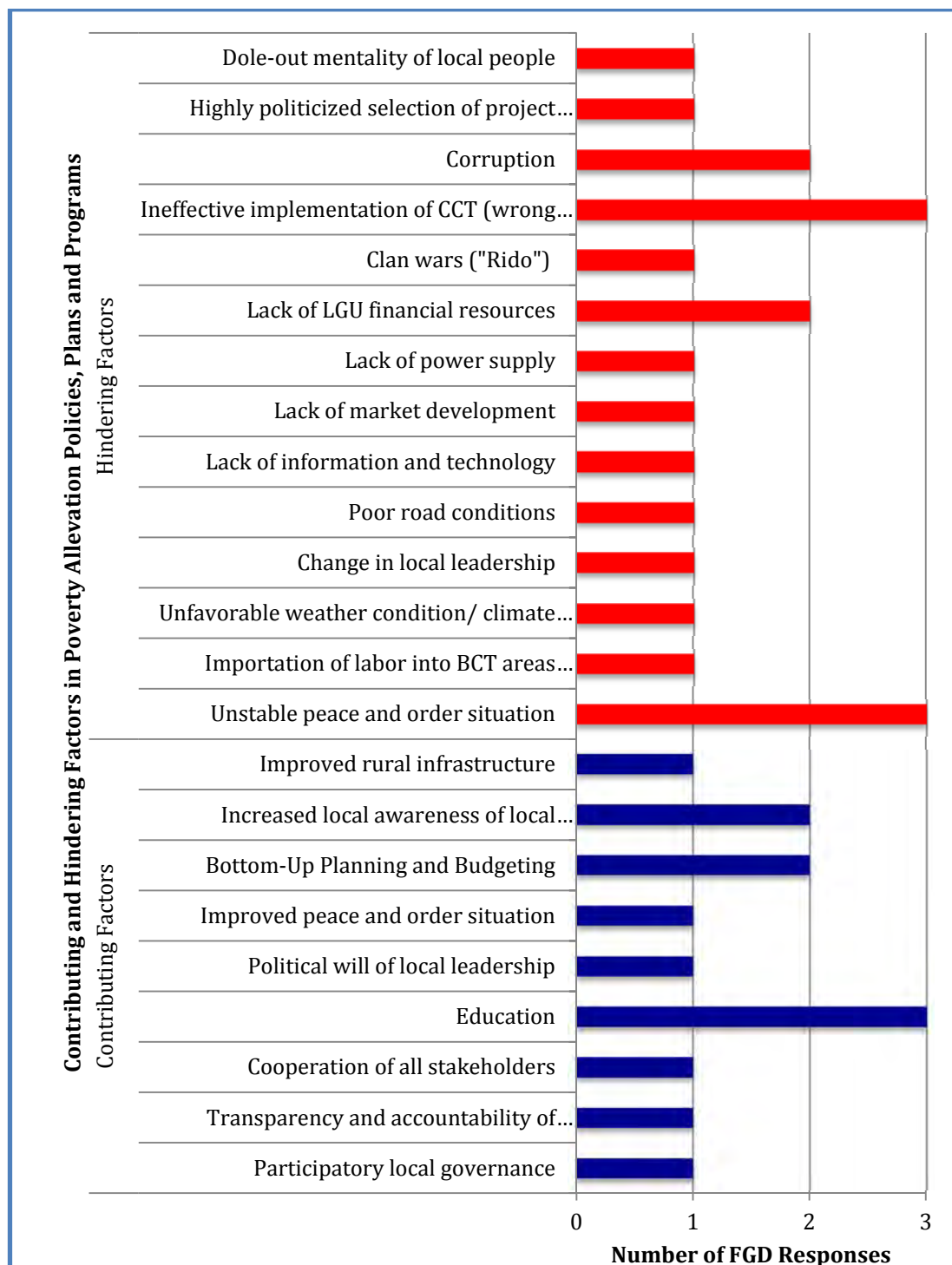


Figure 4.5 Factors of Poverty Alleviation Policies, Plans, and Programs Identified by Stakeholders in BCT

Nine facilitating factors have been identified, four of them attributed to the quality of local governance practiced by the LGUs, such as participatory local governance, political will of local leadership, the practice of bottom-up planning and budgeting, and transparency and accountability of implementing agencies. The other factors relate to the physical and political conditions of the region, in general, and the provinces and municipalities, in particular, such as improved peace and order situation and improved rural infrastructure. Finally, another set of factors relate to the level of education and awareness of the local people on the LGUs' plans and programs and the relationships among local residents, both LGU officials and their constituents.

The stakeholders identified a number of factors that hinder poverty alleviation, ranging from weak local governance structure, leadership, and processes to poor local physical and political conditions, including inter-clan/family conflicts, unfair labor practices, and the dole-out mentality of local people. Some hindering factors, such as poor road and unstable peace and order conditions, could be transformed into major contributory factors, if the relevant LGUs would perform their mandated functions, as specified by law, in the most efficient and effective manner.

4.4 Relationships between Current Condition and Use of Environment and Crosscutting Development Concerns

The common themes emerging from the stakeholders' responses in the FGDs and KIIs indicate that the current condition and use of the environment and natural resources, including major lakes, rivers and marshes, are affecting the overall quality of life, health condition, cultural integrity, and religious practices of the local people, particularly those directly dependent on the resources of Lake Lanao, Ligawasan Marsh, Agus River, Turtle Islands, and many other areas in the BCT. The entry of large plantation and power supply companies into the region, bringing in workers from other provinces, is reportedly reducing employment opportunities for local laborers and causing environmental degradation and pollution in the surrounding communities.

Underlying all these existing and potential environmental problems and threats is the shared recognition among stakeholders about the lack of or weak enforcement of relevant national and local laws and ordinances to protect the environment from illegal and destructive resource use activities and to impose the appropriate punishments on captured violators. In some areas, there is still a widespread belief about the abundance of local natural resources, such that prohibition or strict regulation of resource uses, although considered destructive to the environment, is found to be unnecessary. Still, in a few areas, the current use of resources, such as the forests, by local people is not perceived to be requiring government control or regulation because of the decade-long domination of non-Moro people in land and resource utilization in the BCT.

With the still ongoing cadastral survey and forestland boundary delineation, coupled by the lack of updated natural resource inventory and assessment, the Bangsamoro government faces a great challenge of preparing and implementing a comprehensive environment and natural resources development plan based on accurate and up-to-date planning data. This baseline survey has taken the first step to compile and organize the important natural and social environmental data for BCT. However, the overall outputs of the survey clearly indicate the need for a primary survey of the critical resources of the region for better long-term planning and management purposes.