Chapter 3. Physical Resources

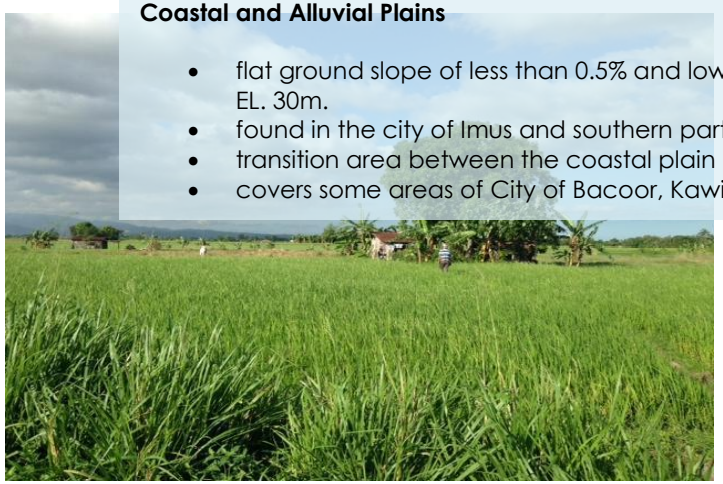
Topography

Coastal Plain

- lowest lowland area
- extremely low ground level of EL. 0m to EL. 2m compared to the high tide level of about EL. 0.8m from the Mean Sea Level (MSL).
- These are the city of Bacoor and municipalities of Kawit, Noveleta and Rosario.

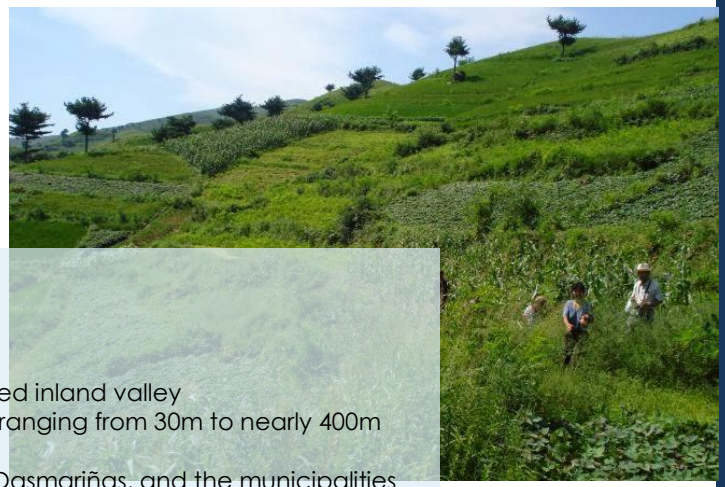
Upland Mountainous Area

- found in Amadeo, Silang, Alfonso and Tagaytay City
- Situated at a very high elevation above EL. 400m with slopes of more than 2%.
- The Tagaytay ridge has a peak elevation of 650m.



Coastal and Alluvial Plains

- flat ground slope of less than 0.5% and low ground elevation of EL. 2m to EL. 30m.
- found in the city of Imus and southern part of General Trias
- transition area between the coastal plain and the central hilly area.
- covers some areas of City of Bacoor, Kawit, Noveleta, Rosario and Tanza



Central Hilly Area

- found on the mountain foot slope
- forms the rolling tuffaceous plateau
- includes steep hills, ridges and elevated inland valley
- characterized with ground elevation ranging from 30m to nearly 400m
- ground slope ranges from 0.5 to 2%
- Cities of Trece Martires City and City Dasmariñas, and the municipalities of Indang and Silang have this kind of topography.

Land Area

Land is considered to be a very significant asset. Generally, it is one of the assets that are expected to appreciate its value over time due to development and scarcity.

Land is referred as dry land, is the solid surface of the Earth that is not permanently covered by water. Land is an area of ground which is being used for a particular purpose. It excludes area below inland water bodies. The proper usage of land is a major determinant or guiding force on the progress of a province.

Cavite covers 8.72% of the CALABARZON's land area. This is relatively small considering that the Region is only comprised of five provinces. The land area of Cavite is equivalent to only 0.48 percent of the total land area of the Philippines which is 299,404.00 hectares. The municipalities of Maragondon and Silang have the biggest land areas comprising 16,549 hectares and 15,641 hectares, respectively while the municipality of Noveleta has the smallest land area as with 541 hectares or 0.38 percent of the provincial total land area.(Table 3A).

Table 3A Land Area by City/Municipality, Province of Cavite: 2015

City/Municipality	Land Area (Hectares)	Percent Distribution (%)
1st District		
Cavite City	1,183	0.83
Kawit	1,340	0.94
Noveleta	541	0.38
Rosario	567	0.40
2nd District		
City of Bacoor	5,240	3.67
3rd District		
City of Imus	9,701	6.80
4th District		
City of Dasmariñas	8,234	5.77
5th District		
Carmona	3,092	2.17
Silang	15,641	10.96
Gen. M. Alvarez	938	0.66
6th District		
Trece Martires City	3,917	2.74
City of Gen. Trias	11,768	8.25
Tanza	9,630	6.75
Amadeo	4,790	3.36
7th District		
Tagaytay City	6,615	4.64
Alfonso	6,460	4.53
Gen. Emilio Aguinaldo	5,103	3.58
Indang	8,920	6.25
Magallanes	7,860	5.51
Maragondon	16,549	11.60
Mendez	1,667	1.17
Naic	8,600	6.03
Ternate	4,350	3.05
Total	142,706	100.00

Source: Provincial Development and Physical Framework Plan 2011-2020

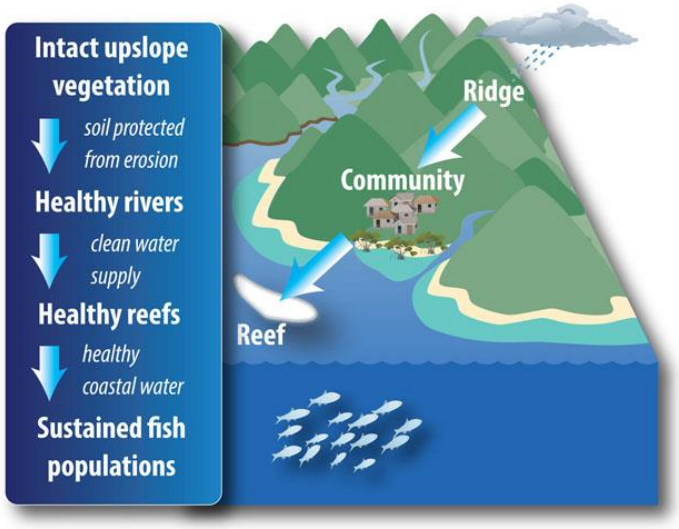
Land Use Planning and Classification

Land-use planning is the general term used for a branch of urban planning encompassing various disciplines which seek to order and regulate land use in an efficient and ethical way, thus preventing land-use conflicts. Governments use land-use planning to manage the development of land within their jurisdictions.

Land-use planning also involves physical planning which is the active process of organizing the structures and function to ensure orderly and effective sitting (or location) of land uses. It encompasses deliberate determination of spatial patterns with an aim of achieving the most optimum level of land utilization in a sustainable manner.

Land classification ensures the proper location of various land uses especially of business, residential and utility areas. This is executed by highly trained urban planners in order to ensure the harmonious movement of people and their activities. Land classifications and adherence to them by the public promotes balanced development.

Land is being classified into two land classifications such as forest lands and alienable and disposable land. Forest lands are being maintained as they play a great role for the ecological balance of the Province. These are protected areas that are home to numerous flora and fauna that need to be guarded and preserved. Correspondingly, the alienable and disposable lands are further classified as built-up areas and production areas. These lands are intended for urban, economic and demographic developments.



Official Concepts and Definition

Built-up Area	- composed of areas of intensive use with much of the land covered by structures. It includes cities, towns, villages, strip developments along highways, transportation, power, and communication facilities, and areas occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from urban areas.
Alienable and Disposable Land	- refers to those lands of the public domain which have been the subject of the present system of classification and declared as not needed for forest purposes.

Table 3B Forest Cover, Province of Cavite: 2014 (Note: No changes from 2014)

Total Forest Cover				Forest Cover w/in Forest Land/Timber Land				Forest Cover w/in A & D			
Total	Broad Leaved		Mangrove	Total	Broad Leaved		Mangrove	Total	Broad Leaved		Mangrove
	Closed	Open			Closed	Open			Closed	Open	
57.37	-	54.39	2.98	41.03	-	41.03	-	16.34	-	13.36	2.98

Source: Department of Environment and Natural Resources-Cavite

Table 3C Location, Type and Land Area of Forests Province of Cavite: 2015

City/Municipality	Type of Forest	Area (Hectares)
Tagaytay City	Unclassified Forest	1,802.900
Magallanes	Unclassified Forest	1,861.000
Ternate	Unclassified Forest	1,248.700
	Classified Forest	1,237.210
Maragondon	Unclassified Forest	2,140.940
	Classified Forest	2,690.790
TOTAL		**8,624.956**

Source: Provincial Development and Physical Framework Plan 2011-2020

Table 3D Mountains in Cavite by Location

Name	Location
Pico de Loro	Maragondon
Mt. Palay-Palay	Ternate-Maragondon
Mt. Buntis	Maragondon
Mt. Mataas na Gulod	Maragondon
Mt. Nagpatong	Maragondon
Mt. Hulog	Maragondon
Mt. Marami	Magallanes
Mt. Gonzales	Tagaytay City

Source: Department of Environment and Natural Resources-Cavite

Table 3E Forest Products by Location, Province of Cavite

Forest Products	Location
Almaciga, Timber, Bamboo rattan, vine, wild plants & animals	Ternate
Timber, Bamboo, Rattan firewood	Magallanes
Bamboo, Usiw, Buho, Rattan Firewood, lumber	Maragondon
Bamboo, Cogon, Rattan, Cabo-negro processed into rope	Gen. Aguinaldo

Source: Department of Environment and Natural Resources-Cavite

Forest Lands

Forest is a large area of land covered with trees. But a forest is much more than just trees. It also includes smaller plants, such as mosses, shrubs, and wildflowers. In addition, many kinds of birds, insects, and other animals make their home in the forest. Millions upon millions of living things that can only be seen under a microscope also live in the forest.

Climate, soil, and water determine the kinds of plants and animals that can live in a forest. The living things and their environment together make up the forest ecosystem. An ecosystem consists of all the living and nonliving things in a particular area and the relationships among them.

The forest ecosystem is highly complicated. The trees and other green plants use sunlight to make their own food from the air and from water and minerals in the soil.
The plants themselves serve as food for certain animals. These animals, in turn, are eaten by other animals. After plants and animals die, their remains are broken down by bacteria and other organisms, such as protozoans and fungi. This process returns minerals to the soil, where they can again be used by plants to make food.

Although individual members of the ecosystem die, the forest itself lives on. If the forest is wisely managed, it provides us with a continuous source of wood and many other products.
Forest lands plays important role in balancing the ecology.
http://forestry-learning.blogspot.com/2010/10/importance-of-forests.html

Cavite lies in the western monsoon forest zone. This location is very beneficial for the formation of tropical rain forests which are characteristically made through natural vegetation. However, due to continuous urbanization, the existence of much valued forest in the province is being threatened.

In 2012 inventory, the existing total forest cover within the province is 57.37 square kilometers (Source: PENRO, Table 3B). These forest areas were categorized as Protected Landscape under R.A.7586 otherwise known as National Integrated Protected Area System (NIPAS) and the unclassified forest (Non-NIPAS).

By virtue of Proclamation No. 1594 on 26 October 1976, a total of 3,928.00 hectares located in Ternate and Maragondon, Cavite was proclaimed as national park. It is now known as the Mts. Palay-Palay and Mataas na Gulod Protected Landscape. The park lies in the border of Cavite and Batangas and has three peaks, Palay-Palay, Pico de Loro and Mataas na Gulod. Still, there were five (5) unclassified forests found along Tagaytay Ridge, Maragondon, Magallanes, Ternate and Alfonso (Table 3C).

Cavite has seven recorded mountains such as Pico de Loro, Mt. Palay-Palay, Mt. Buntis, Mt. Mataas na Gulod, Mt. Nagpatong, Mt. Hulog and Mt. Gonzales (Table 3D).

The forest produces various products that are utilized for human use and consumption. (Table 3E). One that is most notable in Cavite is bamboo which can be found mainly in the municipality of Maragondon and parts of Ternate, Magallanes and General Aguinaldo. Cavite also is a good source of timbers and logs.

Status of Land-Use

Land-use is simply defined as the man's activities on land. Based on the Cavite Provincial Development and Physical Framework Plan 2010-2015, Cavite's alienable and disposable lands are further classified into production lands and built-up areas.

Production lands in Cavite are intended for agriculture, fishery and mining. On the other hand, built-up areas are mainly for residential, commercial, industrial and tourism areas.

Production Land-Use

Production lands support the local development by providing agricultural produce that is part of the economy as well as for food. The production land of Cavite has a total area of 71,474.91 hectares. The entire production land is being used for agriculture and is therefore classified as agricultural lands.

The production land-use accounts to 50.09% of the total land area of the province. With this significant portion, Cavite is still considered as agricultural (Table 3F). Some of the major crops being produced in the province are rice, corn, coffee, coconuts, cutflowers and vegetables. At present, land conversion, especially from agricultural to some other uses, is prohibited under the law in order to protect the environment from abuses due to urbanization.

The agriculture sector in Cavite is mainly consists of crop production, livestock production and fishery. Livestock farms range from piggeries, poultries, goat farms and cattle farms. The climatic suitability of Cavite makes the province ideal for

Table 3F Land Area Classification by City/Municipality, Province of Cavite: 2015

City/Municipality	Total Area of Production Land (Has.)	Total Area of Protection Land (Has.)	Total Built-up Area (Has.)	Island	Total Area (Has.)
1st District					
Cavite City			573.63	609.37	1,183.00
Kawit	450.00		888.00	2.00	1,340.00
Noveleta	54.00		487.00		541.00
Rosario	27.00		540.00		567.00
2nd District					
City of Bacoor	604.00		4,636.00		5,240.00
3rd District					
City of Imus	2,057.00		7,644.00		9,701.00
4th District					
City of Dasmariñas	2,556.00		5,678.00		8,234.00
5th District					
Carmona	609.00		2,483.00		3,092.00
Silang	9,789.00		5,852.00		15,641.00
Gen. M. Alvarez	336.00		602.00		938.00
6th District					
Trece Martires City	523.00		3,394.00		3,917.00
City of Gen. Trias	5,158.00		6,610.00		11,768.00
Tanza	1,897.00		7,733.00		9,630.00
Amadeo	4,382.23		407.77		4,790.00
7th District					
Tagaytay City	1,802.90	2,707.00	2,105.10		6,615.00
Alfonso	5,596.67		863.33		6,460.00
Gen. Emilio Aguinaldo	3,710.00		1,393.00		5,103.00
Indang	7,755.00		1,165.00		8,920.00
Magallanes	5,571.00	1,861.00	428.00		7,860.00
Maragondon	10,266.00	4,831.73	1,451.27		16,549.00
Mendez	768.11		898.89		1,667.00
Naic	7,290.00		1,310.00		8,600.00
Ternate	273.00	3,294.90	773.10	9.00	4,350.00
Total	**71,474.91**	**12,694.63**	**57,916.09**	**620.37**	**142,706.00**

Source: Provincial Planning and Development Office, City/Municipal Planning and Development Offices

integrated farming, having crops and livestock raising in one farm. These livestock farms are very promising industry considering the demand for food of the Cavite population. The cropping industry is also a consistent component of the agricultural economy. The varied weather types in Cavite also provide wide cropping opportunities for Caviteños.

Fishery is also a major component of the agricultural sector. Having rich marine resources and long coastlines, the province is home to numerous fishery activities. This industry has provided livelihood to many Caviteños. In some lowland and even upland areas, fishery, in the form of fishponds are also producing considerable amount of fish products. Some areas in Cavite are also engaged in fish processing and production of fish products like fish sauces and dried fishes. Cavite is also a very well-known source of shellfishes such as mussels and oysters.

Mining is the third component of production land-use in the province. Currently, there are 11 quarry operators in Cavite issued with permit (Table 3G). Quarry materials ranges from base course, conglomerate stone, andesite conglomerate stones, boulders, armor rock and filling materials.

Built-up Areas

The area intended for settlements and industries are called built-up areas. This area also becomes the hub for commercial and business establishments. According to the 2010 Census of Population and Housing by the National Statistics Office, there are 849,755 occupied housing units in Cavite and given the trend will continually increase gradually.

Moreover, according to the Housing and Land-Use Regulatory Board, there are around 62 different housing subdivisions with issued license to sell in the province until 2015. This number is continuously growing with the unremitting issuance of permits to construct housing developments.

Tourism establishments are also considered built-up areas such as golf courses, leisure farms, resorts and the likes.

Table 3G List of Operational Quarry Operators, Province of Cavite: as of December 2015

	Permittee	Location	Commodity	Area In Has.
1	Mac Gregor Gawaran	Salawag, Dasmariñas City	Filling Materials	5.0000
2	Jenny Diones	Pinagsanhan, Maragondon	Filling Materials	5.0000
3	Boris Joans Aldeguer	Sapang I, Ternate	Basalt Andesite, Conglomerate	5.0000
4	Leonora Q. Pakingan	Sahud Ulan, Tanza	Filling Materials	4.7656
5	Sonia Ivanez Bode	Pinagsanhan, Maragondon	Aggregates	4.7000
6	Sabalo Enterprises	Pooc I, Silang	Filling Materials	4.9000
7	Ismael Q. Pakingan III	Punta, Tanza	Filling Materials	4.9700
8	Lamberto L. Lee, Jr.	Sapang, Ternate	Filling Materials, G1, ¾ S1 Base Course/Boulders	5.0000
9	Narciso D. Peji	Pinagsanhan, Maragondon	Filling Materials/Base Course/ Boulders	5.0000
10	Owen Martin K. Congbalay	Pinagsanhan, Maragondon	Banda/Boulders/Armor/Headsize	4.0000
11	Pedro Romulo	Sapang II, Ternate, Cavite	Filling Materials/Boulders	5.0000

Source: Provincial Government – Environment and Natural Resources Office

Alienable and Disposable Lands

In the definition of National Statistics Coordination Board (NSCB), alienable and disposable lands are lands of the public domain which have been the subject of the present system of classification and declared as not needed for forest purposes.

These lands are intended for economic activities broadly classified into production and built-up areas. Production lands can be in the field of agriculture and other related industries. Built-up areas are land intended for urban development activities.

Status of Land Area Classification

The production area of the Province accounts to 50.09% of its total land area. It is followed by built-up areas that cover 40.58% of Cavite. Around 8.90% of the province is considered protection lands such as natural parks and forests and the remaining 0.43% are islands (Table 3F).

Maragondon and Silang are relatively agricultural municipalities with 10,266 and 9,789 hectares of production land, respectively. Tanza, City of Imus and City of Gen. Trias have the most area intended for urbanization. Meanwhile, despite relatively small land area, City of Bacoor and Trece Martires City are dominated with built-up area with only 604 and 523 hectares considered as production land, respectively (Table 3F).

Soil Characteristics

Identification of soil characteristics, most importantly the soil type is a vital activity in area profiling. This is very useful in recommending the best land-use for that area. Moreover, if intended for agriculture, knowing the soil type will also aid in identifying the most suitable crops to be planted in the area. This will contribute to the achievement of optimized land productivity.

The soil surveys conducted by the Bureau of Soils and Water Management (BSWM) revealed that Cavite is composed of ten (10) soil types.

The lowland area of Cavite is generally composed of Guadalupe clay and clay loam. This soil type is characterized as coarse and granular when dry but sticky and plastic when wet. Its substratum is solid volcanic tuff. These types of soils are suited to lowland rice and corn while those in the upland are suited for orchard and pasture.

Guadalupe clay adobes are abundant in the southern part of Bacoor and Imus bordering the city of Dasmariñas. The soil is hard and compact and difficult to cultivate that makes it generally unsuitable for diverse cropping. It is very sticky when wet and granular when dry. Forage grass is advised for this type of soil.

Hydrosol and Obando sand are found along Bacoor Bay. The shoreline of Rosario, Tanza, Naic and Ternate are lined with Guadalupe sand.

The central area principally consists of Magallanes loam with streaks of Magallanes clay loam of sandy texture. This is recommended for diversified farming such as the cultivation of upland rice, corn, sugarcane, vegetables, coconut, coffee, mangoes and other fruit trees. The steep phase should be forested or planted to rootcrops.

The eastern side of Cavite is consists of Carmona clay loam with streaks of Carmona clay loam steep phase and Carmona sandy clay loam. This type of soil is granular with tuffaceaous material and concretions. It is hard and compact when dry, sticky and plastic when wet. This type of soil is planted to rice with irrigation or sugarcane without irrigation. Fruit trees such as mango, avocado and citrus are also grown in this type of soil.

Guingua fine sandy loam is found along the lower part of Malabon and Alang-ilang River at Noveleta.

The type of soils that dominate the upland areas are Tagaytay loam and Tagaytay sandy loam with mountain soil undifferentiated found on the south-eastern side bordering Laguna province. Also on the southern tip are Magallanes clay and Mountain soil undifferentiated with interlacing of Magallanes clay loam steep phase.

The Tagaytay loam contains fine sandy materials, moderately friable, and easy to work on when moist. In an undisturbed condition, it bakes and becomes hard when dry. About one-half of this soil type is devoted to upland rice and upland crops. On the other hand, Tagaytay sandy loam is friable and granular with considerable amount of volcanic sand and underlain by adobe clay. Mountain soil undifferentiated is forested with bamboos found in the sea coast. Cavite also has the Patungan sand characterized by pale gray to almost white sand with substratum of marine conglomerates which are found at Sta. Mercedes in Maragondon and in some coastlines of Ternate.

Forestry

The Mounts Palay-Palay and Mataas Na Gulod Protected Landscape

Cavite is very fortunate to have an area which is considered to be biologically rich. In 1976, by virtue of Presidential Proclamation No. 1594, the Mounts Palay-Palay and Mataas na Gulod were declared to be national parks. The declaration aims to preserve the natural biodiversity of the area as part of the advocacy to preserve the country's natural heritage. The national parks were later named as the Mounts Palay-Palay and Mataas na Gulod Protected Landscape.

The entire landscape is composed of 3,973.13 hectares. The preservation of its natural biodiversity is a strategic move considering the rapid urbanization happening in the province of Cavite and the nearby Metro Manila. Known to be a good source of water, it is of utmost importance to preserve and rehabilitate the damaged portions of the national park.

The national park is approximately located within the geographic coordinates of 14°12' to 14°17' north latitude and 120°38' to 120°42' east longitude. The park covers four (4) barangays (Sapang, Pinagsanhan, Patungan and Papaya) and seven (7) sitios (Malauyas, Caynipa, Caytako, Cacabay, Magabe, Murangdalig and Hamilo). Different portions of the park can be found in three municipalities (Ternate, Maragondon and Nasugbu) under two provinces (Cavite and Batangas).

The Mounts Palay-Palay and Mataas na Gulod Protected Landscape Management Zones

The Park is divided into 10 management zones that ensure a balanced land-use for the park. These are as follows:

1. Strict Protection Zone – 250 hectares

This special zone has high biodiversity value. The area is strictly protected with no man-made interventions or changes are allowed except for scientific studies and/or ceremonial or religious use by indigenous communities. Getting any flora or fauna specie from the area is strictly prohibited. On the other hand, introduction of foreign flora or fauna is likewise not allowed. The strict protection zone is concentrated around the Mts. Palaypalay/Mt. Pico de Loro and abutting the Calumpang Point Naval Reservation.

2. Sustainable Use Zone – 1,995 hectares

This zone covers the largest area of the park. The area can be utilized for sustainable livelihood of the surrounding communities such as gathering of medicinal leaves and roots and the likes. Only natural propagation is allowed in this area and only species that are already present can be cultivated. Furthermore, harvesting will be controlled to maintain natural equilibrium. A portion of the stretch of the Mamba/Cacabay River can be found in this zone.

3. Restoration Zone – 280 hectares

This area was considered a degraded zone which needs to be restored to regain its rich natural habitat. This area will be subjected to activities, fire control, cogon suppression and reforestation to name some. Reforestation will be limited to native species of trees. Once rejuvenated, the area will change its management zone classification. A portion of the stretch of the Palicpican River is located in this zone.

4. Habitat Management Zone – 270 hectares

This is an area with significant habitat and specie value. This zone is subjected to management practices so as to maintain specific condition or habitat for rare, threatened and endangered species. Human habitation and sustainable use maybe allowed if they play a habitat management role. A portion of the stretch of the Palicpican River is located in this zone.

5. Multiple Use Zones - 268 hectares

This area can be utilized for controlled settlement, traditional/sustainable land use, agriculture and income generating activities but should fall within the prescribed activities in the management plan. A portion of the Mamba/Cacabay River is part of this zone.

6. Buffer Zone – 250 hectares

Under the RA 7568, buffer zones are defined as "identified areas outside the boundaries of and immediately adjacent to designated protected areas that need special development control in order to avoid or minimize harm to the protected area." With respect to the Mounts Palay-Palay and MataasnaGulod Protected Landscape, its buffer zone includes the Calumpang Point Naval Reservation, Palicpican Bay, the Caylabne and Puerto Azul Resorts, the rest of Barangay Sapang A of Ternate, Cavite, the rest of Barangays Pinagsanhan A, Pinagsanhan B and Patungan of Maragondon and Barangay Payapa of Nasugbu, Batangas.

7. Recreational Zones – 185 hectares

This area is considered to be of high recreational, educational or environmental awareness value. If the regulating bodies will allow, in consideration of their management plan, activities like eco-tourism, recreational, conservation education or public awareness activities can be done. In this area, facilities like visitor's center, nature trails and food centers can be established. The revenues generated from it can be used to finance programs in benefit of the Park.

8. Alienable and Disposable Zone/Puerto Azul Zone – 502 hectares

This zone can be used for commercial activities as in the case of Puerto Azul Zone.

9. Marine and Coastal Zone

10. Other management zone as maybe used in the management plan and approved by the Secretary

Location of Protected Areas

A total of seven (7) sitios are considered protected areas in Cavite. Likewise, there are portions of the protected areas in the province that extend up to its nearby province such as Batangas (Table 3H).

Table 3H Location of Protected Areas, Province of Cavite: 2015

Name	Locations
Mts. Palay-palay/ Mataas na Gulod	Ternate, Maragondon, Portion of Nasugbu, Batangas
Sitio Malauyas	Ternate, Cavite
Sitios Caynipa, Caytako, Cacabay, Magabe, Mambe, Murandalig	Brgy. Pinagsanhan B, Maragondon, Cavite
Sitio Hamilo	Brgy. Payapa, Nasugbu, Batangas

Protected Forest Area

The protected areas in Cavite could either be vegetative forest or non-forest. The land areas it occupies are as follows:

Table 3l Protected Forest Area as a Percentage of Total Forest Area, Province of Cavite: 2015

Predominantly Timberland	Cover Estimated	Land Area in Hectares
Vegetative Forest	62.50%	2,483.21
Non-Forest	37.50%	1,489.92
Total Forest Area		3,973.13

Source: Department of Environment and Natural Resources

Reforestation Projects

Forest plays important role in our life. According to Russell Maclendon, an environmentalist, there are 21 reasons why forests are important. These are:

1. They help us breathe.

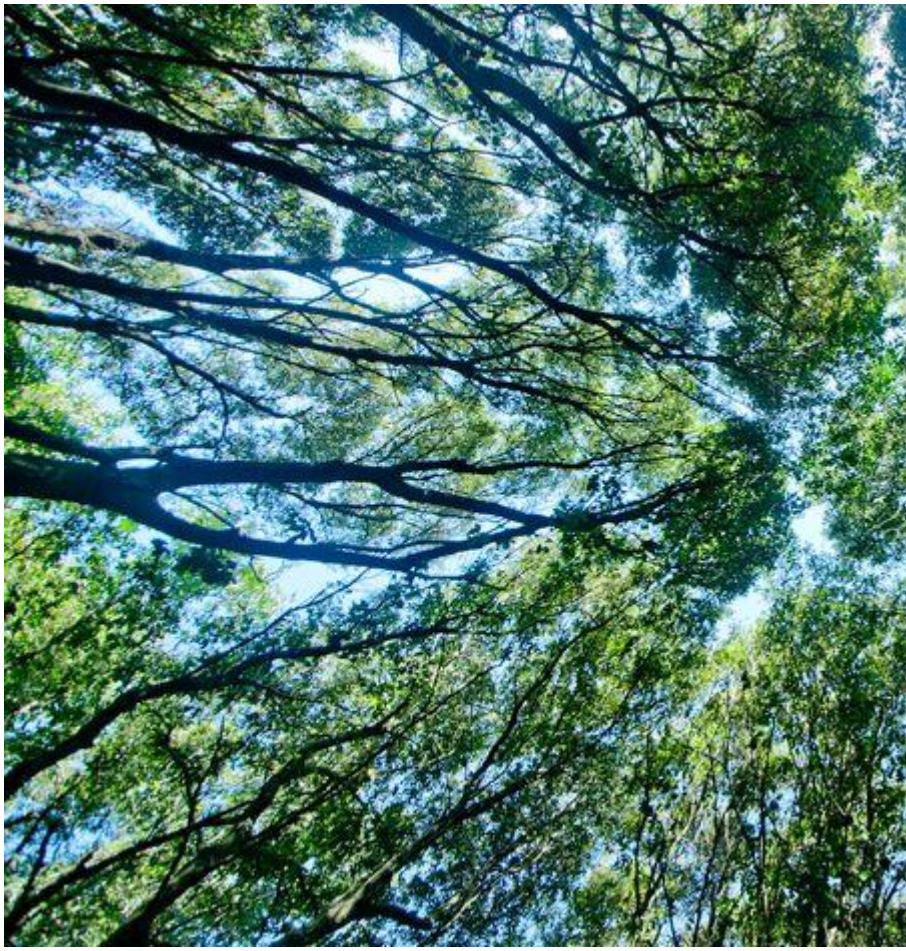
Forests pump out the oxygen we need to live and absorb the carbon dioxide we exhale (or emit). Just one adult leafy tree can produce as much oxygen in a season as 10 people inhale in a year. Plankton are more prolific, providing half of Earth's oxygen, but forests are still a key source of breathable air.

2. They're more than just trees.

Nearly half of all known species live in forests, including 80 percent of biodiversity on land. That variety is especially rich in tropical rain forests, from rare parrots to endangered apes, but forests teem with life around the planet: Bugs and worms work nutrients into soil, bees and birds spread pollen and seeds, and keystone species like wolves and big cats keep hungry herbivores in check.

3. People live there, too.

Some 300 million people live in forests worldwide, including an estimated 60 million indigenous people whose survival depends almost entirely on native woods. Many millions more live along or near forest fringes, but even just a scattering of urban trees can raise property values and lower crime.



4. They keep us cool.

By growing a canopy to hog sunlight, trees also create vital oases of shade on the ground. Urban trees help buildings stay cool, reducing the need for electric fans or air conditioners, while large forests can tackle daunting tasks like curbing a city's "heat island" effect or regulating regional temperatures.

5. They keep Earth cool.

Trees also have another way to beat the heat: absorb CO2 that fuels global warming. Plants always need some CO2 for photosynthesis, but Earth's air is now so thick with extra

emissions that forests fight global warming just by breathing. CO2 is stored in wood, leaves and soil, often for centuries.

6. They make it rain.

Large forests can influence regional weather patterns and even create their own microclimates. The Amazon, for example, generates atmospheric conditions that not only promote regular rainfall there and in nearby farmland, but potentially as far away as the Great Plains of North America.

7. They fight flooding.

Tree roots are key allies in heavy rain, especially for low-lying areas like river plains. They help the ground absorb more of a flash flood, reducing soil loss and property damage by slowing the flow.

8. They pay it forward.

On top of flood control, soaking up surface runoff also protects ecosystems downstream. Modern storm water increasingly carries toxic chemicals, from gasoline and lawn fertilizer to pesticides and pig manure, that accumulate through watersheds and eventually create low-oxygen "dead zones."

9. They refill aquifers.

Forests are like giant sponges, catching runoff rather than letting it roll across the surface, but they can't absorb all of it. Water that gets past their roots trickles down into aquifers, replenishing groundwater supplies that are important for drinking, sanitation and irrigation around the world.

10. They block wind.

Farming near a forest has lots of benefits, like bats and songbirds that eat insects or owls and foxes that eat rats. But groups of trees can also serve as a windbreak, providing a buffer for wind-sensitive crops. And beyond protecting those plants, less wind also makes it easier for bees to pollinate them.

11. They keep dirt in its place.

A forest's root network stabilizes huge amounts of soil, bracing the entire ecosystem's foundation against erosion by wind or water. Not only does deforestation disrupt all that, but the ensuing soil erosion can trigger new, life-threatening problems like landslides and dust storms.

12. They clean up dirty soil.

In addition to holding soil in place, forests may also use phytoremediation to clean out certain pollutants. Trees can either sequester the toxins away or degrade them to be less dangerous. This is a helpful skill, letting trees absorb sewage overflows, roadside spills or contaminated runoff.

13. They clean up dirty air.

We herald houseplants for purifying the air, but don't forget forests. They can clean up air pollution on a much larger scale, and not just the aforementioned CO2. Trees catch and soak in a wide range of airborne pollutants, including carbon monoxide, sulfur dioxide and nitrogen dioxide.

14. They muffle noise pollution.

Sound fades in forests, making trees a popular natural noise barrier. The muffling effect is largely due to rustling leaves — plus other woodland white noise, like bird songs — and just a few well-placed trees can cut background sound by 5 to 10 decibels, or about 50 percent as heard by human ears.

15. They feed us.

Not only do trees provide fruits, nuts, seeds and sap, but they also enable a cornucopia near the forest floor, from edible mushrooms, berries and beetles to larger game like deer, turkeys, rabbits and fish.

16. They give us medicine.

Forests provide a wealth of natural medicines and increasingly inspire synthetic spin-offs. The asthma drug theophylline comes from cacao trees, for example, while a compound in eastern red cedar needles has been found to fight MRSA, a type of staph infection that resists many antibiotic drugs. About 70 percent of all known plants with cancer-fighting properties occur only in rain forests.

17. They help us make things.

Where would humans be without timber and resin? We've long used these renewable resources to make everything from paper and furniture to homes and clothing, but we also have a history of getting carried away, leading to overuse and deforestation. Thanks to the growth of tree farming and sustainable forestry, though, it's becoming easier to find responsibly sourced tree products.

18. They create jobs.

More than 1.6 billion people rely on forests to some extent for their livelihoods, according to the U.N., and 10 million are directly employed in forest management or conservation. Forests contribute about 1 percent of the global gross domestic product through timber production and non-timber products, the latter of which alone support up to 80 percent of the population in many developing countries.

19. They create majesty.

Natural beauty may be the most obvious and yet least tangible benefit a forest offers. The abstract blend of shade, greenery, activity and tranquility can yield concrete advantages for people, however, like convincing us to appreciate and preserve old-growth forests for future generations.

20. They help us explore and relax.

Our innate attraction to forests, part of a phenomenon known as "biophilia," is still in the relatively early stages of scientific explanation. We know biophilia draws humans to water, woods and other natural scenery, though, and exposure to forests has been shown to boost creativity, suppress ADHD, speed up recovery, and encourage meditation and mindfulness. It may even help us live longer.

21. They're pillars of their communities.

Like the famous rug in "The Big Lebowski," forests really tie everything together — and we often don't appreciate them until they're gone. Beyond all their specific ecological perks (which can't even fit in a list this long), they've reigned for eons as Earth's most successful setting for life on land. Our species probably couldn't live without them, but it's up to us to make sure we never have to try. The more we enjoy and understand forests, the less likely we are to miss them for the trees.

The Cavite Arbor Day was conceptualized as a response to Presidential Executive No. 26 dated February 24, 2011 ordering the implementation of National Greening Program or NGP, a government priority project for the environment to plant 1.45 billion trees for a period of six (6) years from 2011 to 2016.

The Provincial Government of Cavite through Sangguniang Resolution No. 237-S-2011 requesting all Cities and Municipalities within the territorial jurisdiction of the province to adopt and implement E.O. 26.

The Provincial Government Environment and Natural resources Office or PGENRO, as one of the lead agencies in implementing this order and ordinance conducted a monthly ARBOR DAY since June 2011 with the cooperation of different municipalities and/or barangays and even conduct validation on the survival rate of seedlings planted for possible replanting.

In 2014, in order to strengthen the drive in promoting the National Greening Program, a Memorandum of Agreement (MOA) was signed last June 25, 2014 between the Provincial Government of Cavite thru PGENRO, DENR and LGU of Magallanes to adopt a 15 hectare area for a period of three years in the 3rd Summit of Buhay Forest in Brgy. Ramirez, Magallanes, Cavite. On its second year, we have continued the tree planting activities in order to meet the target of 10,000 seedlings planted in the area which is a combination of forest and fruit bearing trees.

Monthly tree planting activities were conducted starting June until November 2014 and 2015 to the said forest where NGOs and other employees were invited to participate in the said activity. PGENRO, Eco-aide personnel was assigned to maintain and protect the planted seedlings to ensure permanence.

This year, PG-ENRO initiated conservation and rehabilitation of our stream bank with livelihood component as part of the Cavite Arbor Day Project in line with the principle of continuing Mandamus Order which shall cover the 6 major rivers of Cavite starting 2016 up to 2021 including Labac-Alemang River in 2019; Maragondon River in 2017; San Juan River in 2018; Cañas River 2019; Imus River in 2020; and Bacoor River in 2021.

For the year 2015, a total of 7,718 seedlings of assorted variety were planted. The reforestation endeavors were participated by various public and private entities. The activity is tagged as Cavite Arbor Day Tree Planting Program (Tables 3J and 3K).

Table 3J Cavite Arbor Day Tree Planting Program Report, 2015 (Buhay Forest, Brgy. Ramires, Magallanes, Cavite

Date of Activity	Number/ Kinds of Trees Planted
June 25, 2015	365 Caballero, 241 Guyabano 134 Atis, 40 Rambutan, 44 Manga, 13 Langka, 50 Macopa, 50 Mahogany 63 Alibangbang, 100 Caimito, 150 Mangga 250 Sampaloc
July 31, 2015	430 Langka, 350 Narra, 50 Alibangbang 50 April Shower, 103 Guyabano 377 Sampaloc, 77 Mahogany, 63 Anonas
August 28, 2015	100 Guava, 100 Atis, 100 Duhat, 300 Langka 100 Sampalok, 300 Narra, 100 Guyabano 200 Alibangbang, 200 April Shower 300 Caballero, 35 Langka, 24 Guyabano 141 Gemelina
September 24, 2015	750 Langka, 750 Guyabano
October 30, 2015	75 Alibangbang, 175 Ilang-ilang, 100 April Shower, 270 Mahogany, 198 Acacia, 10 Narra, 60 Gemelina, 198 Fire Tree, 102 Ipil-ipil
November 20, 2015	70 Narra, 30 Mahogany

Source: Provincial Environment and Natural Resources Office

Table 3K Reforestation Projects, Province of Cavite: 1981 to 2014

Year Established	Area(in hectares)	Species Planted	Location
1981-2001	697.00	assorted species	Mts. Palay-palay/Mataas na Gulod reforestation Project located at Maragondon & Ternate & Magallanes, Cavite
2002	11.00	assorted species	Mts. Palay-palay/Mataas na Gulod reforestation Project located at Maragondon & Ternate
2003	-	-	-
2004	10.00	mahogany & narra	Mts. Palay-palay/Mataas na Gulod reforestation Project located at Maragondon & Ternate
2005	12.00	mahogany	-do-
2006	-	-	-
2007	24.00	acacia, narra, camachile mahogany, tuba-tuba	San Agustin, Magallanes, Cavite
2008	12.00	mahogany, narra, acacia	Mts. Palay-palay/Mataas na Gulod reforestation Project located at Sapang,Ternate
	32.00	mahogany, narra, acacia & akleng parang	-do- (under soil conservation & watershed management)
2009	52.00	Mahogany, narra,mango, jackfruit, santol, rambutan, kaimito,	Pinagsanhan, Maragondon and Sapang, Ternate
2010	No	plantation	establishment
2011	40.00	Fruit trees	Ramirez, Magallanes (NGP Site)
2012	280.00	Mahogany, alibangbang, Narra, banaba, fire tree, anahaw, golden shower, Molave, kupang, eucalyptus, balete, kaong	Talipusngo, San Agustin, Maragondon (Urban watershed, PACBRMA and CBFM area)
2013	100.00	Indigenous species	Pinagsanhan, Maragondon (NGP Site)
2014	309.00	Fuelfood species, cacao, fruit trees and rattan	Ramirez, Magallanes and Pinagsanhan, Maragondon
Total	**1,579.00**		

Source: Provincial Environment and Natural Resources Office

Mangrove Areas

Mangroves are various types of trees up to medium height and shrubs that grow in saline coastal sediment habitats. The ecological balance does not end in the protection of the land but of the water resources as well. Part of this is the maintenance of mangrove areas that supports the water ecosystem. Despite that coastal settlements are not encouraged, mangroves also serve as protection among inhabitants in the coastlines. Mangrove forests are home to a large variety of fish, crab, shrimp, and mollusk species. These fisheries form an essential source of food for thousands of coastal communities around the world. The forests also serve as nurseries for many fish species, including coral reef fish.

The Provincial Environment and Natural Resources Office of Cavite is actively promoting the protection and rehabilitation of mangrove areas in the province and even creating new ones. For the year 2015, the PENRO conducted an inventory of mangrove areas in Cavite as follows:

Table 3L Mangrove Areas, Province of Cavite : 2015

Location	Area in Has.
City of Bacoor	0.26
Kawit	13.06
Cavite City	0.99
Noveleta	4.12
Tanza	6.50
Rosario	3.00
Naic	0.50
Ternate	2.12
Maragondon	2.10
Total	32.65

Source: Provincial Environment and Natural Resources Office (PENRO), Trece Martires City

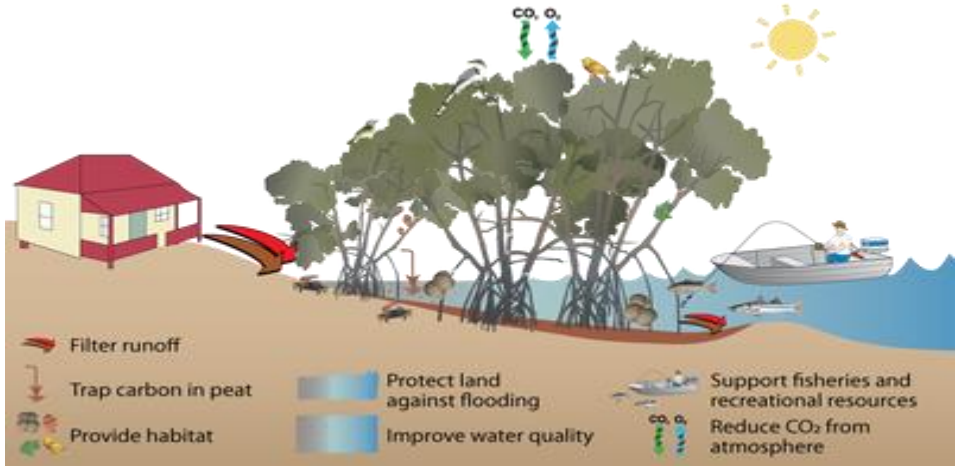


Table 3M Mangrove Areas, Province of Cavite: as of June 25, 2015

Year Established	Area (has.)	Species Planted	Location/Project Site
2000	3.00 1.00	Bakauan	Noveleta, Cavite; Bacoor, Cavite
2001	no	Mangrove plantation	Established
2002	4.00	Bakauan	
2003	no	Mangrove plantation	Established
2004	3.00	Bakauan	Munting Mapino, Naic
2005	3.00	Bakauan	Kawit, Cavite
2006	6.00	Bakauan	Sapang, Ternate, Cavite
2007	3.00	Bakauan	Halayhay, Tanza, Cavite
2008	no	Mangrove plantation	established
2010	no	plantation	establishment
2011	no	plantation	establishment
2012	10.00	Mangrove plantation	MBCO Funded, Noveleta, Cavite
2013	20.00	Mangrove plantation	San Rafael Noveleta, and Kawit, Cavite
2014	50.00	Mangrove Plantation	San Rafael, Noveleta, Cavite
TOTAL	103.00		

Source: Provincial Environment and Natural Resources Office (PENRO), Trece Martires City

Watersheds

Cavite is home to various watersheds that made water supply manageable in the province as of the moment especially in the upland areas. According to the United States Geological Science, a watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel. The word watershed is sometimes used interchangeably with drainage basin or catchment. Ridges and hills that separate two watersheds are called the drainage divide. The watershed consists of surface water – lakes, streams, reservoirs, and wetlands – and all the underlying ground water. Larger watersheds contain many smaller watersheds. It all depends on the outflow point; all of the land that drains water to the outflow point is the watershed for that outflow location. Watersheds are important because the stream flow and the water quality of a river are affected by things, human-induced or not, happening in the land area "above" the river-outflow point. In the province of Cavite, there is a total of 970.98 hectares of watershed plantations. The program started since 1996 and remains to be a priority project of the environment bureau.

Table 3N Established Watershed Plantation, Province of Cavite: as of June 25, 2015

Year Established	Area (has.)	Species Planted	Location/Project Site
1996	1.00		
1997	1.00		
1998	0.50		
1999	13.00		
2000	24.00	Mahogany & dapdap	Indang, Cavite
2001	0.90	Mahogany	Pinagsanhan, Maragondon, Cavite
2002	2.50	Mahogany & dapdap	Alfonso, Cavite
2003	6.00	Mahogany & dapdap	Mahabang Kahoy, Indang
2004	no	Watershed plantation	Vegetative measures established
2005	no	Watershed plantation	Vegetative measures established
2006	no	Watershed plantation	Vegetative measures established
2007	no	Watershed plantation	Vegetative measures established
2008	32.00	Mahogany	Sapang, Ternate
2009	no	Watershed plantation	Vegetative measures established
2010	5.00	Narra, mahogany & dapdap	Lumampong Balagbag, Indang
2012	232.00	Kaong, bamboo, malaruhat, bignai, narra, kalumpit Narra, molave, batino, dao	Alfonso & Gen. Aguinaldo (NGP-Streambank Protection Project)
	170.00		Puting Kahoy, Silang, Sampaloc 1 & 2, San Agustin 1 & 2, Dasmarinas City&Pantihan 1, 2, 3 & 4, Maragondon, Cavite
2013	100.00	Indigenous species	Streambank Plantation (NGP project) Pinagsanhan, Maragondon
	80.00	Bamboo species	Bamboo plantation (NGP project)
	190.00	Indigenous species	Silang, Cavite
	47.16	Indigenous species	Streambank Protection/NGP Project located in the municipalities of Indang, Trece and Naic Congressional Iniatiative Streambank Protection Project located at Silang, Cavite
	65.92	African Tulip, Narra	Congressional Initiative Streambank Protection Project located at GMA, Cavite and Silang
2014	119.00	Bamboo	Streambank Protection/NGP Project located at Amadeo, Indang, Gen. Trias, and Trece Martires City, Cavite
Total	**1,089.98**		

Source: Provincial Environment and Natural Resources Office