CITY GOVERNMENT OF NAGA

City Planning and Development Office

Sectoral Studies

Ecological Profile of Naga City

Volume III

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Chapter 1

INTRODUCTION

This volume presents the Sectoral Studies conducted in the process of developing the city's Comprehensive Land Use Plan (CLUP). Collectively, they form part of the city's Ecological Profile. An Ecological Profile (EP) is the more comprehensive replacement of the usual socioeconomic profile, which gives equal coverage to the physical, biological, socioeconomic, cultural and built environments.

It consists of three main parts: an Ecosystem Analysis, Sectoral Studies, and Special Area Study focusing on Naga's built heritage. They are organized into the following chapters:

Chapter 1 presents a brief history of Naga City.

Chapter 2 profiles the city's geophysical environment, including its biodiversity areas built around the Mt. Isarog National Park (MINP).

Chapter 3 presents the highlights of studies on local climate change adaptation and disaster risk reduction.

Chapter 4 takes a closer look at the socio-demographic profile of Naga.

Chapter 5 provides an overview of the local economy.

Chapter 6 profiles the city's infrastructure and environmental support systems.

Last but not least, Chapter 7 and 8 and look at Naga's heritage resources and its proposed heritage district, and its green growth and transit-oriented development strategies.

BRIEF HISTORY[1]

Pre-colonial era. Bicol region is closely allied with the confederation called the Kedatuan of Madja-as (Itself formed by Austronesian rebels against Rajah Makatunao in a civil war in Brunei), which is located in Panay island. According to the Maragtas, two Datus who followed Datu Puti eventually arrived at Taal Lake and then split up, one group settling later around Laguna de Bay, and another group pushing southward into the Bicol Peninsula, making Bicolanos an intermediate group between people from Luzon and people from the Visayas. The discovery of an ancient tomb preserved among the Bicolanos refers to some of the same deities and personages mentioned in the Maragtas examined by anthropologists during the 1920s.

Spanish colonial period. In 1573, on his second expedition to this region, the conquistador Juan de Salcedo landed in a village and named it "Naga" because of the abundance of Narra trees ("Naga" in Bikol).[2]

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[1] "Naga, Camarines Sur." https://en.wikipedia.org/wiki/Naga,_Camarines_Sur

[2]The late Fr. Raul Bonoan, S.J., former president of Ateneo de Naga University, however advanced an alternative theory linking the name to the Nagas, a serpent-worshipping northern Indian tribe that settled near or around water springs.

In 1575, Captain Pedro de Chávez, commander of the garrison left behind by Salcedo, founded on the site of the present central business district (across the river from the original Naga) a Spanish city which he named La Ciudad de Cáceres, in honor of Francisco de Sande, the governor-general and a native of the city of Cáceres in Extramadura, Spain. It was still by this name that it was identified in the papal bull of August 14, 1595 that erected the See of Cáceres, together with those of Cebú and Nueva Segovia, and made it the seat of the new bishopric under the Archdiocese of Manila.

In time, the Spanish city and the native village merged into one community and became popularly known as Nueva Cáceres, to distinguish it from its namesake in Spain. It had a city government as prescribed by Spanish law, with an ayuntamiento and cabildo of its own. At the beginning of the 17th century, there were only five other ciudades in the Philippines. Nueva Cáceres remained the capital of the Ambos Camarines provinces and later of the Camarines Sur province until the formal creation of the independent chartered city of Naga under the Philippine Republic.

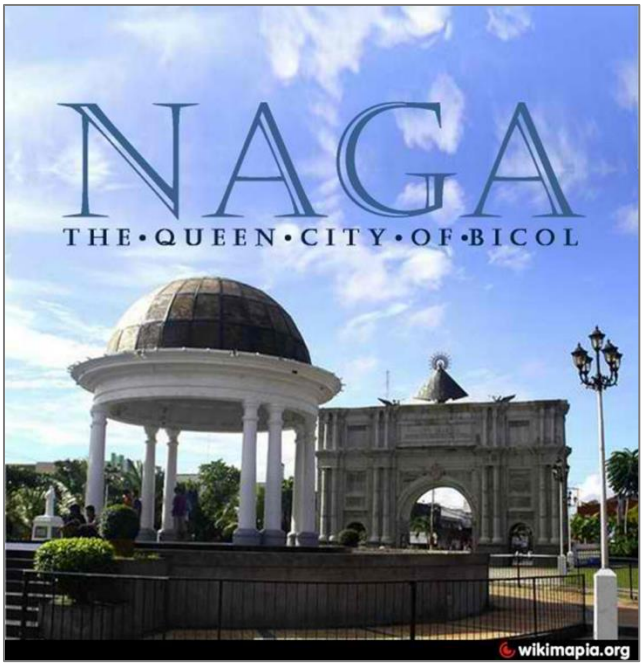
The bishops of Cáceres occupied a unique place in the Philippine Catholic hierarchy during most of the Spanish regime. By virtue of the papal bull of Gregory XIII, ecclesiastical cases originating in the Spanish East Indies, which ordinarily were appealable to the Pope, were ordered to be terminated there and no longer elevated to Rome. Decisions of bishops were made appealable to the archbishop and those of the latter to the bishop of the nearest see. Thus, in the Philippines, the decisions of the Archbishop of Manila were subject to review by the Bishop of Cáceres whose jurisdiction then extended from the whole Bicol region, the island-province of Marinduque and the present-day Aurora, which was once part of the former Tayabas Province, which is now the province of Quezon. In this sense, bishops of Bikol were delegates of the Pope and could be considered primates of the Church of the Philippines. This was the reason why bishops of Cáceres and archbishops of Manila were sometimes engaged in interesting controversies in the sensational Naga case and in such issues as canonical visitation and the secularization of the parishes. As papal delegate, Bishop Francisco Gaínza, then concurrent bishop of Cáceres, sat in the special ecclesiastical tribunal which passed upon the civil authorities' petition to divest Fathers Burgos, Gómez, and Zamora of their priestly dignity. Gaínza did not only refuse the petition but also urged their pardon.

American colonial period. With the advent of the American rule, the city was reduced to a municipality. In 1919, it lost its Spanish name and became officially known as Naga. It acquired its present city charter in 1948, and its city government was inaugurated on December 15 of the same year by virtue of Republic Act No. 305. Rep. Juan Q. Miranda sponsored this legislative act which put flesh into the city's bid to become among the only few independent component cities in the country.

World War II and Japanese occupation. Naga came under Japanese occupation on December 18, 1941 following the Japanese invasion of Legazpi a few days earlier. More than three years later, on April 9, 1945, combined U.S. and Philippine Commonwealth troops under the United States Army, Philippine Commonwealth Army and the Philippine Constabulary, aided by Bicolano guerrilla resistance groups, finally liberated Naga and defeated the Imperial Japanese invaders, thus ending the war.

Independent Philippines. After Naga was liberated from the Japanese, the task of rebuilding the town began in earnest. With only a few casualties, Naga was able to rebuild quickly after the war. After many petitions, Naga became a city on June 18, 1948.

Religious center. Naga City goes by many names: "Queen City of Bicol" and Heart of Bicol due to its central location in the Bicol peninsula, and the Pilgrim City because it is also home to the largest Marian pilgrimage in Asia, the Lady of Peñafrancia, the region's patroness. The 315-year old devotion makes Peñafrancia, together with the Divino Rostro, one of the most popular objects of devotion in the country.



Naga City goes by many names.

Consequently, Naga is also Bicol's religious center. It is the seat of the metropolitan Roman Catholic Archdiocese of Caceres, whose jurisdiction includes all the suffragan sees of Bicol, the Dioceses of Daet, Legazpi, Libmanan, Masbate, Sorsogon, and Virac.

Development administration. Coordinating growth and development is the City Government of Naga, which directed the city's transformation into a center of good governance in the Philippines. For the last two decades, it has earned close to 200 national and international awards for innovations and excellence in diverse areas of local governance from the time of the late Mayor Jesse M. Robredo up to the present under the administration of Mayor Bongat. It is the "Most Competitive Component City" for 2015 and 2016.

Naga is also the core of Metro Naga, an official designation given the city and 17 municipalities in the area administered by the Metro Naga Development Council. Metro Naga is a metropolitan area that also includes Pili, the provincial capital, and covers most of the 3rd district of the province and part of its 2nd, 4th and 5th districts. Metro Naga comprise about 40% of the total population of the province, and 23% of its land area.

Chapter 2

GEOPHYSICAL ENVIRONMENT

This chapter summarizes the geophysical context of Naga City as a means of defining current realities that underpin the plan.

PHYSICAL PROFILE

Geographic location. Naga City is centrally located in the province of Camarines Sur, about 377 kms south of Manila and 100 kms north of Legazpi City, Albay. Nestled at the foot of Mt. Isarog, the city has a total land area of 8,448 hectares or 84.46 sq kms.

On the Philippine Map, it is placed between 13 to 14° North Latitude and between 123 to 124° East Longitude. It is bounded on the North by the towns of Canaman, Magarao and Calabanga; on the East by Mt. Isarog; on the South, by Milaor and the capital town of Pili; and on the West by the town of Camaligan. (Fig. 3.1.)

Topography. The city's terrain generally slopes upward from west to east. Its city center, trisected by the Bicol and Naga rivers which are fed by creeks and riverines that crisscross the city, is located near its lowest point, making it susceptible to flooding when unusually heavy rainfall causes these waterways to overflow.

Slope suitability. The low flatlands from the city center up to the upper barangays of Pacol and San Isidro at foot of Mt. Isarog have slopes of 0-3% (almost level) to 3-8% (nearly level to slightly sloping). Collectively, they account for 58% of the total land area.

On the other hand, the eastern part covering barangay Carolina has slopes of 8-18% while Panicuason, which includes the Forest and Parks Reserve of Mt. Isarog that forms part of the

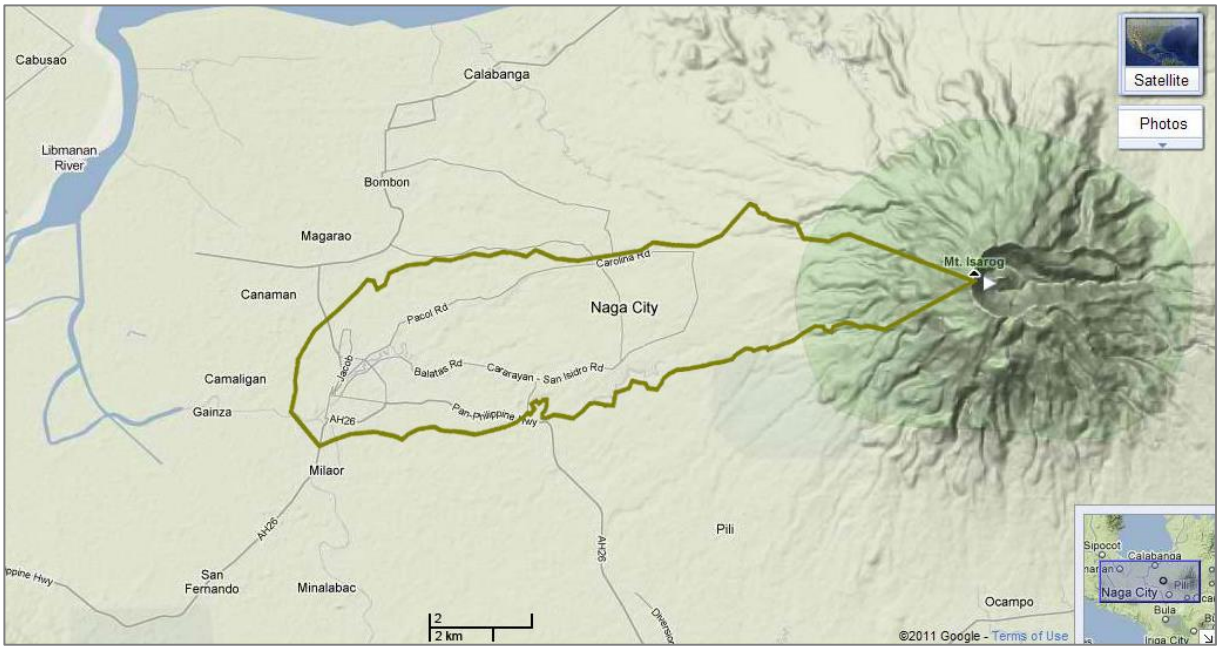


Fig. 3.1. Location Map of Naga City. Base map from Google Maps, city boundaries from Comprehensive Land use Plan 2000

National Integrated Protected Areas System (NIPAS), has the steepest from 18-30% and above.

Soil fertility. Agricultural adaptability of the soil is well-suited for palay, corn, abaca, coffee, sugar, fruit, root crops and other vegetable varieties. Soil-fertile areas are generally located in the agricultural barangays of Cararayan, Pacol, Carolina, Panicuason and San Isidro. Some agricultural activities can also be seen in some portions of San Felipe, Balatas, Tabuco, Mabolo and Concepcion Grande.

They correspond to the three major soil types found in the city. The Pili clay loam, part of the Pili Series of Philippine soils, is found in the low elevation areas of the city. Pili soils are poorly drained and renewed by the Bicol River every year by delivering and depositing fine volcanic materials and organic matter from highlands through flooding. On the other hand, the Tigaon clay, found in the city's midlands (Pacol, Cararayan, San Isidro and lower Carolina) is part of the Tigaon Series, found in undulating and rolling, or hilly to mountainous (east of Mt. Iriga and Lake Buhi) areas in Camarines Sur. Tigaon series has good moisture retentivity with water easily percolating through soil layers. Finally, the Bulusan loam is found in upper Carolina and the whole of Panicuason. These are primary soils developed from the weathering of massive to fragmented volcanic rocks, mostly basalt and andesite.

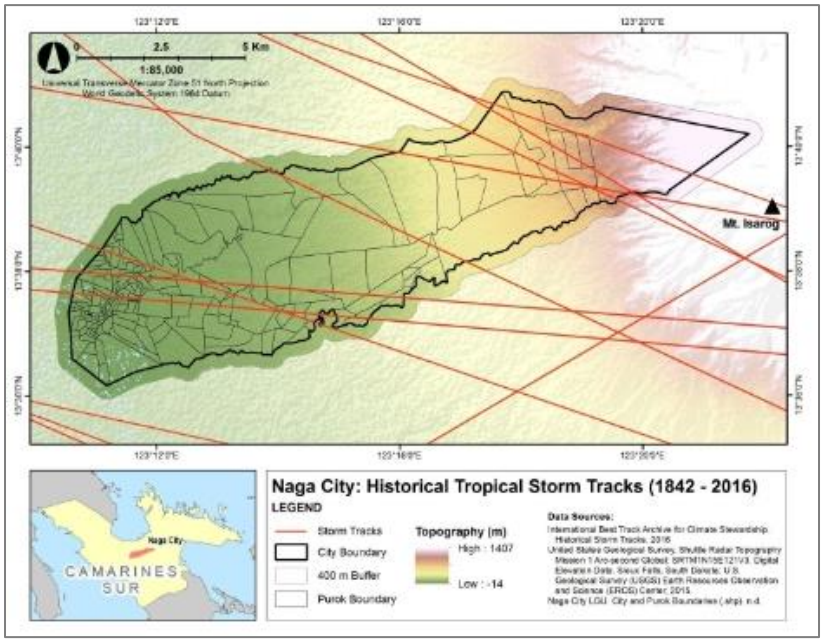


Fig. 3.2. Historical Typhoon Tracks in Naga City

Climate and rainfall. Naga's climatic type falls under Type II under the Modified Coronas classification. This condition is characterized by a definite absence of dry season and a very pronounced maximum rain period from November to January. Under the Köppen climate classification system, this is equivalent to a tropical savanna climate. It is characterized by monthly mean temperatures above 18 °C in every month of the year and typically a pronounced dry season, with the driest month having precipitation less than 60 mm.

Between 2005 and 2014, the city had an average annual rainfall of 2,450 mm, ranging between a low of 2,083 mm (2007) and a high of 3,393 mm (2011). The 10-year average represents a 19% increase over the 2,104 mm recording during the previous planning period. September to December are usually the wettest, while February and April are the driest. During the same period, mean temperature ranged between a low of 23.4 to a high of 31.3 ºC, or an annual average of 26.8 ºC.

Typhoons. Naga, as is the whole of Bicol Region, is susceptible to typhoons, lying in the usual east-to-northwest path taken by these weather disturbances that regularly visit the Philippines.

(See Fig. 3.2.) Between 2005 and 2016, an average of 18 typhoons entered the Philippine area of responsibility – from a high of 25 in 2013 to a low of 11 in 2010.

While most hardly caused material damage to the city, they remain a threat. In fact, 13 of the 16 strongest typhoons that hit the Philippines from 1947-2016 all passed through Bicol. (See Table 3.1.) Three of these took place between 2006 and 2016: “Reming” (Durian) on November 30, 2006, whose winds peaked at 320 kph; “Glenda” (Rammasun) on July 15, 2014, with maximum winds of 215 kph; and “Nina” (Nock-Ten) on December 25, 2016, with maximum winds of 250 kph.

THE NAGA RIVER WATERSHED

The land area of Naga City spans 8,448 hectares but its watershed area is estimated at only 5,445, part of which extends beyond the city’s territorial boundary. The Naga River watershed appears like an elongated leaf with a pointed tip, lying down along the east-west axis; with its outlet oriented almost due west and its tip oriented almost due east. Its widest portion is located approximately one-third of its total length reckoned from its lowest portion (mouth of the river). (See Fig. 3.3.)

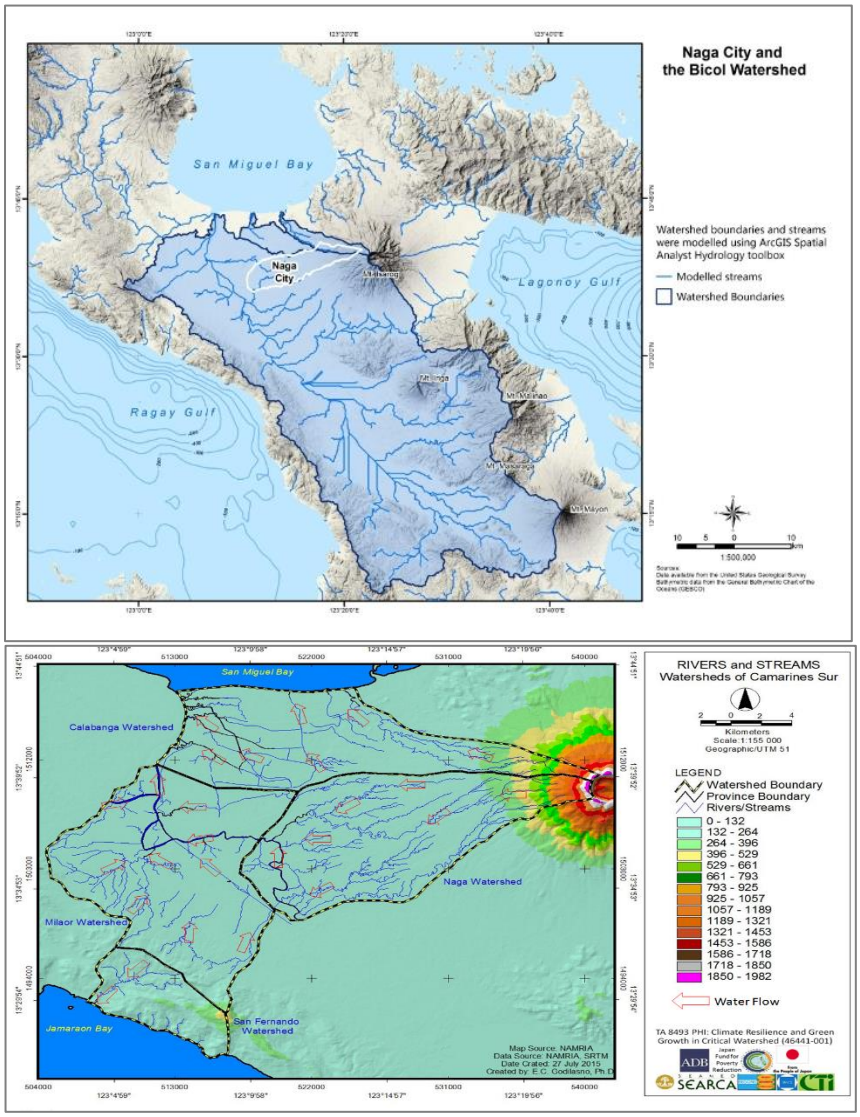


Fig. 3.3. The Naga River Watershed

Slope. The slope of the watershed varies: It is relatively level from its junction of the Bicol River up to Barangay Carolina, with very gentle slope below 18%. This starts to rise from Barangay Carolina to Panicuason to about 18% slope. From the lowest portion of Barangay Panicuason, the slope starts to rise quickly beyond 18% and up to more than 100% towards the peak to Mt. Isarog. In terms of land

area, it is broken down as follows: 1-18%, 4,996 hectares; 18-38%, 519 hectares; and above 38%, 28 hectares.

Altitude. The lowest portion of the watershed is the outlet of the Naga River that empties into the Bicol River. At its junction with the Bicol River, the riverbed is a little lower than sea level inasmuch as it allows backflow of sea water into the lower portion of its river system (i.e., within the urban area).

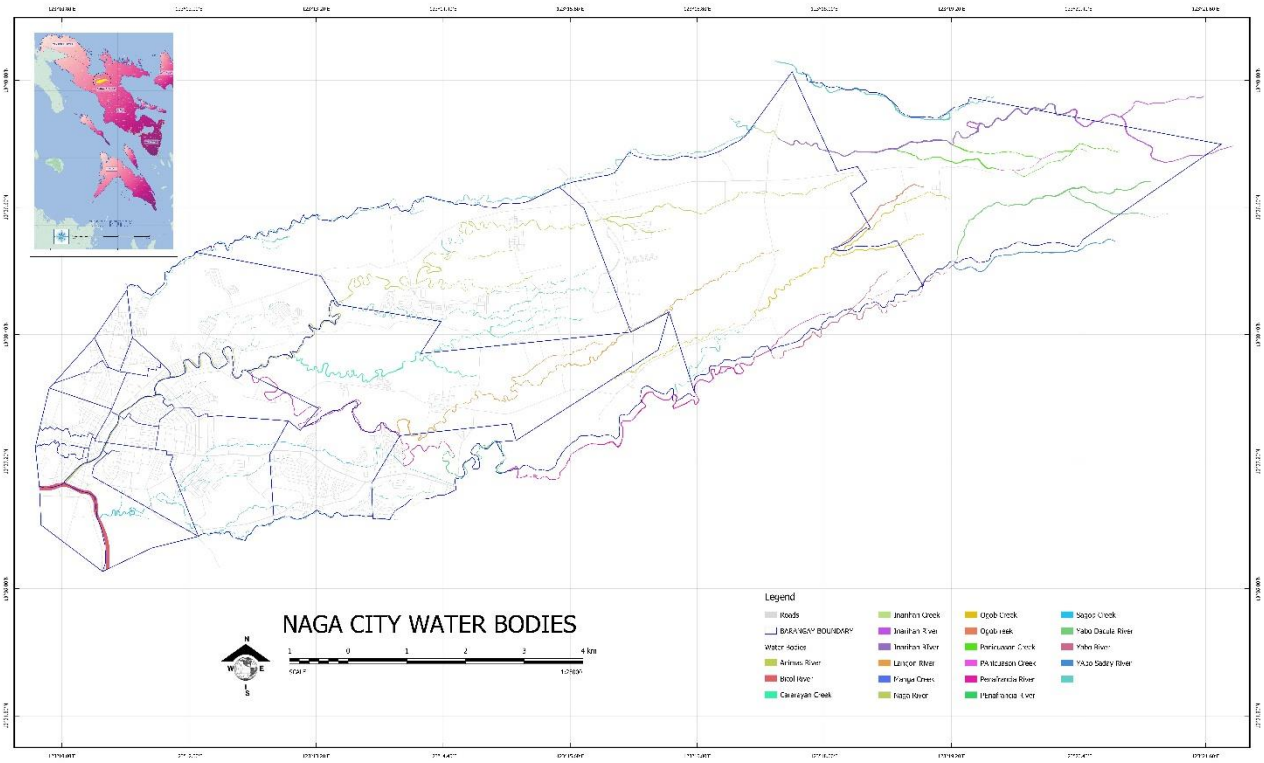


Fig. 3.4. The water bodies in Naga City.

At the boundary of Barangay Pacol and Carolina, the altitude is approximately 100 meters above sea level and about 350 meters at the boundary of Barangay Carolina and Panicuason. Within the latter, it rises to approximately 1400 meters, until it reaches the highest altitude of 1,966 meters above sea level at the peak of Mt. Isarog.

Figure 3.4 shows the water bodies in the city that comprise the Naga River watershed, comprising of rivers and creeks lying between the headwaters at Mt. Isarog and the main Bicol River.

Land use. In 2000, land use was measured as follows: forestry, 547 hectares; agricultural, 3,812 hectares; built-up area, 958 hectares; water bodies, 55 hectares; and others, 73 hectares for a total of 5,445. The main portion of the city is located in low and flat topography that is frequently inundated by floods when water from the Naga and Bicol rivers overflow their banks.

The watershed boundary of Naga City River was delineated by tracing the topographic divide/ ridgeline using a NAMRIA topographic map. The boundary of watershed extends beyond the administrative jurisdiction of Naga City. Specifically, it includes portion of barangay Tinangis of the Municipality of Pili, and some parts of the Municipality of Goa in its eastern side. In

particular, the watershed is bounded in the north by the Municipality of Calabanga; in the south by Pili; in the east by the Bicol River; and in the west by Goa.

BIODIVERSITY AREAS

Mt. Isarog National Park (MINP) is the main locus of biodiversity in Naga City. The park has a total of 10,112 hectares and cover, aside from the city, its neighboring towns of Pili, Ocampo, Tigaon, Goa, Tinambac and Calabanga. (See Fig. 3.5) The national park was established pursuant to National Park Presidential Proclamation 293 issued in 1938, and enhanced under Natural Park Presidential Proclamation 214 issued in 2002.

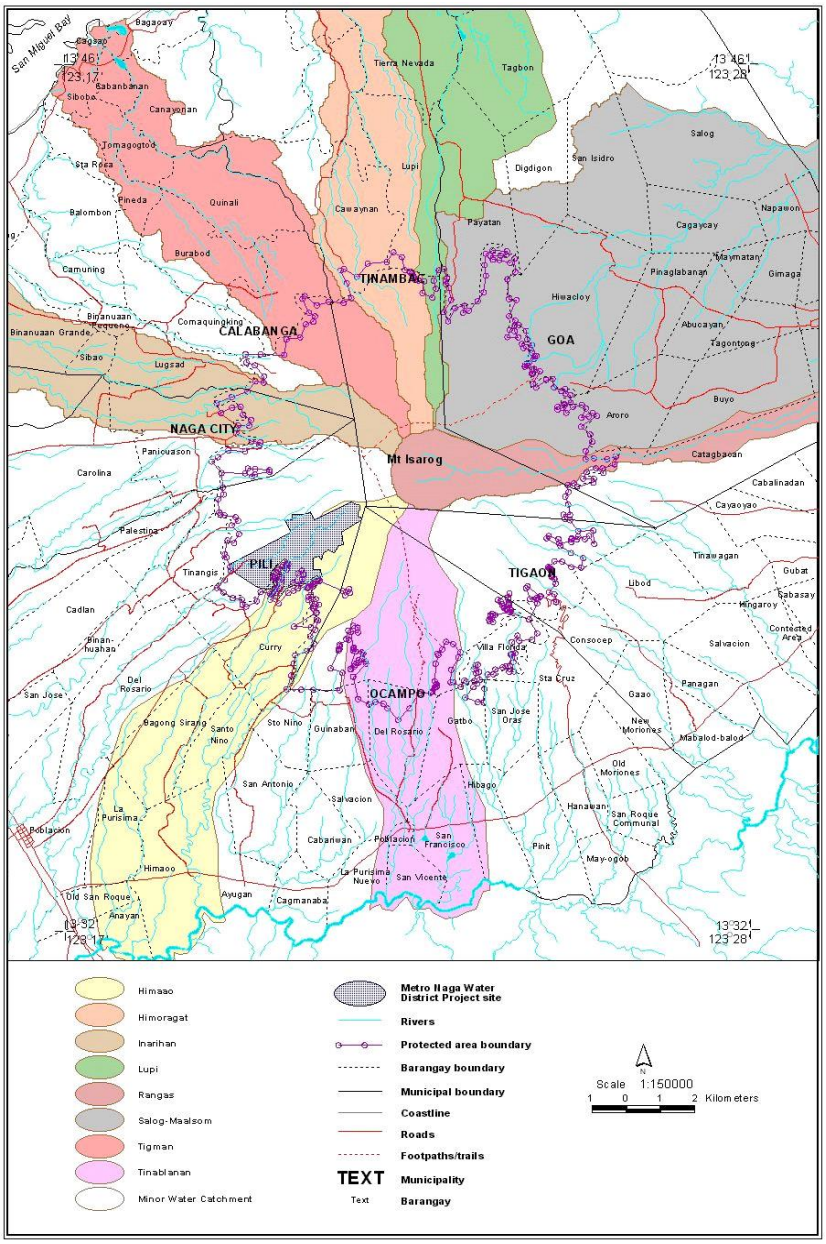


Fig. 3.5. Map of the Mt Isarog National Park

Flora and fauna. An incredible number of plants grow in the MINP. It is a habitat for some 3,000 species of flora, which include dipterocarps, epiphytes, rattans, ground ferns, lianas and herbs. In higher elevation, pitcher plants, palms, mosses and liverworts are abundant. For instance, Table 3.2 contains a list generated by a 2015 study conducted within Barangay Panicuason alone.

There are 48 types of mammals found in the national park, 15 of which are said to be rare. Of these, 6 are said to be endemic species to Mt. Isarog, including velvet-fronted nuthatch, Isarog blind snake, Mt. Isarog shrew mouse, Isarog striped-shrew mouse, the rare Mount Isarog Forest Skink, and Isarog shrew rat. In addition, the Isarog Cloud Frog was first described by scientists in 1997. In all, scientists have identified possibly three new frog species, 8 species of snakes, and 19 species of lizards. Table 3.3 summarizes the vertebrate species found within the protected area.

Status of wildlife. A study on Mt. Isarog Park's management and effectiveness reported 60.7% in 2010 and 70% in 2013, indicating an improvement in its management. There is an on-going biodiversity and management survey for 2015. The status of wildlife in Mt. Isarog based on IUCN and Haribon categories are as follows: Isarog shrew rat is vulnerable; whiskered pitta as nearly threatened (Haribon) and Philippine cockatoo as critically endangered (Haribon).

The project not only supports forest conservation in 350 hectares but also the expansion of wildlife habitat through ecological rejuvenation of the river banks and easement areas. These actions improve water holding capacity and regulate water flows and carbon sequestration. The City ENRO and the Mt. Isarog PAMB, together with academic partners Ateneo de Naga University (ADENU) and the Central Bicol State University for Agriculture (CBSUA) continue to monitor the endemic flora, fauna and wildlife species in the protected landscape.

Management interventions. Specifically, the following management interventions are being implemented in MINP: (1) capacity development trainings; (2) conduct of enhanced survey and registration of protected area occupants (SRPAO); (3) provision of alternative livelihood to PA occupants; (4) law enforcement training and certification for Mt. Isarog Guardians (MIGs); (5) community empowerment and capacity development trainings on disaster risk reduction and management (DRRM), biodiversity management system (BMS) and conflict management; (6) multimedia communication campaigns; and (7) assessment using the Management Effectiveness Tracking Tool (METT).

The on-going assessment on the current status of Mt. Isarog by DENR shows that environment protection is the highest expenditure of the project amounting to 26.42% of the total budget. MINP is also being nominated as the 3rd biosphere reserve in the Philippines.

Biodiversity plan

These priority species described above were identified by the DENR as bio-indicators of the current condition of the forest. The increase or decrease in the number of these species indicates the health of the ecosystem. Toward this end, the city has adopted the following action plan.

Threats to biodiversity. Just like other areas of MINP, the Panicuason area is not spared from illegal activities being done by people living within the periphery of the Mt. Isarog and also by visitors and hikers. This includes Illegal cutting/logging, charcoal-making, wildlife hunting, timber poaching, gathering of non-timber/minor forest products, treasure hunting, agricultural encroachment and other minor offenses such as vandalism, damaging parts of trees and littering.

In 2019, series of forest fires inside the protected area was observed. Initial investigations point out that these fires were caused by honey-gatherers who are using smoke to drive away bees. Embers left by these gatherers easily spread out and triggered huge forest fires. Another possible cause is the poaching of 'cloud rats' or locally known as *bugkon*. Locals are using the same method of using smoke to cast these creatures out of their homes (which is inside a tree hollow or cavity) and lead them into a trap.

Strategies to reduce threats. To address these threats, the city government, through the City ENRO and its partners, are implementing the following measures:

- *Illegal logging/cutting, timber poaching* – conduct of Information, Education and Communication (IEC) campaign especially to peripheral communities regarding the illegal cutting, transporting and even selling of timber products. This intervention can improve the level of awareness of the people that could eventually result to higher social participation.

- *Charcoal making* - by strictly imposing environmental laws covering illegal charcoal-making and its transportation. This includes Section 77 of Presidential Decree 705*. (Unlawful possession of implements and devices used by forest officers.)* Penalties include imprisonment for a period of not less than two (2) nor more than four (4) years and a fine of not less than one thousand pesos (P1,000.00), nor more than ten thousand (P10,000.00) pesos in addition to the confiscation of such implements and devices, and the automatic cancellation of the license agreement, lease, license or permit.

- *Wildlife hunting*. This threat can be regulated by strict implementation of RA 9147 or the "Wildlife Conservation and Protection Act".

- *Gathering of non-timber forest products.* This includes activities such as harvesting of *putyukan* of honey, orchids, ferns, and others. Not only do these activities affect the natural ecological balance but it poses relative threats, one of which is forest fire. One of the mitigating measures being conducted by Naga City is the launching of Environmental Enforcers by deputizing local leaders in controlling and eradicating these activities.

- *Agricultural encroachment.* One of the most prevalent threat in the Panicuason side is the encroachment of agricultural or planting site into the boundaries of protected area. The most common is abaca plantation, but here are also farmers who cultivate coconut, corn, vegetable and other crops. What makes this activity detrimental is the 'clearing phase' where farmers remove existing trees and plants in the area to give way and space for their desired crops. One way of regulating agricultural encroachment is to provide the people with alternative livelihood. This could be in form of capacity development, training, seminar or provision of starter kit for chicken, duck, mushroom and other livelihood.

- *Treasure hunting.* Not only does this kind of activity disturb the ecosystem but it also poses other destruction such as removal of vegetation, collapsing or caving of manmade holes (for buried treasures). Regular forest patrolling and strict monitoring intervention will help eradicate this kind of activity inside the protected area.

- *Minor offenses (including vandalism, littering, damaging flora and fauna)* - proper orientation before entering the protected area must be conducted to ensure that all visitors are aware of the guidelines and house rules inside the park.

These measures are also complemented by the following management strategies identified under the plan:

- *Management constraints and limitations.* These include socio-economic constraints, institutional and legislative constraints and administrative constraints.

- *Management zones.* It is necessary to determine the areas suitable for ecotourism within the Multiple-Use Zone of the protected area. There must be a clear designated areas for parking, administrative area, camping site, trails, guard stations, viewing area, etc. A base map should

be generated locating the specific ecotourism attractions and infrastructure, as well as the sensitive and fragile areas. Based on the base map, a Zoning Map can then be formulated.

- *Visitor site planning.* Visitor use shall be concentrated only in a few locations within the protected area, usually called visitor sites. In MINP Panicuason area, the visitor sites are the Malabsay Falls area, Nabontolan Falls and the blooming baby falls area. However, it is expected that after completion of the proposed viewing deck, souvenir shops and hotel/restaurant in the area, they will form part of visitor sites.

- *Visitor management.* Strategies for visitor management include: *(*a) Limiting number of visitors to a given area. The carrying capacity of MINP Panicuason area being adopted and implemented by the city s twenty-five (25) visitors at any given time. (b) Limiting length of stay. The City ENRO limits the duration of climb/hike up to a maximum of two (2) days only. The Malabsay, Nabontolan and Baby Falls recreation activities are also limited to a one (1) activity only with operation time of 8:00AM to 4:00PM daily. (c) Encouraging use of other areas. By advocating 'inclusive development,' the City promotes other tourist destinations and ecotourism sites located outside Naga.

- *Modification of location use.* These are carried out within problem areas by:
  a) Encouraging camping only incertain areas. There are designated camp sites along the trail where hikers can do camping. Duly accredited guides and porters are made aware that camping should be help only in these areas.
  b) Locating facilities in non-problematic areas. The Protected Area Office (PAO), staff house, and other buildings were all located in a non-problematic area near the entrance of MINP Panicuason.
  c) Discouraging off-trail travel. It is not only discouraged but totally prohibited for visitors and hikers to utilize other routes aside from the designated ones. Off-trail hikes can only be allowed if the person or group has secured a Gratuitous Permit from the DENR thru PAMB stating that they can bushwhack or create a new route for their specific purpose.

- *Modification of type of use and visitor behavior* by:
  a) Discouraging/prohibiting damaging practices and behavior. During orientation, visitors are made aware of the PA house rules and guidelines that the city is implementing within its territorial boundaries.
  b) Teaching correct ecotourism ethics. "Take nothing but pictures. Leave nothing but footprints. Kill nothing but time"
  c) Requiring use of guide. In securing hiking permit, applicants are informed that they are required to have a local accredited guide/s no matter how expert or experienced hiker they may be. Contact numbers are provided in the hiking permit.
  d) Discouraging use of animal transport. The main reason as to why the city provide a set of accredited porters is to regulate or eliminate the use of animal transport. These porters, just like hiking guides, also underwent a series of trainings and capacity development.
  e) Discouraging radios and noisy equipment. Also during orientation, visitors and hikers are informed about the regulated use of sound emitting equipment such as radios, cellphones and others. This is to protect the natural serenity of the place.

ENVIRONMENT AND NATURAL RESOURCES ACCOUNTING

Environment and natural resource accounts (ENRA) of a given municipality will establish the baseline conditions of its natural capital such as land, water, forest, coastal and marine

resources that will drive its local economy towards green growth. The physical accounts are subjected to economic valuation to determine the direct and indirect values of the physical and natural assets of a locality. The specific objectives of ENRA are the following:

- To determine in physical and economic terms the state of environment and natural resources in the locality
- To analyze the impacts of climate change and natural disasters on ENR quality and quantity depreciation
- To recommend strategies and measures to improve the status of ENR as a driver of the local economy

The scope of Naga city's ENRA covered the main economic drivers of the municipality, such as, agriculture, forestry, water resources and municipal incomes. The other natural resources of Naga city are equally important but due to lack of data, such natural resources as biodiversity and renewable energy were not analyzed. The main data sources are from secondary sources, namely, CLUP and CDP of Naga city, NAMRIA GIS for land cover (2003 and 2010) and the PDPFP of Camarines Sur.

Land use account

The land cover/land use changes accounting in aggregate values for 2003 and 2010 for Naga city are provided in Table 3.4.

- The total area of Annual crop in 2003 decreased by 58.35% in 2010.
- Built-up area increased in 2010 by 80.30%
- Forest park and reserve decreased in 2010 by 9.2%
- Total area of Perennial crop increased in 2010 by 41.44%
- Grasslands/shrubs decreased in 2010 by 31.38% reduction in size.

Summary of ENRA results

In the ENRA study, the total area planted rice, corn, sugarcane and abaca all posted a reduction in size. (See Table 3.5 for the detailed breakdown.) The summary of findings are as follow:

- The decline in the area of agriculture is attributed mainly to the conversion of agriculture land to urban uses considering the fact that Naga city is a growth center which is expected to rapidly urbanize. The value of irrigated riceland production declined by 81% as a result of the decreased in land area planted and yield.
- On the other hand, the area planted to corn also decreased but its yield per hectare increased by 58% due to new corn varieties planted and improvement in extension services. Thus, the value of production of corn increased by 36%.
- Forest cover in the watershed of Naga city declined due to kaingin. However, the reforestation efforts in the Protected Areas (NIPAS) increased forest cover by about 12% compensating for the lost in forest cover due to kaingin. The computed net increase in value of the forest cover was P36 million or 14% for the period 2013 as baseline and 2015 as closing stock.
- Water supply connections increased by 32% in 2015 (closing account) compared to its 2013 figures (opening account). The groundwater of Naga is however over-extracted and is projected to be depleted in the coming years. It was revealed in a study by LWUA that the annual groundwater recharge was estimated at only 2.38 M cu. m. per year while current extraction is at 4.79 cu. M. per year.

Table 3.1. Most Intense Typhoons that Hit the Bicol Region, 1947-2006

Name	Period of Occurrence	Highest Wind Speed Recorded (in km/hr.)	Distance from Naga City (in km.)
1. STY Reming (Durian)	Nov 26 - Dec 1, 2006	320	15 - South
2. STY Sening (Joan)	Oct 11 - 15, 1970	275	**Direct Hit**
3. STY Rosing (Angela)	Oct 30 - Nov 4, 1995	260	40 - North
STY Anding (Irma)	Nov 21 - 27, 1981	260	30 – NE
4. STY Nina	Dec 20 - 28, 2016	250	
STY Loleng (Babs)	Oct 15 - 24, 1998	250	35 - NNE
5. STY Sisang (Nina)	Nov 23 - 27, 1987	240	30 – SW
STY Saling (Dot)	Oct 15 - 20, 1985	240	70 - North
STY Herming (Betty)	Aug 7 - 14, 1987	240	70 - SSW
STY Yayang (Vera)	Nov 04 - 07, 1979	240	90 – NE
6. TY Harriet	Dec 28, 1959 - Jan 2, 1960	225	**Direct Hit**
7. TY Glenda	July 9 - July 20, 2014	215	
TY Trix	Oct 16 - 23, 1952	215	22 - North
TY Unsang (Ruby)	Oct 21 - 26, 1988	215	100 - NE
8. TY Warling (Orchid)	Nov 17 - 27, 1983	205	180 - NE
TY Welming (Emma)	Oct 31 - Nov 08, 1967	205	20 – SW
9. STY Yoling (Patsy)	Nov 17 - 20, 1970	200	90 - North
10. STY Dindo (Nida)	May 13 - 19, 2004	185	117 - ENE
STY Kading (Rita)	Oct 25 - 27, 1978	185	90 - North
TY Huaning (Ruby)	Jun 22 - Jul 2, 1976	185	70 – NE
11. TY Milenyo (Xangsane)	Sep 25 - 30, 2006	180	30 – SW
12. TY Dinang (Lee)	Dec 23 - 28, 1981	175	60 - South
TY Yoning (Skip)	Nov 3 - 12, 1988	175	150 – SW
13. TY Monang (Lola)	Dec 2 - 7, 1993	170	35 - North
14. TY Didang (Olga)	May 12 - 27, 1976	150	200 - North
TY Fran	Dec 27, 1950 - Jan 1, 1951	150	30 - North
TY Jean	Dec 22 - 29, 1947	150	**Direct Hit**
15. TY Unding (Muifa)	Nov 14 - 21, 2004	130	5-10 - East
TY Konsing (Ora)	Jun 23 - 25, 1972	130	20 – SW
TY Bebeng (Vera)	Jul 12 - 16, 1983	130	30 – SW
16. TY Saling (Dan)	Oct 6 - 13, 1989	120	15 – SW

Source: Weather Philippines Foundation Inc.

Table 3.2. Flora at Mt. Isarog National Park. Sagun, 2015

Family Name	Common Name	Scientific Name
Moraceae	Anubing	*A. ovata*
	Antipolo	*Artocarpus blancoi*
	Tabgun	*Ficus ritificaulis*
	Langka	*Artocarpus heterophyllus*
	Tibig	*Ficus nota*
	Hauli	*Ficus septica*
	Balite	*FicusbaleteMerr*
	Kanapay	*Ficus magnoliifolia*
	Malatibig	*Ficus congesta*

	Aplas	*Ficus irisana*
Fabaceae	Tindalo	*Afzelia rhomboidea*
	Narra	*Pterocarpus indicus*
	Bani	*Pongamia pinnata*
	Kupang	*Parkia javanica*
	Antsoan-Dilau	*Senna spectabilis*
Myrtaceae	Malabayabas	*Tristania decorticata*
	Bagras	*Eucalyptus deglupta*
	Lipote	*Syzygium polycephaloides*
Verbenaceae	Alagau	*Premna odorata*
	Teak	*Tectona grandis*
	Gmelina	*Gmelina arborea*
Sapotaceae	Caimito	*Chrysophyllum cainito*
	Malasantol	*Sandorium vidalii*
	Nato	*Palaquium luzoniense*
Cauanrinaceae	Agoho	*Casuarina equisetlifolia*
Cytheaceae	Tree fern	*Cythea sp.*
Meliaceae	Kalantas	*Toona calantas*
	Mahogany	*Swietenia macrophylia*
Lauraceae	Avocado	Persea americana
	Puso puso	*Litsea glutinosa*
Anacardiaceae	Dao	*Dracontomelon dao*
	Lamio	*D. edule*
Dipterocarpaceae	Red lauan	*S. negrosessis*
	Tangile	*S. polysperma*
	White lauan	*Shorea contorta*
Anacardiaceae	Manga	*Mangifera indica*
Mimosaceae	Ipil-ipil	*Leucaena leucocephala*
Caesalpiniaceae	Ipil	*Intsia bijuga*
Mimosaceae	Rain tree	*Samanea saman*
Aracaceae	Palasan	*Calamus merrilli*
Palmae	Bagsang	*Metroxylon inerme*
Burseraceae	Pili	Canarium ovatum
Araliaceae	Malapapaya	Polyscias nodosa
Ulmaceae	Malaikmo	*Celtisluzonica*
Rubiaceae	Kape	*Coffea arabica*
	Bangkuro	*Morinda citrifolia*
Sterculiaceae	Boyok boyokan	*Pterospermum niveum*
Euphorbiaceae	Anislag	*Securinega flexuosa*
	Binunga	*Macaranga tanarius*
Vitaceae	Mali mali	*Ticorea aculeata*
Ebenaceae	Bolong eta	*D. pilosanthera*
	Kamagong	*D. philippensis*
Apocynaceae	Lanete	*W. laniti*

Table 3.3. Identified Fauna (Vertebrates) at Mt. Isarog National Park

Species Class	Scientific Name	Common Name	Number of Individuals
Herpetofauna	*Trimeresurus flavomaculatus*	Philippine Pit Viper	2

	Coelognathus erythrurus	Philippine rat snake	1
	Python reticulatus	reticulated python	1
	Brachymeles brevidactylus	Southern Bicol Slender Skink	1
	Hemidactylus frenatus	Common House Gecko	3
	Draco volans	Malay Flying Lizard	2
	Gonocephalus sp.	Agamid angle-head lizards	1
	(Lipinia pulchella)	bark skink	1
	Varanus olivaceus	Monitor lizard	1
	Rhacophorus bimaculatus)	two-spotted tree frog	1
	Rana luzonensis	Luzon stream frog	1
Mammals	*Cynopterus brachyotis*	Short nosed fruit bat	1
	Ptenoclirus jagori	Musky fruit bat	3
	Magaderma spasma	False vampire bats	1
	Rhinolophus sp.	Horse shoe leaf nose bat	2
	Harplocephalus herpia	Common bats	2
	Maaca fascicularis	Long tailed macaque	1
	Rattus everetti	Forest rat	1
	Paradoxurus hermaphroditus	Palm civet	3
	Sus philippinsis	Wild pig	1
Aves	*Ixos philippinus*	Philippine Bulbul	8
	Rhipidura cyaniceps	Blue-headed Fantail	1
	Dicaeum trigonostigma	Orange-bellied Flowerpecker	2
	Dicaeum austral	Red striped Flowerpecke	1
	Orthotomus cucullatus	Mountain Tailorbird	2
	Lanius cristatus	Brown Shrike	2
	Hirundapus celebensis	Purple Needletail	1
	Phapitreron leucotis	White-eared Brown Fruit Dove	1
	Actiniodes lindsayi	Spotted Wood Kingfisher	6
	Dendrocopos maculatus	Philippine Woodpecker	3
	Spilornis holospilus	Philippine Serpent Eagle	2
	Columba vitiensis	Metallic Wood Pigeon	2
	Sarcops calvus	Coleto	1

Table 3.4. Naga City Aggregate Land Cover/Land Use Changes from 2003-10

Land Cover/Land Use	2010 Total area (Ha)	2003 Total area (Ha)	Percent Change
Annual crop	1,364.42	3,276.61	-58.35
Built-up	3,447.53	1,912.07	80.3
Forest park & reserve	554.77	611	-9.2
Inland Water	43.77	43.72	0.0011
Open Forest	63.34	0	0
Perennial Crop	1,801.58	1,273.66	41.44
Idle lands/grassland/shrubs	346.13	504.43	-31.38
Total Area	7,621.49	7,621.49	

Table 3.5. Summary of Physical and Economic Accounts of Naga City: 2013-15

ENR	Opening Stock (2013)		Closing Stock (2015)		Changes (%)	
	Volume of prodn (MT)	Economic value (PhP)	Volume of prodn (MT)	Economic value (PhP)	Physical Account	Economic Account
Agriculture						
Irrigated rice	23,470.72	436,391,097.00	5,526.88	81,455,157.44	(76.40)	(81.33)
Rainfed rice	141.05	2,203,906.25	ND	ND	ND	ND
Paddy rice	30.00	PhP468,750.00	ND	ND	ND	ND
Corn	3,108.10	128,294,318.88	6,403.67	201,795,902.28	106.03	57.29
Livestock & Poultry	**No. of Heads**		**No. of Heads**			
Cow	211.00	2,532,000.00	600.00	7,200,000.00	184.36	184.36
Carabao	2.00	7,400.00	150.00	2,025,000.00	7,400	27,264
Swine	1,523.00	7,310,400.00	2,500.00	12,000,000.00	64.14	64.14
Poultry	294.00	17,640,000.00	300	17,640,000.00		18,000,000.00
Fisheries	77.00mt	87,780,000.00	ND	ND	ND	ND
Domestic water supply	**Daily consumption cu.m.**		**Daily consumption cu.m.**			
Residential	24.51	254,479.63	24.19	251,157.17	(1.30)	(1.30)
Commercial	54.55	566,375.51	53.55	555,992.86	(1.8)	(1.8)
Industrial	ND	ND	ND	ND	ND	ND
Institutional	110.62	1,148,532.00	166.70	1,730,793.71	50.69	50.69
Forest	564ha	250,076,000	644ha	286,052,000	14.18	14.38

Chapter 3

CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION

This chapter provides highlights of the results and findings of assessment studies which include the following: 1) climate change projections and potential future impacts; 2) hazard exposure assessment, 3) climate change vulnerability assessment, and 4) GHG inventory. Its focus is on the most critical barangays, population, physical and natural assets exposed to various hydro- meteorological and geological hazards presently and potentially affecting the city. Equally given emphasis are the impacts of climate change in the six development sectors, namely: health, water resources, transportation, forestry, coastal and marine resources and agriculture sector. Assessments on HEA and CCVA were conducted both at the barangay and city level while the GHG inventory and LGU Capacity assessment were conducted at the city level.

LOCAL CLIMATE CHANGE SCENARIO

Precipitation/Temperature Change

It is projected that the temperature of Camarines Sur, in which Naga City is a part, during the summer season will increase by 1.1ºC for 2020 and by 2.2ºC by 2020. There shall be longer El Nino spells. (Fig. 3.6)

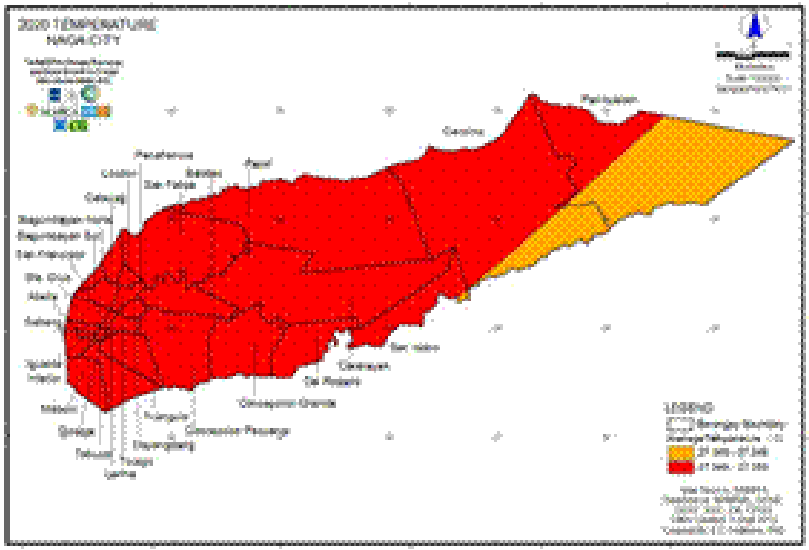


Fig. 3.6. Projected Temperature (2020), Naga City

Rainfall change. Rainfall is projected to decrease by almost 15% during the summer months of March, April and May for 2020 and by 25% for 2050. The projected highest rainfall increase is 9.5% during the rainy months of June, July and August for 2020 and by 16.5% for 2050. This means that Camarines Sur including Naga City will suffer more from heat stress and drought during the summer months for the years 2020 and 2050 while the province will experience more rainfall during the months of June, July and August for the two projected years. (See Table 3.6.)

The frequency of rainfall with greater than 300mm is projected at 4 days by 2020 and 11 days by 2050 which are much higher than the baseline observed value of only 1 day. This simply means more flooding days by 2020 which will further double by 2050. The number of dry days will decrease to 3,698 by 2020 and by 3,811 by 2050 from the observed baseline of 6,219 days. This means that Camarines Sur will have longer wet days than dry days in the near and distant future but with extreme El Nino spells.

Sea rising level. The World Meteorological Organization (WMO) said the Philippines posted the highest average increase in sea levels, at 60 cms, against the global average of 19 cms since the year 1901. As Naga is in the mouth of Bicol River basin, the overflow coming from the Bicol River tributaries results to increase frequency and depth of flooding including the nearby towns downstream of Naga River.

Extreme events. From 1948-2009 or for a total period of 61 years, Camarines Sur recorded a total of 114 tropical cyclones. Out of the 114 tropical cyclones recorded, 1 is considered as super typhoon, 56 typhoons, 35 tropical storms and 23 tropical depressions. The month of October had the most number of tropical cyclones with 26 occurrences and the months of February and April had the least with one occurrence each. From a range of 1 to 10 – 10 being the most vulnerable – Naga City got a score of 6.10 (WWF and BPI Foundation). It is second to Tacloban City (6.74) in being the city most vulnerable to climate change.

ELEMENTS, SECTORS AND INSTITUTIONS EXPOSED TO CLIMATE CHANGE IMPACTS

Under Hazard Exposure Assessment (HEA), existing hazards in the city and their potential future threats are examined considering not only hydro-meteorological but also geological hazards that are of major concern to the local governments (Fig. 3.6).

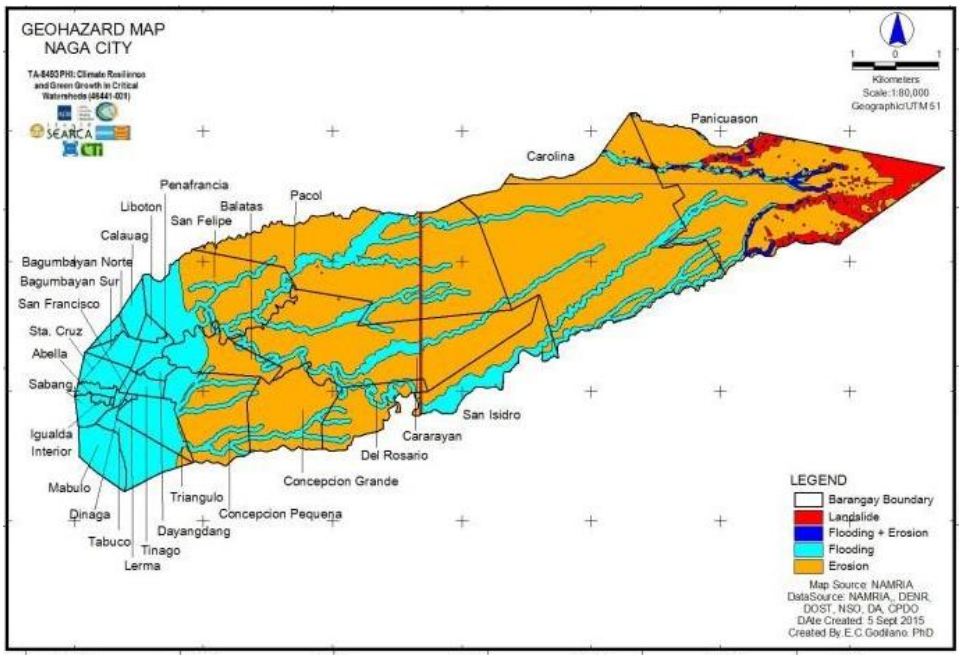


Fig. 3.7. Hazards Affecting Naga City

The assessment centered on barangays, population, physical and natural assets that are exposed at varying degrees to different natural hazards.

Barangays exposed to various hazards

- ***Flooding.*** Seventeen of the 27 barangays or 63% of the total number of barangays in the city have 90-100% of their area exposed to flooding.

- ***Landslide:*** On the other hand, only six out of the 27 barangays are exposed to landslides. These barangays include: Cararayan, Carolina, Del Rosario, Pacol, Panicuason, and San Isidro. The total area exposed to landslides comprises only 4% of the total area of the city. Two barangays in the city registered high exposure to erosion, namely: Panicuason (100%

of the barangay's total area); and Carolina (98%). About 32% of the city's total land area is exposed to slight erosion and 7% to moderate erosion.

- ***Liquefaction.*** About 11% of the total land area of the city is exposed to liquefaction. Most of these liquefaction prone areas are located on the western end of the city. Twelve barangays have their whole land area (100%) exposed to liquefaction.

Population exposed to various hazards

- ***Flooding.*** About 61% of the total population of the city is affected by flooding of different depths. Seventeen of the 27 barangays in Naga city have more than 90% of their total population exposed to floods. These barangays include Abella; Bagumbayan Norte; Bagumbayan Sur; Calauag; Dayangdang; Dinaga; Igualdad Interior; Lerma; Liboton; Mabulo; Penafrancia; Sabang; Sta. Cruz; Tabuco; Tinago; Triangulo; and San Francisco.

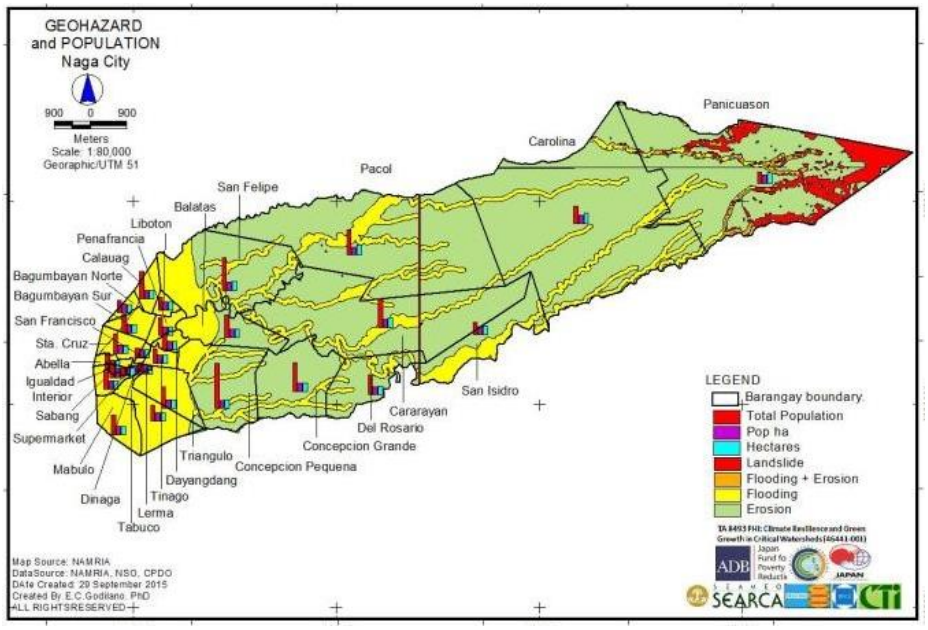


Fig. 3.8. Population Exposed to Various Hazards, Naga City

- ***Landslide.*** Of the total population of the city, less than one percent is exposed to landslides. Six barangays which were found to be exposed to landslides are: Cararayan; Carolina; Del Rosario; Pacol; Panicuason; and San Isidro. All these barangays have less than 1% of their total population exposed to landslides except Panicuason, which has 27% of its population exposed to landslides.

- ***Liquefaction.*** Forty-one percent (41%) of the total population of the city is exposed to liquefaction. The 13 barangays with 90-100% of their total area prone to liquefaction include: Abella (100%); Bagumbayan Sur (100%); Calauag (100%); Dinaga (100%); Igualdad Interior (100%); Liboton (100%); Sabang (99.97%); Mabulo (99.84%); San Francisco (99.78%); Sta. Cruz (99.73%); Lerma (97.71%); Bagumbayan Norte (99.70%); and Penafrancia (96.14%). Population exposed to various hazards such as flood, landslide and erosion is depicted in Figure 3.8.

- ***Flooding.*** Seventeen of the 27 barangays or 63% of the total number of barangays in the city have 90-100% of their area exposed to flooding.

Physical assets of barangays exposed to hazards

Physical facilities exposed to flooding were identified and counted to be 73 in all. These facilities include food/store (14); Hospital/Clinic/Pharmacy (9); Government facilities (6); Police station (5); Motel/Hotel (8); Bank (9); Church (6); Gas Station (6); Tourist Attraction/Recreation (7); Bus Station/Stop/Repair (2); and Train Station (1). A total of 50 physical assets are also exposed to liquefaction. Others are as follows:

- Four bridges in the city are exposed to flooding. These bridges are located in Liboton, San Francisco, Igualdad Interior, and Tabuco. These bridges are also exposed to liquefaction.

- The city has 46 schools located in 17 barangays that are exposed to flooding. On the other hand, 24 schools located in 10 barangays are exposed to liquefaction.

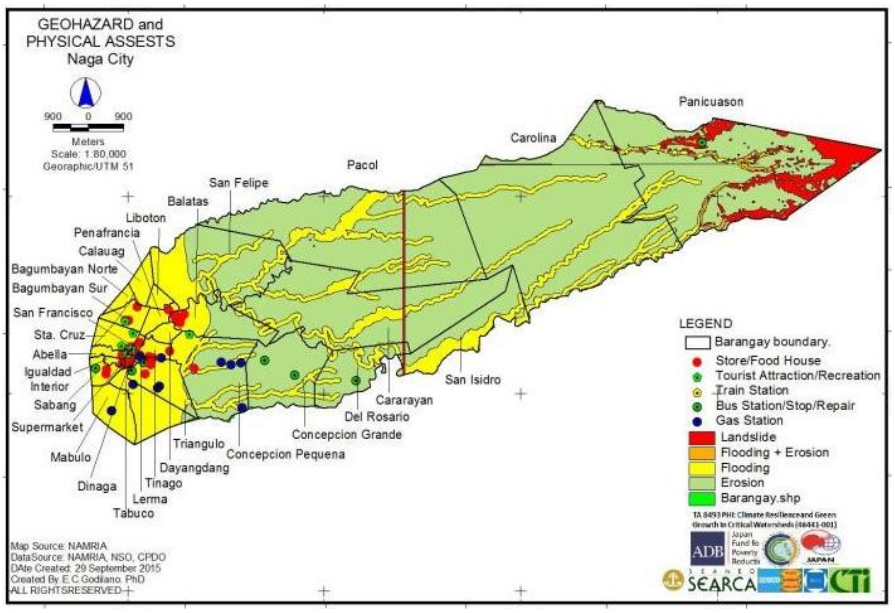


Fig. 3.9. Physical Assets Exposed to Various Hazards, Naga City

- Of the total length of roads exposed to all types of hazards (i.e., flood, erosion and landslide), about 27% are exposed to flooding. Roads exposed to landslides are located in only two barangays in the city: Cararayan and Panicuason. In addition, about 21 km or 7%of the roads in the city is exposed to liquefaction.

Figure 3.9 depicts the physical assets located in different barangays which are exposed to various hazards.

Land uses exposed to hazards

Total built-up areas exposed to various flooding depths comprise about 8% of the total city area. Of the total built-up areas exposed to flooding, about 8% is susceptible to deep floods of more than 1.5m depth. Three barangays are considered critical since more than 75% of their total built-up areas prone to floods are susceptible to deep flooding. These barangays are: Dinaga (82%); Mabulo (79%) and Tabuco (77%).

About 2,252 hectares of agricultural areas in the city that are planted to annual and perennial crops are exposed to flooding of various depths. Of the total agricultural areas that are exposed to flooding, 15% is affected by deep floods of more than 1.5m depth. Two barangays registered the largest proportion of agricultural areas that are exposed to deep flooding: Tabuco with 84% of its agricultural areas affected; and Mabulo with 74% affected.

SUMMARY FINDINGS OF VULNERABILITY ASSESSMENT
(EXPOSURE, SENSITIVITY AND ADAPTIVE CAPACITY)

Sectoral CCVA Assessment, Health Sector

Diarrhea/diarrheal diseases. Twelve of the 27 barangays in Naga City have moderate vulnerability to a diarrhea outbreak. These include Mabolo, Tabuco. Triangulo, Abella, Bagumbayan Sur, Dayangdang, Igualdad Interior, Sabang, Santa Cruz, Tinago, Lerma, and Bagumbayan Norte, with the rest of the barangays having low vulnerability to a diarrhea outbreak. All barangays with moderate susceptibility to a diarrhea outbreak have the highest proportion of total population residing in flood-susceptible areas at > 60% to 80%

Dengue fever/dengue hemorrhagic fever. Twenty-three (23) barangays in Naga City have moderate vulnerability to an outbreak of dengue fever/dengue hemorrhagic fever while four, namely Carolina, Dinaga, Panicuason, and Penafrancia have low vulnerability. The observed gradient in the vulnerability of barangays to a dengue fever outbreak can be explained – in part – by differences in sensitivity to the given climate change impact. In particular, barangays with low vulnerability to an outbreak of dengue fever / dengue hemorrhagic fever are among the barangays with the lowest susceptibility to flooding (< 0.1 meter), and the lowest proportion of total population residing in flood-susceptible areas.

Leptospirosis. Mabulo and Tabuco have moderate vulnerability while the rest of the barangays having low vulnerability to a leptospirosis outbreak. The observed gradient in the vulnerability of barangays to a leptospirosis outbreak can be explained – in part – by differences in sensitivity to the given climate change impact. In particular, Mabolo and Tabuco have the highest susceptibility levels to flooding (>1.5 meters) among barangays in Naga City.

Sectoral CCVA Assessment, Water Resources Sector

Drought. Overall, Naga City's water resources are moderately vulnerable to drought. Forest cover and land use attributes are factors that increase the drought susceptibility wherein, the built-up area is increasing in all directions from the center of the city. On the average, sixteen (16) barangays have built up area of 11 to 30% of the total land area while 31 to >50% of the total land area is already building up in eleven (11) barangays.

Flood. The water resources of Naga City is moderately vulnerable to flood with two barangays qualifying under the "high vulnerable" category: Mabolo and Triangulo. Both were found to have the largest portion of their total area (more than 90%) under the high inundation zones. Barangays that belong to higher limit of moderately vulnerability include Dayangdang, Dinaga, Igualdad Interior, Lerma, Sabang, San Francisco, Tabuco and Tinago. Barangay Penafrancia has no apparent flooding. However, its settlements and communities are located along or adjacent to the Bicol and Naga rivers thereby making it moderately vulnerable to floods. Panicuason registered the lowest vulnerable area to flooding mainly because 89% of its total area is located in rolling to hilly terrain. A review of the flood inundation maps would show that deep flooding would occur in the western portion of Naga City in the vicinity of Bicol and Naga rivers.

Sectoral CCVA Assessment, Transportation

Flooding. All of the city's roads, which include primary roads situated in its western part, are vulnerable to flooding. Historically, the eastern portion, which part covers Mt. Isarog, is not prone to flooding. Within the sub-watershed, the city proper is located in the downstream area making it highly sensitive and exposed to inundation as water flows westward from eastern uplands. Roads in the following 7 barangays have high vulnerability to flooding based on the flood model results conducted by the Project: Cararayan; Carolina; Mabulo; Pacol; San Isidro; San Felipe; and Triangulo. The rest of the 20 barangays in the city have moderate vulnerability to floods.

Landslide. Generally, the whole city is not susceptible to landslides except for barangays Carolina and Panicuason. Some road segments in the following five (5) barangays are highly vulnerable to landslides: Cararayan; Carolina; Pacol; Panicuason; and San Isidro. The other 22 barangays have their road segments moderately vulnerable to landslides.

Liquefaction. Naga City has low to moderate vulnerability to liquefaction. Except for strips of land around the town and within Barangay Carolina, the city is less vulnerable to liquefaction. Historically, only one fifth of the city or the entire town proper, is susceptible to liquefaction. The land area outside the city proper and going eastward to Mt. Isarog, is not prone to liquefaction. Seven barangays have road segments with moderate vulnerability to liquefaction: Balatas; Calauag; Carolina; Concepcion Pequeña; San Felipe; Tabuco; and Triangulo. The other 20 barangays have low vulnerability to liquefaction. Overall, the road segment with highest vulnerability to liquefaction belongs to Triangulo, a barangay that is historically prone to the hazard.

Sectoral CCVA Assessment, Forestry sector

The barangays that were identified to harbor forests are Carolina, Pacol, Panicuason and San Isidro. The forestry sector of Naga City is composed of the forestry areas in the Mt. Isarog National Park (MINP) that are inside the administrative boundaries of the city. This consists of 484.02 hectares of closed broad leaved forest and 8.87 hectares of communal forest. The sector also includes the areas consisting of strips in river banks planted to trees and are part of the National Greening Project of the city. The findings are as follows:

- ***Erosion.*** The forests of all the four barangays (Carolina, Pacol, Panicuason and San Isidro) have moderate level of overall vulnerability to soil erosion. All the forests of the four barangays were rated to have moderate vulnerability to erosion.

- ***Flooding.*** Except for Barangay Panicuason, which has a low vulnerability to flooding, the other three forested barangays are moderately vulnerable to flooding when the rivers and tributaries traversing them swell and overflow.

- ***Landslide.*** The overall vulnerabilities to landslides of the forestry sector of the four barangays are moderate in Pacol, Panicuason and San Isidro. Carolina forestry sector has a high vulnerability to landslide.

- ***Drought.*** All four barangays (Carolina, Pacol, Panicuason and San Isidro) have high vulnerability to drought based on projected rainfall volume.

- ***Wildfire.*** Barangays Carolina and Pacol have moderate vulnerability to wildfire while Pacol and Panicuason have low vulnerability to wildfire.

Sectoral CCVA Assessment, Agriculture sector

Naga City remains primarily an agricultural community. Of the city's total land area of 8,448 has, around 4,550 (54%) is devoted to agriculture and the sector employs 14 percent of the total households. Eleven of the city's 27 barangays are crop production areas. These barangays include: Carolina (Upland/Hilly); San Isidro (Upland/Hilly); Cararayan; Pacol (Upland/Hilly); Panicuason (Upland/Hilly); San Felipe; Mabolo; Balatas; Concepcion Grande; Del Rosario; and Concepcion Pequeña.

Floods, Drought, Typhoons, Soil Erosion and Pests and Diseases. All the eleven 11 agriculture crop areas, namely: Carolina (Upland/Hilly); San Isidro (Upland/Hilly); Cararayan; Pacol (Upland/Hilly); Panicuason (Upland/Hilly); San Felipe; Mabolo; Balatas; Concepcion Grande; Del Rosario; and Concepcion Pequeña are moderately vulnerable to flood, drought, typhoon, soil erosion and pests and diseases.

GHG EMISSION ASSESSMENT

Summary of findings

The rapid urbanization of the city has raised the concern on its GHG Emission. A community-based GHG Assessment conducted in 2015 highlights the following Summary of Major Findings:

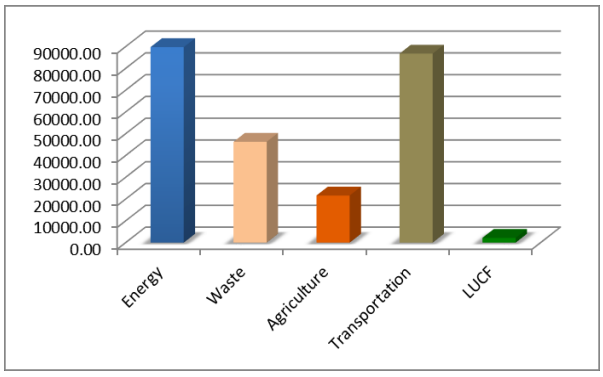


Fig 3.10. Carbon Emission of the Different Sectors in Naga

- Total emissions of Naga City including the LUCF sector amounted to 246,640.13 tons. The Energy and Transportation sectors contributed almost the same amount in the city's total emissions.

- About 36% of the total emissions came from the Energy sector while around 35% was contributed by the Transportation sector. The Energy sector had an emission of 89,760.04 tons while the transportation sector contributed 86,776 tons.

- Ranking third among the sectors was the Waste sector with an emission of 46,288 tons of CO_2 or 19% of the total emissions. Following the Waste sector was the Agriculture sector which contributed about 21,632.70 tons or 8.77% of the total emissions. Results indicate that Naga City has small area allotted to crop production and has few livestock. LUCF which contributed 0.89% of the total emissions of Naga City had a total emission of 2,183 tons CO_2. (See Fig. 3.10).

Net emission

Considering the amount of carbon absorbed by the LUCF sector of Naga City (9,501.47 tons CO_2), the net carbon emission of Naga City is 237,138.66 tons. Results show that the LUCF sector of Naga City is not large enough to offset the carbon emission of the City. The

estimated per capita emission of CO2 equivalent for the city is 1.4. This per capita value is almost double than the World Bank estimated standard value of 0.7tons CO2e per capita.

CLIMATE CHANGE MITIGATION AND ADAPTATION PLAN

In 2019, the City Government developed and adopted a Local Climate Change Action Plan (LCCAP), 2021-25 to mitigate the impact of these multiple hazards. The plan would need P1.5 billion in additional funding to implement, including a project package amounting to PhP700 million which was submitted to the People Survival Fund (PSF) for possible funding.

Table 3.7 presents the breakdown of the plan's resource requirements by key result area (KRA) and proposed funding source. It has five KRAs:

1. Ensuring resilient communities through improved food security and ecosystem
2. Reducing hazard through integrated water resource management practices
3. Reducing risk of worsening climate change impact and disasters to men and women (human security)
4. Promoting climate change-resilient, eco-efficient entrepreneurs and green growth-oriented city, and
5. Implementing improved climate responsive monitoring and regulatory systems implemented.

The specific PPAs under the LCCAP are detailed under Annex "E.III" of Vol. 1 (Comprehensive Land Use Plan, 2016-30).

Flood management. One of the activities under KRA No. 2 is the development and design of a climate-proof integrated flood management master plan. This was carried out through the Integrated Naga River Revitalization Project (iNRRP) pre-feasibility study, funded with technical assistance from the Cities Development Initiative for Asia (CDIA).

The flood management component of the study recommended the provision of "robust" flood defenses that do not totally fail or collapse when design discharges are exceeded but still provide a certain degree of protection. These include the following:

- Low earth embankment levees or revetment encircling the City and along the Naga River with an elevation of +3.75 to +4.00 msl (a height of 1-2 meters) to both north and south of the town, to prevent overbank flow, Levees and low concrete barrier walls could be built in such a way as to be heightened at a later date;
- Flood prevention works along both banks of the Naga River from the mouth at the Bicol River to the Basilica Landing stage above Magsaysay Bridge at elevation +3.75 msl to +5.5 msl, which would include bank stabilization and re-enforcing the toe of the banks and the existing concrete revetments where necessary;
- Channel diversion to move water from the Naga River away from human settlements and over developed river bank areas, cut-off channel (floodway) and low earth levees of up to one meter high would be constructed along the lower slopes of the tributaries to the Naga River;
- Solid river barrier walls on the Naga River and flap gates on drainage outlets, Barrier walls could be built with solid poured concrete foundations (including concrete piles for foundation support and slope-toe stability). Flap gates would be provided on all drainage outfalls. They could later be raised to higher elevations using hollow concrete blocks;
- Improved internal drainage system for the CBDs with two low lift pump facilities to lift waters over the Bicol River barrier wall and/levees so as to evacuate storm and flood waters from these areas in a reasonable period of time;
- A total of 27 mobile pumps for evacuating low lying areas where stagnant water had accumulated and to flush out drains before the typhoon season;

- Low-lift pumping facilities to evacuate flood waters from the city. For the low-lift pumping facilities, the structures could be built to house say 20 pumps but only install 10 pumps thus allowing the flexibility to add additional pumps as the need arises or to reduce the overall evacuation time of inundated areas;
- Mobile pumps to drain low areas and flush drains prior to a typhoon season;
- Concrete stilts for urban poor to raise their dwellings above flood level.
- A flood warning system using loud distinguishable sirens (like tornado sirens in the USA); and
- The provision of staff gauges and automatic water level recorders to be mounted on existing bridge supports along the Naga River would provide a much needed supplemental data base that would serve the scientific community at large to correlate global climate models (GCMs) with local data.

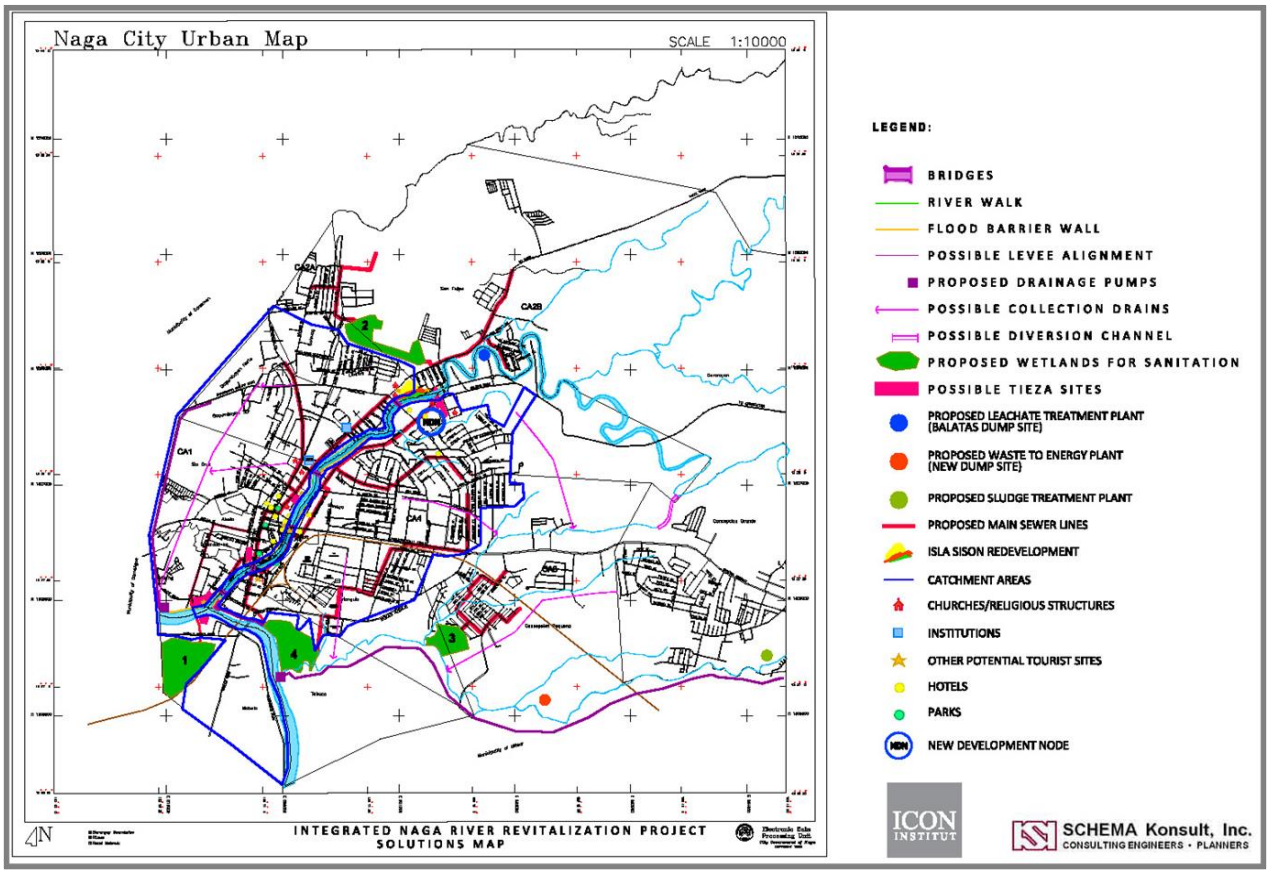


Fig. 3.11. The Flooding Problem Solutions Map for Naga City. Courtesy of CDIA.

Fig. 3.11, taken from the iNRRP Pre-FS, maps out the above mentioned solutions to the city's perennial flooding problems.

DISASTER RISK REDUCTION AND MANAGEMENT

Natural hazards, such as typhoons, flooding, land instability, earthquakes, urban fires and conflagration, power failure, have the potential to cause environmental, social economic loss through damage to habitation, life line facilities, and infrastructure. Land uses that fail to

recognize the areas prone to hazard risks are not sustainable and can cause communities and the environment unnecessary harm or damages especially to the business community. Communities need to be developed in a sustainable manner by insuring a close linkage between hazard mitigation, comprehensive land use planning that focus on future land uses and climate change adaptation.

Guide to action

Although disasters will be basically felt at the barangay level, it is important to build confidence and self-reliance at the barangay level, which can be best effected through timely, supportive and planned interventions by the city government.

A Counter-Disaster Plan is an understanding of the causes of disaster, anticipating its effects to constituents and their environment, knowing the counter measures to prevent or lessen the consequences and applying the appropriate measures effectively. Only a sustained effort and preparedness can make a disaster management plan effective socially acceptable.

The city's Risk and Hazard Maps, developed by the EDP-GIS unit, were updated by DRRM personnel to suit up with the current state of city's development plan. This includes the study on the state of the Naga River where barangays are situated that were prone to flooding. Flood hazard maps were developed as well as the population at risk was determined, hence, infrastructural mitigation were developed to minimize the effect of the flooding.

Institutional arrangements

This multi-hazard approach in disaster risk reduction and management, proposes that all agencies and departments with their disaster specific functions come under a single umbrella of control and directions to attend to all kinds of disasters, thus understanding and implementing the pre-defined Incident Command System will be followed all along.

The existing arrangements have strengthened this administrative arrangement, with the City Mayor as ground commander being the LDRRMC chairman. He is being supported by the Executive Officer of the Local Disaster Emergency Operations Center (DEOC) at City Hall. The objective is to have a simplified and uncluttered system of disaster response.

The Disaster Emergency Operation Center (DEOC). The Disaster Emergency Operation Center is the center of the operation during a disasters or even during normal times. The structure of the DEOC can expand or contract depending on the disaster situation. This is located at the Naga City Public Safety Office where the Central Communications Center is located, that also serves as the Command Center.

The primary function of DEOC is to implement the NDRRM Plan, which includes coordination, operations management, data collection, record keeping, public information, resource management and proposed project to the chairman of the Public Safety Committee for policy development.

The DEOC, its systems and procedures are designed in such a way that information can be promptly assessed and relayed to concerned parties. Rapid dissemination contributes to a faster response and effective decision-making during an emergency. As the master coordination and control point for all counter-disaster efforts, the DEOC is the center for decision making

under a unified command. In a disaster situation, the DEOC will come under the direct control of the chief executive. Or any person designated by him as the chief of operations.

The usual activities of the DEOC will be to:

- Ensure that all barangays continue to regularly update the BDRRM Plan and encourage them to prepare specific plans for areas prone to specific disasters;
- Continue identify and interact with the Government departments/agencies, laboratories, research institutions and NGO's to evolve mitigation strategies and set-up study groups and task forces for specific vulnerability studies.
- Serve as the data bank and ensure that mitigation strategies are planned and implemented;
- Upgrade and update the city DRRM Plan according to the changing situation of the city, and its development trend;
- Disseminate the information about the city DRRM Plan to other departments of the city government and barangay level.
- Organize damage assessment and needs assessment and update the city DRRM Plan accordingly;
- Ensure that the warning and communication systems and instruments in the DEOC are in working conditions.
- Ensure that all emergency rescue equipment and personnel are all ready for deployment at any given time and situation.

On the receipt of the warning or alert from any agency which is competent to issue such warning, all community preparedness measures including counter-disaster measures will be put into operation. The chief executive will assume the role of the chief of operations for disaster management with the aid of the DRRM Officer.

The occurrence of disaster would essentially bring into force the following:

1. The DEOC will be on full alert.
2. The DEOC can expand to include agencies/Office with responsibilities for specific tasks.
3. An on-going UHF RADIO 406.3000 Mhz. will be used for radio communication, wireless communication and hotline contact with the PNP 166, BFP 160, and Ambulance, BMC OPCEN, will be the contact numbers of the DEOC for the dispatch of their personnel, fire trucks and ambulances and other emergency equipment.
4. The DEOC will implement THE HELP LINE 3000 (472-3000, 811-3000, 478-3000) for the use of the key agencies involved in disaster management to be backed up with a mobile cellular number and a VHF communications facility.
5. The DEOC will implement and use an Incident Command System for its operation.

Agencies, Offices Primarily Responsible in Addressing a Threat. Helping the DEOC are the following agencies:

- City Mayors Office (DRRMC, City Disaster Management Services)
- The Naga City Public Safety Office
- Naga City Disaster Risk Reduction and Management Office
- Bureau of Fire Protection / Naga City Central Fire Station/BFP SRU/EMS
- Department of Education/ Pre Determined Evacuation Centers
- Naga City Hospital/Emergency Rescue Naga
- Philippine National Police / Naga City Police Office
- Philippine National Police/ MARITIME Group
- City Health Office/ Center for Decease Prevention and Surveillance
- City Social Welfare and Development Office- Relief Operations

- City Agriculturist Office
- City Engineers Office
- Philippine National Red Cross
- Naga City Peoples Council
- Camarines Sur Medical Society/Philippine College of Surgeon
- KABALIKAT NAGA CENTRAL/Emergency Communications System

A set of protocols for pre-crisis, crisis and post-crisis action plans have been adopted by the City Government to guide its efforts in times of disasters.

Pandemic planning

A good example of how these institutions came together is Naga's response to the Covid-19 pandemic. Thanks to 1,700 warm bodies and volunteers from national and local government agencies and private sector partners, guided by the Incident Management Team (IMT) that directed the city's response, Naga has managed the spread of covid within the city. This was made possible by the following strategies:

1. **Single-point direction**. At the institutional level, it had the IMT, which later transformed into the Naga's Health and Emergency Response Task Force (HERTF) pursuant to a city ordinance. HERTF is the primary city agency in charge of coordinating local efforts to contain the disease, and makes all key decisions in the task to safeguard all stakeholders.

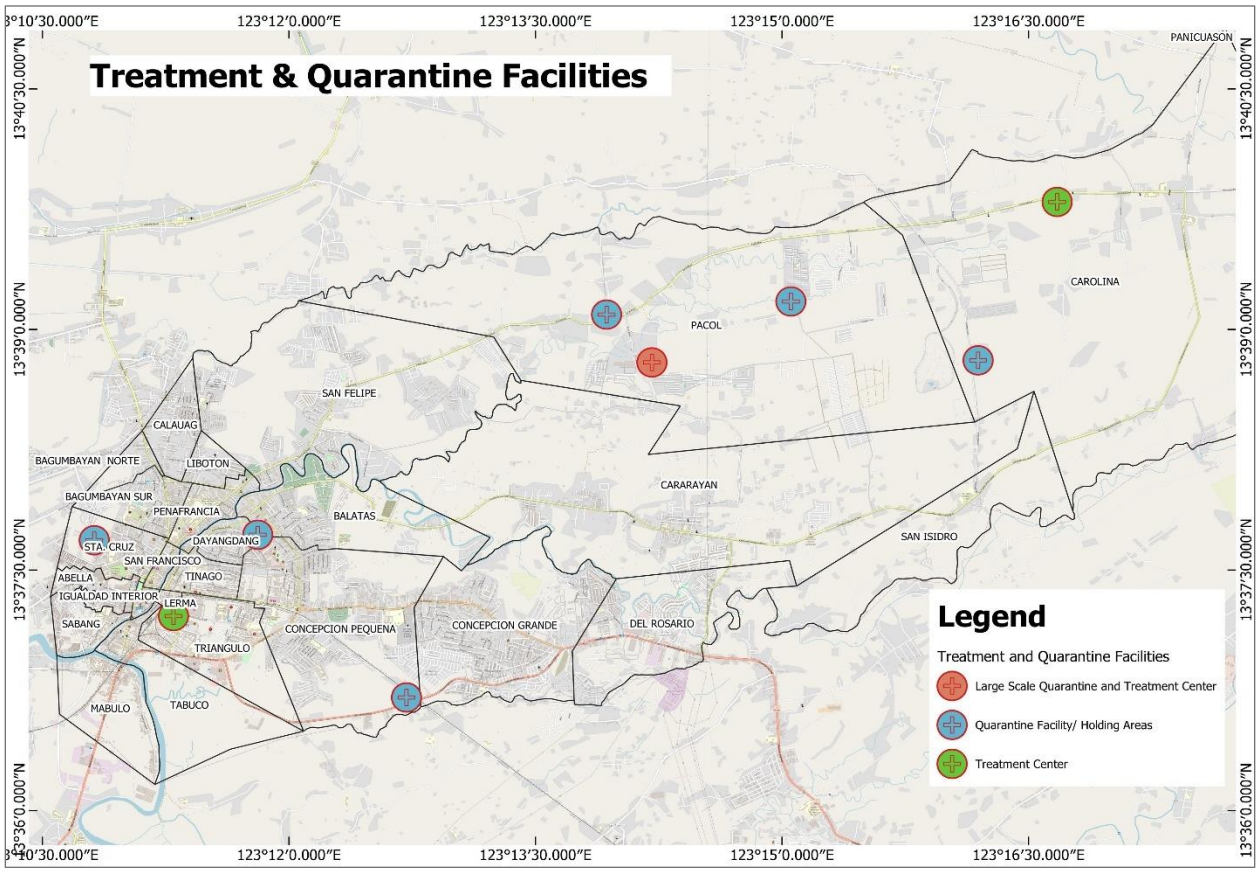


Fig. 3.12. Naga City's Covid-19 Quarantine and Treatment Facilities

2. **Public-private partnerships**. Through the IMT/HERTF, the city quickly imposed various types of lockdowns where necessary and adopted policies well ahead of the national government. To multiply capacity of the city government, vehicles made available by schools like the University of Nueva Caceres, Ateneo de Naga University and Naga College Foundation. To provide food, industrial kitchens provided by the Bicol State College of Applied Sciences and Technology (BISCAST), using food stuff and cooks organized by the Metro Naga Chamber of Commerce and Industry, were mobilized. Moreover, local public-and-private sector-driven humanitarian task group worked with the Red Cross to ensure that all private donations are directed to vulnerable residents in need.

3. **Evidence-based and science-informed decision making.** The city managed the disease well, thanks to developed local capacity to assess covid's various dimensions. This includes a local web-based GIS-powered Covid19 dashboard that is updated regularly. The system tracks available resources spatially, and guides the implementation of localized lockdown solutions to contain the disease. Figure 3.11, for instance, maps out the city's treatment and quarantine facilities, which includes the JMR Coliseum at the city center and the Metro Naga Sports Complex at the periurban areas.

   Another is the locally developed *eSalvar* contact tracing solution -- a QR-code based mobile phone app developed by Nueca, a local IT company, in partnership with the city's information technology department. *eSalvar* allows the city government to track the spread of Covid-19 by capturing up to the 3rd level of contacts with individuals suspected of having caught the virus. Armed with these data, it implemented evidence-based local solutions and strategies aimed at containing its spread.

4. **Responsive policy development.** Through the Sangguniang Panlungsod, the city government laid down clearcut policies for the "new normal," approved the enabling ordinance for eSalvar contact tracing, and implemented budgetary realignments that allowed funding for business stimulus, community employment, and Naga's own PT-PCR laboratory.

Table 3.6. Frequency Table for 1-day Rainfall (mm) based on Observed Values (1951-2010) and Projected for 2020 (2006-2035). Camarines Sur

Frequency (Years)	2	3	5	10	20	30	50	70	60	100
1951-2010 Observed values	180.0	213.5	251.5	300.3	384.4	376.6	412.4	436.7	445.8	461.7
2020, bias corrected (2006-2035)	175.9	215.1	262.5	327.5	397.5	440.9	498.6	539.6	555.3	583.5

Table 3.7. Resource Requirements, LCCAP, 2021-25. Naga City

EXPECTED RESULTS		Budgetary Requirement		
		LGU	NGAs	Others
C1. Resilient communities through improved food security & ecosystem ensured				
1.1	Rehabilitate and protect Mt. Isarog	2.40	6.60	
1.2	Expand buffer zone and protect KBAs	3.25		0.30
1.3	CC adaptive agricultural extension services expanded		3.70	14.80
1.4	Innovative partnership support among farmers developed	2.00		9.00
		7.65	**10.30**	**24.10**
	Subtotal			***42.05***
C2. Reduced hazard through integrated water resource management practices				
2.1	Multi-functional rehabilitation of Mt. Isarog River tributaries implemented	43.13	3.50	388.13
2.2	Ecological restoration of creeks implemented and sustained	69.00	342.81	273.71
2.3	CC adaptive management pocesses of flood reduction and water systems facilitated	0.70	6.30	
2.4	LID technology promoted at community level established	1.08	6.30	9.54
2.5	Ground water management and practice by various sectors improved	5.80		8.70
		119.70	**358.91**	**680.07**
	Subtotal			***1,158.68***
C3. Reduced risk to men and women of worsening climate change impact and disasters (human security)				
3.1	Procedures and capacity on CCA-DRRMO for various sectors enhanced	23.09	80.00	2.54
3.2	Management for CCA-DRRM including IER and post disaster rehabilitation improved	0.90		
3.3	System for CC related health emergency and post disaster response updated	0.97		1.62
3.4	CC proofed rehabilitation and resettlement areas adopted	14.00	22.50	93.42
3.5	Inclusive and gender responsive relocation and resettlement areas provided	3.00	5.40	9.60
		41.96	**107.90**	**107.18**
	Subtotal			***257.04***
C4. Climate change-resilient, eco-efficient entrepreneurs and green growth-oriented city promoted				
4.1	MSMEs' capacities for eco-efficient production and operations facilitated	0.10		5.00
4.2	Implement clean fleet program	0.68		0.00
4.3	Multi-mode transport system promoted	6.00		11.65
4.4	Renewable renewable energy and energy efficency/conservation promoted	0.23		
		7.00		**16.65**
	Subtotal			***23.65***
C5. Improved Climate responsive monitoring and regulatory systems implemented				
5.1	Inclusive public policy development, monitoring & evaluation including compliance implemented	7.23		
5.2	Evidence based local policies to institutionalize initiatives enacted	0.72		
	Subtotal			***7.94***
	GRAND TOTAL			**1,489.36**

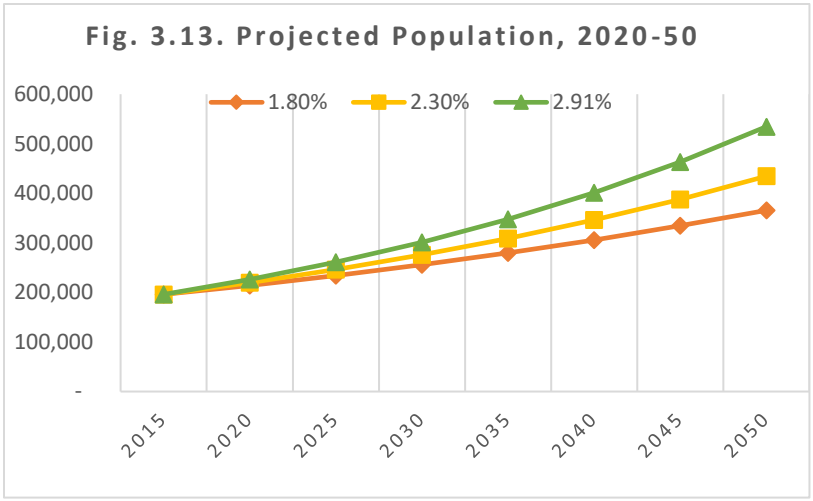
Chapter 4

POPULATION AND SOCIAL PROFILE

This chapter summarizes the demographic and social context of Naga City as key inputs in characterizing the current realities underpinning the CLUP.

DEMOGRAPHY

Population count and trends. The 2015 Census by the Philippine Statistics Authority (PSA) puts Naga's population at 196,003. This is an increase of 21,072 inhabitants over the 2010 total of 174,931, making Naga the fastest growing city in Bicol in terms of population. This translates to a 2.3% annual population growth rate, lower than the 2.91% registered between 2007 and 2010.



Of the total, 49% are male while 51% are female. The latter's share has been steadily growing: in 1995, there were only 95 females for every 100 male population; in 2010, there were already 104 females for every 100 males.

In 2015, the city's household population reached 42,152, higher by 6,223 compared to the 35,929 recorded in 2010, yielding an average household size of 4.61, lower than the 4.84 recorded five years back. By comparison, there were 5.20 persons per household in 2000. These mean there are around 5 persons in the average Nagueño family over the last 15 years.

By 2030, the city's population is projected to hover between a low of 256,028 to a high of 301,300[1]. (Fig. 3.13.) If the current 2.3% growth rate is maintained, Naga's population will reach 273,715 by 2030. (See Tables 3.8 and 3.9.)

Age-sex structure. Naga is a city of young people. Children and the youth (those aged 24 and below) comprise more than half (54%) of the total population. More than a quarter (29%) is of school age, with preschoolers accounting for 4%, elementary 12% and secondary 13% of the total.[2] While males make up 52% of the total school-age population in the lower years, the situation is equalized at the secondary level with males and females each getting 50%. (See Table 3.10)

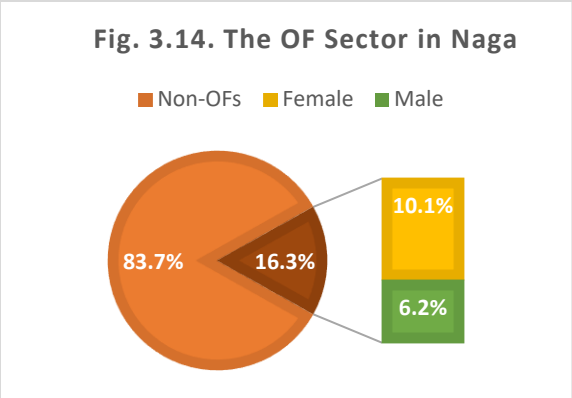
[1] The low-growth scenario is based on an annual population growth of 1.80% recorded between 1991-2000. The high-growth scenario is based on a 2.91% annual growth recorded between 2007-2010.

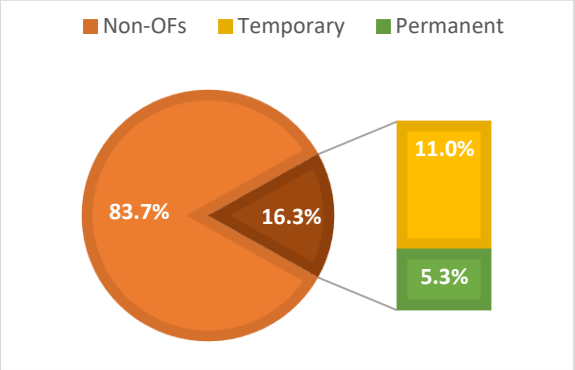
[2] This is further broken down into 9% for junior high school (Grades 7-10) and 4% (Grades 11-12) under the new K-12 curriculum.

Population density. Based on PSA standards, Naga is 100% urban. At 2,320 residents per sq km as of 2015, up from 1,631 per sq km 15 years ago, it remains the most densely populated city in Bicol using a land area of 84.48 sq kms as base.[3]

Naga has a total of 27 barangays of varying sizes. In terms of population, Dinaga is the smallest with 456 inhabitants as of 2015 while Concepcion Pequeña is the largest with 23,577. In terms of land area, Lerma is the smallest with 5.1 hectares while Carolina is the biggest with 1,777. Lerma is also the densest at 461 persons per hectare while Panicuason is the least dense at only 2 persons per hectare. (See Table 3.11.)

Migration. In 1990, 39% of the city's population were considered migrants. In the 2007 Ateneo de Naga University SSRC survey, 43% of city residents are born in Naga, 38% are from Camarines Sur, 9% are from other Bikol provinces, and 11% from outside Bikol. Their average length of stay in Naga is 28 years.





The pace of migration has remained largely the same between 2000 and 2010. Only 5% (2010) to 6.7% (2000) of the household population aged five years old and above moved their place of residence: almost all (between 93.3 to 95%) stayed in Naga. In 2010, 2.8% moved in from other cities or towns of Camarines Sur, 2% from other provinces, and 0.2% percent from other countries.

According to OWWA data, there were around 2,155 overseas Filipino workers (OFWs) who are from Naga in 2016; after adjustments, it is estimated that around 8.5% of the city household population have an OFW member. The city's CBMS data for 2011 and 2015 place their number between 6.5 to 6.8%. Both are higher than the 2015 PSA data placing the share of Bikolano OFWs to the Philippine total at only 3.1%.

The OWWA and CBMS figures, however, are closer to results of the 2014 ASSRC survey which says that 16.3% of the city's household population have a family member abroad. (Fig. 3.14.) The same survey said that 61.8% of these international migrants are female while 38.2% are male. Moreover, two of every three (67.6%) are Overseas Filipino Workers (OFWs) working abroad, while 32.3% have permanently migrated or Overseas Filipinos (OFs).

Poverty incidence. According to NSCB estimates, the official figures used by government, poverty incidence in Naga reached 15.7% in 2012, an improvement over the 16.6% registered in 2006 and the 24.4% in 2009.

[3] This document will use 84.48 sq. kms as Naga's land area, consistent with the Philippine Geographic Standard Code (PGSC) reflected in the PSA website. This is notwithstanding the reduced 77 sq, kms measure put forward by the Land Management Bureau of the DENR in 2013, which is under review.

To more fully capture the extent of poverty, these official figures are supplemented by two other data sets. One is the self-rated poverty data generated through the annual Naga City Poverty and Governance Public Opinion Poll conducted by the Ateneo de Naga Social Science Research Center. Over the last few years, there has been a significant downtrend in the number of people saying they are poor: from a high of 62% in 2007, it went down to 48% in 2013, 42% in 2014 and 43.5% in 2015.

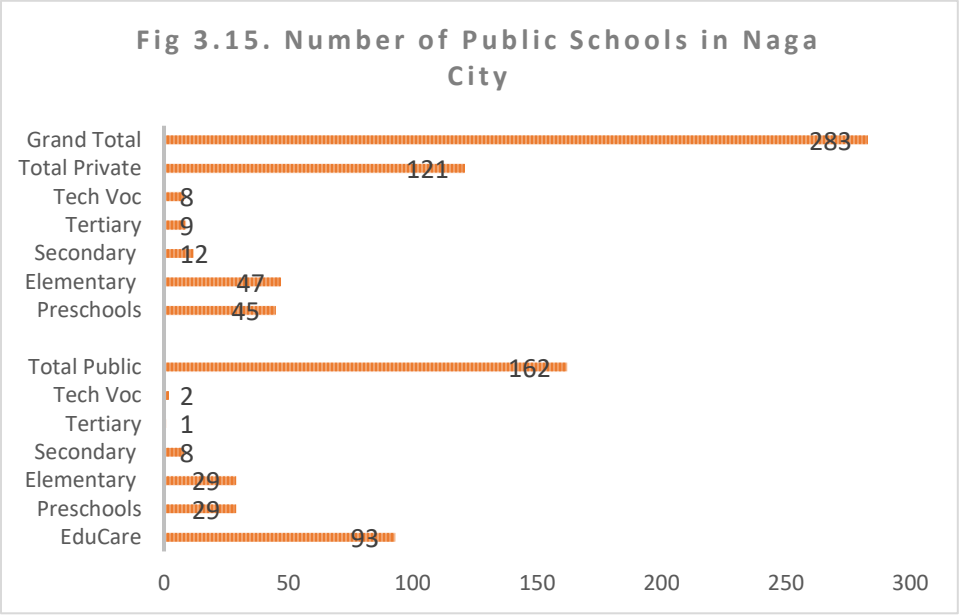
The other source are official data generated through the Community Based Monitoring System (CBMS), a survey conducted by the city government every three years. In 2015, the CBMS identified a total of 10,872 households (33.4%) as income poor. This means at least 1 in every 3 households has no significant income to satisfy its basic food and non-food needs. Income poverty is highest in Carolina (49.4%) and Concepcion Pequeña (1,291 households).

SOCIAL SERVICES

Education. As a center of education in Bicol, Naga offers quality education from preschool to graduate courses. In 2016, its educational institutions, including city and barangay-operated SEED Montessori and Educare centers which provide preschool training, totaled 283. Of these, 162 are public and 121 private. The figure is 56% higher than the 2009 level, driven by both the private sector which grew by 75% and the public sector which grew by 45%. (Fig. 3.15.)

Preschool. Both government and the private sector in Naga provide preschool services. Barangay Educare centers (including its flagship SEED schools) increased to 93 from only 27 in 1987. All Educare centers provide Montessori-type instruction to preschoolers as a result of a city government program aimed at strengthening early child education and development. The city's Educare centers are mentored by 86 well-trained teachers. Complementing them are 45 privately-owned schools that provide similar services through their kindergarten classes.

For school year 2016-17, their combined enrolment reached 9,110, which is 11% higher than the 8,212 recorded in 2009. Against the projected preschool age (3-5 years old) population of 7,884, it also translates to a 116% participation rate, which indicates that 16% of preschool enrollees are non-city residents.



Elementary. Elementary education is provided by 29 public and 47 private schools. For school year 2016-17, public elementary schools recorded a total of 29,546 enrollees while private schools had 6,105 for a total of 30,651. Against the projected elementary school age (6-12

years old) population of 22,900, this translates to a 134% participation rate, substantially higher than the 111% recorded in 2009. This indicates that about one-third of enrollees in the local elementary school system are non-city residents.

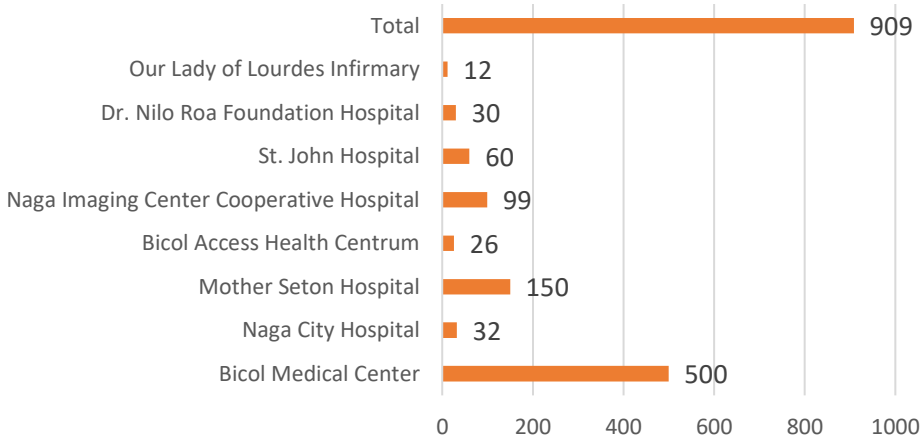
Secondary. Secondary education is provided by 8 public and 12 private schools. For school year 2016-17, public secondary schools accommodated 16,491 enrollees while private schools welcomed 8,917 for a total of 25,408. The total is 40% higher than the enrolment in 2009. Meanwhile, enrolment in public schools grew by 29% while private schools grew by 67% during the same period. Against the projected high school age (13-16) population of 16,808, this translates to a 151% participation rate, significantly higher than the 118% participation rate recorded in 2009. More importantly, these data include enrolment of non-city residents, which mask access issues at the secondary school level.

Tertiary. Naga City has 10 schools at the tertiary level, eight of which are privately-owned and two – the Bicol State College of Applied Science and Technology (BISCAST) and the City College of Naga – are state-owned. These institutions offer various courses ranging from 2-year secretarial course to a 4 to 5-year academic degree course such as nursing, engineering, law, arts and sciences. They also offer graduate and post-graduate courses. For school year 2016-17, their combined enrolment reached 27,412, which is 56% higher than the 17,539 recorded in 2009.

Technical-Vocational. Students who cannot afford formal college education usually avail of courses offered by 10 technical-vocational (TechVoc) schools in the city, eight of which are privately-owned. Courses offered vary from care giving to basic computer operations. For school year 2016-17, their combined enrolment reached 1,088.

Health. As of 2016, Naga is home to a total of eight hospitals and infirmary, three of which are government-owned with the rest private. The three government health facilities are the 500-bed Bicol Medical Center (BMC) along Panganiban Avenue, the 32-bed Naga City Primary Hospital in Peñafrancia Avenue, and the 12-bed Our Lady of Lourdes Infirmary in Barangay Carolina, the latter two owned and operated by the Naga City Government. (Fig. 3.16.)

Fig. 3.16. Hospitals and Bed Capacity in Naga City



On the other hand, the five private hospitals – Mother Seton Hospital, Bicol Access Health Centrum, Naga Imaging Center Cooperative (NICC), St. John Hospital and Dr. Nilo Roa Foundation Hospital – have a combined 365 beds. Together with the government hospitals' 544, it brings Naga's total number of hospital beds to 909. This translates to a bed-to-population ratio of 1:4,617, lower than to the standard ratio of 1:2,000.

In addition, there are 139 clinics in the city, 109 of which are medical and 28 dental. The number of physicians and dentists practicing their profession reached 302 and 76, respectively, which translate to a ratio of 1.5 physicians per 1,000 and 0.4 dentist per 1,000 population. Against the standard of 1 physician and 1 dentist per 20,000 population, this means that Naga has more than enough physicians and dentists to serve its residents.

Protective services. The Naga City Police Office (NCPO) handles the daily peace and order situation of the city, with its manpower complement of 359 in 2013 increasing by 65% compared to four years back. Protective services in Naga is further enhanced by the presence of 50 police aides and 26 volunteers hired by the city government through the Public Safety Office (PSO), as well as 24 private security agencies.

In keeping the peace, the local police force has finger-printing equipment, intra-station radiocom systems, police vehicles, motorcycles and assorted PNP-issued firearms at its disposal. These are complemented by Closed Circuit Television (CCTVs) equipment installed throughout the city which are being monitored by the PSO.

For effective response time in case of emergency, the NCPO has established three community precincts in Plaza Quezon, Concepcion Pequeña, Peñafrancia Avenue and Cararayan in addition to its headquarters along Barlin Street. Backing them up is the 185-strong City Public Safety Company based in Elias Angeles Street, as well as police assistance centers in Tabuco and Carolina.

On the other hand, fire protection services in Naga are provided mainly by the local branch of the Bureau of Fire Protection (BFP) which falls under the operational control and supervision of the BFP Regional Office. As of 2013, the local firefighting force is composed of 86 personnel, 20% smaller than the 108 it had four years back. The BFP unit is nonetheless complemented by around 100 volunteers from the Progressive Mason Club (Chin Po Tong) Fire Brigade and Naga White.

Firefighting facilities and equipment being used by the local fire bureau consist of six firetrucks, an ambulance and one rescue truck. These are complemented by Chin Po Tong and Naga White's respective fleet of firefighting, fire suppression, rescue and mechanical extraction equipment.

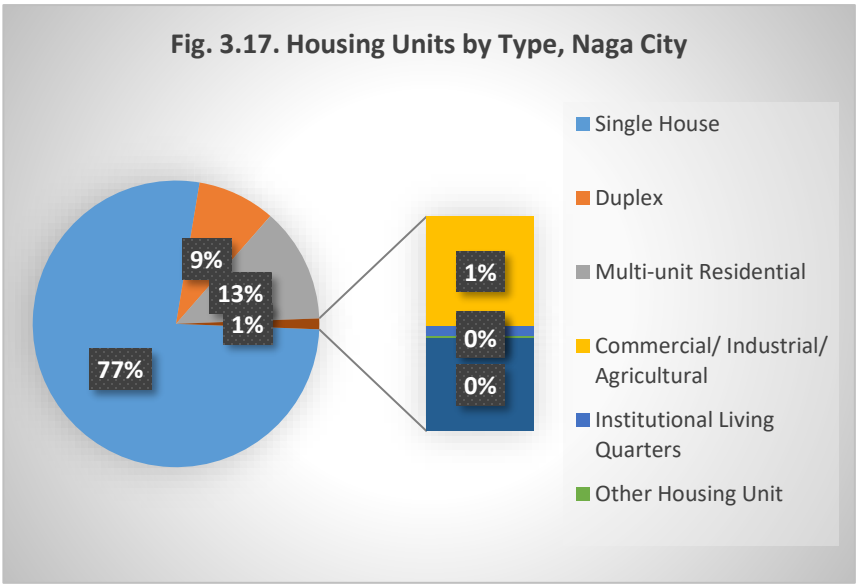
The Naga City District Jail (NCDJ) located in barangay Del Rosario houses all inmates of MTC and RTC and detainees/prisoners of the third and fourth districts of the province. As of 2016, there were 493, 87% more than the 263 inmates it housed in 2009. The NDCJ is one of the facilities in the province being maintained by the Bureau of Jail Management and Penology (BJMP), an agency under the Department of Interior and Local Government (DILG).

Housing. Based on the 2010 Census, there were 35,210 housing units in the city, 37% higher than the 25,674 recorded in 2000. At an annual average increase of 3.7%, it means that house construction grew at a faster clip than the city's population growth. Of these 77% were single houses, 13% were multi-unit residences (apartments, rowhouses, condominiums, townhouses), 9% duplex-type, and the remaining 1% were institutional living quarters, other housing units, and commercial, industrial and agricultural buildings being used for dwelling. (Fig. 3.17.) Compared to the previous survey, there was a marked shift towards multi-unit and duplex-type residences (which increased by 3 percentage points each) from single houses over the last 10 years.

The same survey showed that 88% of the housing units had outer walls and 87% had roofing made of strong materials – a 5 and 9 percentage-point improvement over the previous period, respectively. Moreover, 80% of the housing units do not need repair, or if at all only needs minor repairs (8 percentage points better). More than 4 of every 5 units (86%) were built within the last 30 years (up by 7 percentage points over the previous survey), with a third (35%) built only in the last 10 years, again indicating a robust pace of house construction in the city. (See Table 3.12.)

The PSA survey results tally with findings of the 2015 CBMS survey conducted by the city government, which shows that a total of 2,030 out of 32,509 households (6.2%) were reported to be living in makeshift houses. This is lower compared to the 8.4% recorded in 2011. In addition, only 830 households out of the same total (2.6%) were considered informal settlers. The PSA survey places those staying rent-free without consent of owner at 9%.

Most of the new housing stock in the city were built in the 52 subdivisions covering a combined area of 320.39 hectares that were issued development permits by the City Government since 2000 and completed over the last 14 years. (See Table 3.13.)



On the other hand, according to the Naga City Disaster Mitigation Plan, areas that are considered danger zones for housing are those located along the Naga and Bicol Rivers and those areas that are perennially flooded during heavy rains and typhoons. Severely flooded areas, which cover approximately 60 hectares, can be found in low-lying parts of barangays Abella, Calauag, Dayangdang, Igualdad Interior, Peñafrancia, Sabang, San Francisco, Sta. Cruz, Triangulo and Tinago. Records of the Housing and Settlements Development Office (HSDO) also indicate that about 55% of urban poor families covered by its Kaantabay sa Kauswagan (KSK) program are located in these flood-prone barangays.

SETTLEMENTS PLAN

To address the needs of Naga's urban poor, the city government has been implementing the Naga KSK program which focuses on helping urban poor communities obtain security of tenure either by helping them acquire their homelots on-site or providing new ones in off-site government-owned relocation sites. Twenty-six years after its launching in 1989, KSK program beneficiaries have reached 9,191 in 2015 (representing 23% of the 40,535 estimated household population), more than twice the 4,000 households originally targeted for coverage.

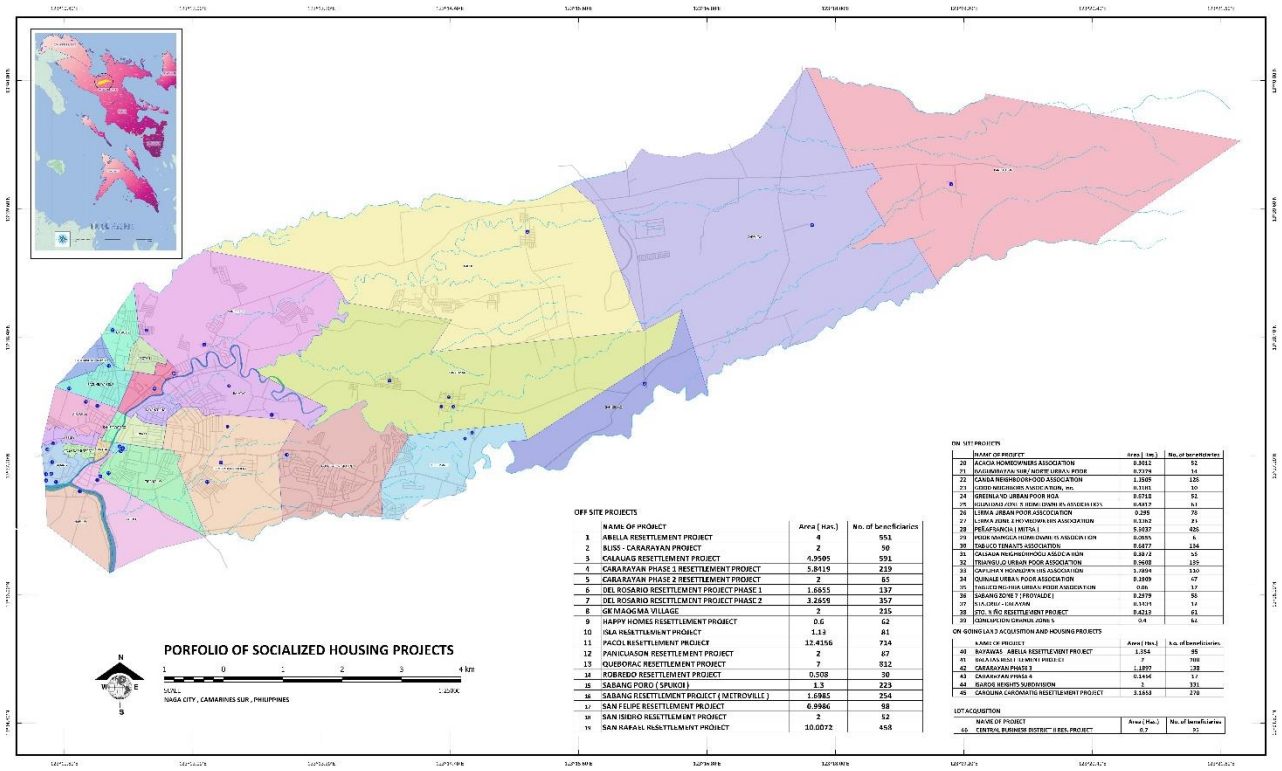


Fig. 3.18. HSDO's portfolio of socialized housing projects as of 2018.

Fig. 3.18 presents the portfolio of the city government's on-site and off-site socialized housing projects implemented under the KSK program, which has reached a total of 46 locations all over Naga in 2018.

Goals. Under the Local Shelter Plan (LSP), 2018-32, the city envisions to establish livable, safe and resilient city and local communities. It will be carried out by promoting mixed-use development in its settlement areas, create community-based economic and social activities and services that minimize home-to-work trips, and help lessen the city's carbon footprint. At the same time, it also seeks to improve Naga's resilience as an urban community by mitigating hazards; reducing local vulnerabilities, minimizing exposure and improving adaptive capacity of local communities.

Key activities. To achieve that goal, the plan calls for acquiring and developing 226 hectares of land for housing and resettlement from 2018 until 2032, and lowering the incidence of the doubled-up households by 89 units annually during the same period by providing separate shelter for each doubled-up household.

It includes a low-rise housing project in Mabulo, on a newly acquired city government property, that seeks to become a demonstration project of high-density approach to socialized housing under the KSK.

Other key acvitities that will be pursued under the plan include the following:

- Provide access to level III water system provided by the Metro Naga Water District to 382 households annually
- Provide access to electrical system provided by CASURECO II to 553 households annually
- Assist 1,051 households annually.in upgrading their dwelling structures

- Upgrade road networks and/or construction of 10.2 kms. of new road access to benefit 2,311 households
- Upgrade existing drainage system and/or construct new drainage lines to serve 2,958 households
- Provide sanitation facility (septic tank/toilet bowl) to 2,168 households
- Ensure that garbage collection is efficiently provided by the Solid Waste Management Office (SWMO) for the proper disposal of all household wastes in the 27 barangay of the city beginning 2018; and
- Ensure that the LSP will facilitate access to affordable housing facility, employment, livelihood opportunity and resources generation activities of the beneficiaries.

Table 3.14 summarizes the updated list of Naga's socialized housing projects as of 2021, showing significant strides made in attaining the LSP goals and targets.

Table 3.8. Population of Naga City, 1960-2015

Feb 15 1960	May 6 1970	May 1 1980	May 1 1990	May 1 2000	May 1 2010	May 1 2015
55,506	79,846	90,712	115,329	137,810	174,931	196,003

Table 3.9. Projected Population of Naga City, 2015-50

YEAR	1.80%	2.30%	2.91%
2015	196,003	196,003	196,003
2020	214,258	219,615	226,208
2025	234,214	246,072	261,068
2030	256,028	275,715	301,300
2035	279,874	308,930	347,733
2040	305,941	346,146	401,320
2045	334,435	387,846	463,166
2050	365,584	434,569	534,543

Table 3.10. Household Population of Naga City by Age Group and Sex, 2010

	BOTH SEXES	MALE	FEMALE
All Ages	173,731.00	85,318.00	88,413.00
Under 1	3,785.00	1,967.00	1,818.00
1-4	15,105.00	7,842.00	7,263.00
5-9	19,289.00	9,957.00	9,332.00
10-14	19,738.00	10,096.00	9,642.00
15-19	19,286.00	9,348.00	9,938.00
20-24	16,462.00	8,080.00	8,382.00
25-29	13,714.00	6,800.00	6,914.00
30-34	12,410.00	6,082.00	6,328.00
35-39	10,591.00	5,115.00	5,476.00
40-44	9,849.00	4,869.00	4,980.00
45-49	8,703.00	4,179.00	4,524.00
50-54	7,369.00	3,503.00	3,866.00
55-59	5,813.00	2,829.00	2,984.00
60-64	4,158.00	1,855.00	2,303.00
65-69	2,806.00	1,140.00	1,666.00
70-74	2,039.00	769.00	1,270.00
75-79	1,293.00	461.00	832.00
80 years old and over	1,321.00	426.00	895.00

Table 3.11. Population of Naga City by Barangay, 1990-2015

BARANGAY	1990	1995	2000	2007	2010	2015
NAGA CITY	115,329	126,972	137,810	160,516	174,931	196,003
Abella	6,348	5,740	5,016	5,150	4,418	4,788
Bagumbayan Norte	2,099	1,952	2,331	2,193	2,669	2,911
Bagumbayan Sur	5,482	5,544	4,709	5,265	6,036	6,959
Balatas	5,092	5,719	6,808	6,964	8,333	10,404
Calauag	5,045	6,707	7,208	10,529	11,022	11,513

Cararayan	3,487	5,469	7,355	9,108	12,108	15,998
Carolina	3,248	3,330	4,349	3,347	5,542	5,841
Concepcion Grande	6,095	7,598	8,524	10,725	11,979	11,137
Concepcion Pequeña	12,943	15,615	16,818	20,555	21,326	23,577
Dayangdang	4,653	5,216	4,604	4,026	4,635	4,568
Del Rosario	1,824	5,021	6,260	7,046	7,055	9,332
Dinaga	887	741	467	371	485	456
Igualdad Interior	2,290	2,620	2,591	3,345	3,775	3,379
Lerma	2,235	2,363	2,329	2,150	2,056	2,337
Liboton	2,712	3,269	3,006	3,119	2,870	3,075
Mabolo	5,167	5,751	5,962	6,529	6,875	7,611
Pacol	3,158	3,146	6,271	7,996	9,981	11,673
Panicuason	1,236	1,366	1,847	2,246	2,033	2,715
Peñafrancia	5,753	5,644	5,451	5,563	5,139	5,712
Sabang	5,587	6,179	5,991	5,953	6,742	7,000
San Felipe	4,840	3,977	6,126	13,238	14,196	17,444
San Francisco	1,628	1,483	1,139	953	941	947
San Isidro	1,333	1,698	1,813	2,053	2,301	2,768
Sta. Cruz	6,603	6,135	5,750	6,879	6,761	7,442
Tabuco	4,578	4,392	4,276	4,034	4,265	4,129
Tinago	4,844	3,721	3,927	3,521	3,403	3,268
Triangulo	6,162	6,576	6,882	7,658	7,985	9,019
Annual average growth rate		1.94%	1.80%	2.20%	2.91%	2.30%

Table 3.12. Occupied Housing Units by Construction Materials of the Outer Walls and Roof, Naga City. 2010

CONSTRUCTION MATERIALS OF THE OUTER WALLS	TOTAL OCCUPIED HOUSING UNITS	CONSTRUCTION MATERIALS OF ROOF								
		Galvanized Iron/ Aluminum	Tile Concrete/ Clay Tile	Half Galvanized Iron and Half Concrete	Wood	Cogon/ Nipa/ Anahaw	Asbestos	Makeshift/ Salvaged/ Improvised Materials	Others	Not Reported
Total	35,210	29,097	637	736	263	4,071	7	319	76	4
Concrete/Brick Stone	19,747	18,735	598	147	8	201	5	5	48	
Wood	5,809	4,405	18	74	201	1,085	1	19	6	
Half Concrete/ Brick/ Stone and Half Wood	5,316	4,360	19	434	31	445	1	18	8	
Galvanized Iron/Aluminum	367	308	1	7	3	44		2	2	
Bamboo/Sawali/ Cogon/Nipa	2,817	839		52	14	1892		16	4	
Asbestos	4	2	1	1						
Glass										
Makeshift/ Salvaged/ Improvised Materials	740	263		7	4	234		229	3	
Others	69	51		1		14			3	
No walls	2			1		1				
Not reported	339	134		12	2	155		30	2	4

Table 3.13. Inventory of Approved Subdivisions, Naga City. 2010-16

Name of Subdivision	Developer	Location	Total Area (ha.)	Date Approved
LPHI High Subdivision Phase I	Laguna Properties Holdings, Inc.	Pacol	10.8575	21-Jun-00
San Alfonso Homes	Laguna Properties Holdings, Inc.	Pacol	10.8575	28-Jun-00
Expansion of Eternal Gardens Memorial Park	Peñafrancia Memorial Park Corporation	Balatas	2.8781	04-Oct-00
San Francisco Village II	Laguna Properties Holdings, Inc.	Pacol	8.5800	20-Dec-00
Caceres Heights Resort Subdivision	Jamaica Realty & Marketing Corp.	Pacol	26.2150	06-Dec-00
Parkview Village I	Enjoy Realty & Development Corporation	San Felipe	6.8026	02-May-01
Parkview Village Subdivision II	Enjoy Realty & Development Corporation	San Felipe	4.9827	27-Jun-01
San Francisco Village I-D	Laguna Properties Holdings, Inc.	Pacol	1.1300	27-Jun-01
San Ignacio Estate Phase II	Laguna Properties Holdings, Inc.	Pacol	3.0660	23-Jan-02
Villa San Vicente de Paul Subdivision	St. Louise de Marillac Village, Sta. Isabel Village, St. Elizabethan Village HOAs	Pacol, Cararayan	12.4690	19-Dec-02
Villa Obiedo Subdivision	8990 Housing Development Corporation	Cararayan	10.8635	07-Dec-03
LBC Resettlement Site	City Government of Naga	Sabang	0.1859	22-Dec-03
LPHI Commercial Development Area	Laguna Properties Holdings, Inc.	Pacol	2.4160	09-Aug-04
St. Jude (Thaddeus) Village 1	Concepcion Grande Development, Inc.	Concepcion Grande	3.4235	11-Oct-04
Naga Greenpark Village Subdivision	Enjoy Realty & Development Corporation	Del Rosario	1.5000	17-Jan-05
Vista Basilica Homes Subdivision	Enjoy Realty & Development Corporation	Balatas	2.4812	21-March-05
Isarog Hills 1	Fil-Estate Properties, Inc.	Carolina	7.9787	25-Apr-05
Haciendas de Naga Farmlot Subdivision	Enjoy Realty & Development Corporation	Carolina	21.1799	14-Nov-05
Isarog Hills Phase 1-A Subdivision	Fil-Estate Properties, Inc.	Carolina	7.3113	14-Nov-05
Haciendas de Naga (Residential Estate Subdivision)	Enjoy Realty & Development Corporation	Carolina	39.6496	05-Dec-05
Deca Homes Naga	8990 Housing Development Corp.	San Felipe	6.8435	02-May-06
St. Jude (Thaddeus) Village II	Concepcion Grande Development. Inc.	Concepcion Grande	1.7804	24-Jul-06
Chito Community Housing Project	Consuelo “Chito” Madrigal Foundation, inc.	Pacol	4.0000	07-May-07
Parkview Executive Townhomes	Enjoy Realty & Development Corporation	San Felipe	4.2197	07-May-07
St. Jude (Thaddeus) Village III	Concepcion Grande Development. Inc.	Concepcion Grande	8.3028	26-Mar-07
Deca Homes Northfield Estates	8990 Housing Development Corporation	Bagumbayan Norte	2.2619	04-Mar-08
Laura Village Subdivision	Mr. Fortunato P. Mendoza	Concepcion Pequeña	0.6132	02-Sep-08
Laura Village Subdivision	Mr. Fortunato P. Mendoza	Carolina	0.2626	02-Sep-08
Camella Naga Subdivision	Communities Phils. Cam. Sur, Inc.	Del Rosario	9.8294	09-Sep-08

Deca Homes Grandvale Residences	LYRR Realty Development. Corp.	San Felipe	5.7379	21-Apr-09
Deca Homes Langon Vista	LYRR Realty Development Corp.	Cararayan	6.7119	02-Jun-09
Don Pepe Farm Lot Subdivision	First Pacol Realty Development & Builders Corp	Pacol	5.9920	23-Jun-09
Lessandra Naga Subdivision	Communities Naga Inc.	Del Rosario	3.2574	02-Mar-10
Chito Community Hidalgo Plains	Consuelo "Chito" Madrigal Foundation, inc.	San Isidro	2.0000	25-May-10
Austria Village Relocation Project	Ms. Carolina Austria-Molistecu	Carolina	3.0000	26-Oct-10
St. James Homes Subdivision	Concepcion Grande Development. Inc.	Concepcion Grande	6.1061	26-Oct-10
Parkview Executive Townhomes Phase II	Enjoy Realty & Development Corp.	San Felipe	1.9912	08-Feb-11
Camella Heights Subdivision. (formerly Cerritos Heights)	Communities Naga, Inc.	Del Rosario, Cararayan	11.2880	24-May-11
Parkview Employees Village	Enjoy Realty & Development Corporation	San Felipe	1.8328	29-Nov-11
St. James Homes Phase II	Concepcion Grande Development. Inc.	Concepcion Grande	7.3475	22-May-12
Jolly Neighbors Resettlement Project	City Government of Naga	Sta. Cruz	4	10-Jul-12
Consuelo Heights Subdivision	Consuelo "Chito" Madrigal Foundation, inc.	Pacol	3.0216	04-Dec-12
Isarog Heights Subdivision	City Government of Naga	Carolina	2.0000	04-Dec-12
Golden Roseville Subdivision	City Government of Naga	Bagumbayan Sur	7.0000	04-Feb-14
Deca Homes – Sabella	LYRR Realty Development Corp.	Abella	1.9697	04-Mar-14
Deca Homes - Sabella 2	LYRR Realty Development Corp.	Sabang	1.1633	11-Nov-14
Naga City Employees Housing Project Phase I	City Government of Naga	San Felipe	0.9986	25-Aug-15
Deca Homes Grandvale II	LYRR Realty Development Corp.	San Felipe	4.2287	07-Jul-15
Naga City Employees Housing Project Phase II	City Government of Naga	Del Rosario	0.9960	29-Jul-15
Krisco Homes I Socialized Housing Subdivision	Hi-Tone Construction & Development. Corp	Cararayan	1.7892	29-Sep-15
Faber Homes Socialized Housing Subdivision	Realty Investments Incorporated	Pacol	0.9523	29-Sep-15
Deca Homes Vistansa Subdivision	LYRR Realty Development Corp.	Pacol	14.0645	31-May-16
Total Land Area			**320.39**	

Table 3.14. Updated List of Socialized Housing Projects, Naga City. As of 2021

No.	Name of Project	Area (in hectare)	No. of Beneficiaries	Location/Barangay
OFF-SITE PROJECTS				
1	Balconville (Uswag Balatas 2)	0.788	84.00	Concepcion Pequena
2	Bliss – Cararayan	2.000	50.00	Cararayan
3	Cararayan P-1	5.842	219.00	Cararayan
4	Cararayan P-2	2.000	65.00	Cararayan
5	Concepcion Grande Dried Creek Bed Res.	2.000	73.00	Concepcion Grande
6	Del Rosario Res P-1	1.666	137.00	Del Rosario
7	DELROHOA Subd.	3.266	250.00	Del Rosario

8	Green Valley Subd	12.416	776.00	Pacol
9	Golden Roseville Subd.	7.000	810.00	Bagumbayan Sur
10	Happy Homes Subd.	0.600	62.00	Concepcion Grande
11	Isarog Heights Subd. P-1	2.000	169.00	Carolina
12	Isarog Heights Subd. P-2	2.000	154.00	Carolina
13	Jolly Neighbors Subd	4.000	551.00	Sta. Cruz
14	LBC Subd.	0.184	39.00	Sabang
15	Liberty Village 1	2.800	385.00	Cararayan
16	Liberty Village 2	0.870	154.00	Cararayan
17	Mabolo Village Subd.	2.501	335.00	Mabolo
18	Maogma Village	2.000	221.00	Balatas
19	Metroville Subd.	1.699	254.00	Sabang
20	Palm Village Homes	0.050	21.00	San Felipe
21	Palmera Village 1	1.190	138.00	Cararayan
22	Palmera Village 2	2.000	228.00	Cararayan
23	Panicuason Bgy. Site	2.000	87.00	Panicuason
24	Robredo's Village (Sabang Riverside)	0.050	39.00	Sabang
25	Sagrada Familia Subd.	1.130	81.00	Peñafrancia
26	San Sebatian Village	0.100	14.00	Tinago
27	San Isidro Bgy. Site	2.000	52.00	San Isidro
28	San Rafael Res. Site	10.007	458.00	Cararayan
29	Sitio Batag Res. Site	0.100	22.00	San Felipe
30	Smallville Subdivision	0.146	16.00	Del Rosario
31	Spukoi (Sabang Poro)	1.300	223.00	Sabang
32	Starville Subd.	4.951	667.00	Calauag
33	St. Claire Subd.	3.800	392.00	Concepcion Pequeña
34	St. Isidore Subdivision	1.655	164.00	San Isidro
35	Upville Subd.	0.999	98.00	San Filipe
36	Uswag Balatas Subd.	1.927	495.00	Balatas
	ON-SITE PROJECTS			
37	Acasia HOA On-Site Project	0.301	52.00	Abella
38	Bagumbayan Sur/Norte On-Site.	0.738	12.00	Abella
39	Calzada Neighborhood Assn. On-Site Proj	0.387	56.00	Mabolo
40	Canda Neighborhood Assn. Proj	1.151	128.00	Concepcion Pequeña
41	Capilihan HOA, Inc. On-Site Proj	1.789	110.00	Calauag
42	Cararayan On-Site Proj (Cararayan 4)	0.143	17.00	Cararayan
43	Dona Clara Village	5.932	447.00	Concepcion Pequena
44	Lerma Grand Subdivision	0.200	46.00	Lerma
45	Good Neighbors HOA, Inc. On-Site Proj	0.118	10.00	Igualdad
46	Greenland UP HOA, Inc. On-Site Proj	0.872	52.00	Concepcion Pequeña
47	Guavaville Subd.	0.145	32.00	Abella
48	Igualdad Z-5 HOA On-Site Proj	0.481	63.00	Igualdad
49	Immaculate Village	0.400	76.00	Concepcion Grande
50	Lerma Urban Poor Assn. Inc. On-Site Proj	0.295	78.00	Lerma
51	Lerma Z-2 HOA, Inc. On-Site Proj	0.136	23.00	Lerma
52	Naga Damayan (Sitio Tahao	0.350	30.00	Concepcion Grande
53	Mabolo HOA, Inc.	1.500	133.00	Mabolo
54	Mitra- Peñafrancia	5.504	428.00	Peñafrancia
55	Pook Manga HOA, Inc. On -Site Proj	0.056	6.00	Brgy. Sta. Cruz
56	Tabuco Ng Hua HOA On-Site Project	0.060	17.00	Tabuco
57	Tabuco Tenants Assn. On-Site Proj	0.688	134.00	Tabuco

58	Triangulo Urban Poor HOA, Inc. On-Site Proj	0.961	139.00	Triangulo
59	Quinale UPA, Inc. On-Site Proj	0.191	47.00	Tabuco
60	Sta. Cruz-Calayan	0.143	12.00	Sta Cruz
61	Sto. Niño HOA, Inc.	0.421	61.00	Sabang
62	Villa Robredo HOA, Inc.	0.298	52.00	Sabang
	Subtotal	**12.293**	**10,244.00**	
SPECIAL PROJECTS				
63	Naga City Employees Housing Project 1	0.569	48.00	Del Rosario
64	Naga City Employees Housing Project 2	0.996	141.00	Del Rosario
65	Naga City Employees Housing Project 3	10.000	663.00	Carolina
	Subtotal	**11.565**	**852.00**	
	GRAND TOTAL	**123.858**	**11,948.00**	

Chapter 5

THE LOCAL ECONOMY

This short chapter provides an overview on the wealth-creating segment of Naga's society.

Structure. According to the 2000 ADB Cities Databook, Naga has a primarily trading and service-driven economy. "The service sector employs the bulk of the city's labor force, accounting for 71% of the total. The secondary and infrastructure sector (manufacturing, utilities and construction at 14%) and others (agriculture and government at 15%) account for the rest." The service sector is further broken down into wholesale and retail trade (32%), consumer services (15%), financial and real estate services (9%), and social services (15%). (Fig. 3.19.)

With the entry of business process outsource (BPO) companies and the country's two leading mall operators, especially over the last 10 years, it stands to reason that the share of the service sector has grown larger, especially at the expense of agriculture and manufacturing. In fact, using local revenues derived from economic activities as proxy indicator, the primary sector of the local economy (built around agriculture) accounted for 8% of the total, the secondary sector (built around manufacturing, utilities and construction) accounts for 3%, while the tertiary sector (built around services) accounts for 89% of the total in 2016.

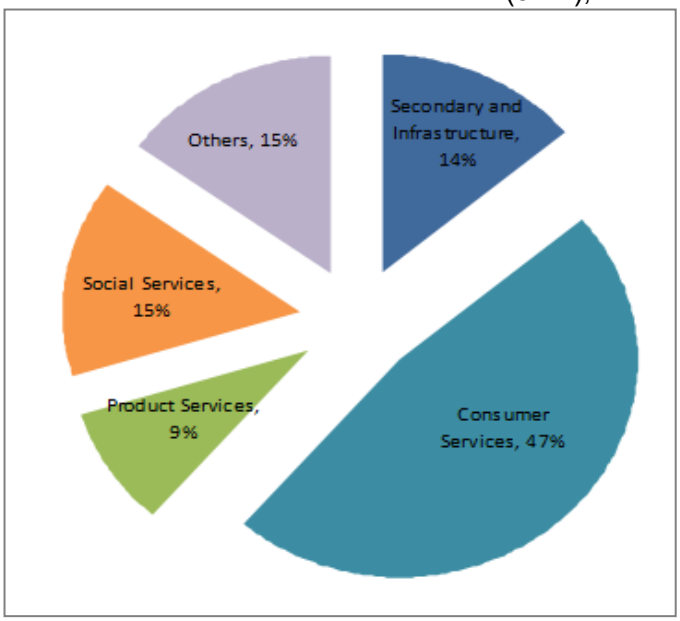


Fig. 3.19. Structure of Naga's economy. Based on 2000 ADB Cities Data Book.

Trade, commerce and services. As of December 2013, Naga City has a total of 7,468 business establishments (1,079 new, 6,389 renewals). This is 37% higher than the 5,459 firms registered in 2011 (1,046 new, 4,413 renewals) which translates to a 12.2% annual growth of the business sector for the last 3 years. It is also 86% higher than the 4,025 firms registered in 2000 (889 new, 3,136 renewals). By comparison, the sector grew by only 4.8% between 2000 and 2010.

The business registry of the Metro Naga Chamber of Commerce and Industry (MNCCI) however shows that the local economy is more robust than what official figures show. In 2015, the city had a total of 16,202 micro, small and medium enterprises (MSMEs). Of the total, 8,806 (54%) were registered enterprises while 7,396 (46%) were unregistered and belonged to the informal sector. This is six percentage points higher than the 40% recorded in 2007, indicating a thriving and growing underground economy.

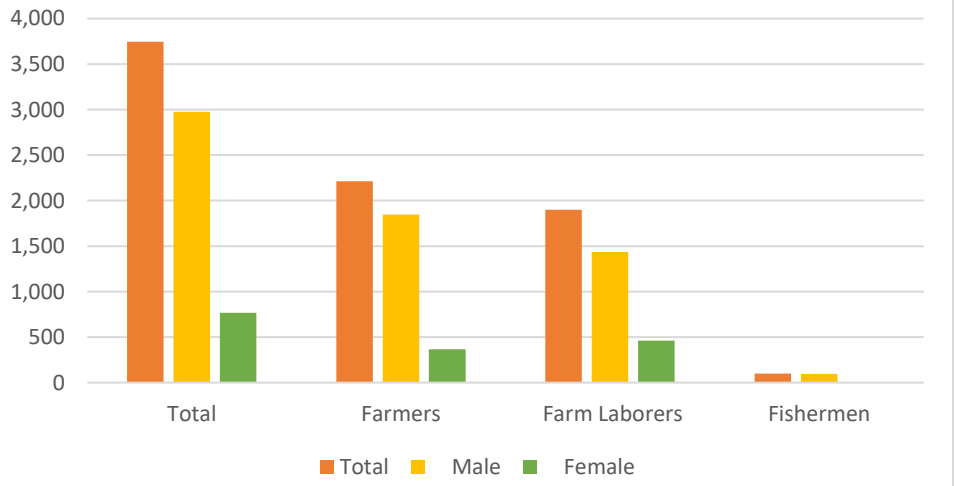
In terms of economic activity, retail (46%) and services (20%) are the predominant type of businesses, affirming the ADB figure. Others include real estate and leasing (9%); agribusiness (7%); financial intermediation (4%); transportation, storage and communications (4%); health and social work (3%); hotels and restaurant (2%); fishing, construction, manufacturing and education (1% each). (See Table 3.15.)

In 2013, a total of 54 banks were operating in Naga – eight more than the 46 recorded in 2010 and 14 more than the number in 2000 – further reinforcing the city's standing as the regional financial center of Bicol. Of these, 15 are commercial banks, 19 universal, 3 thrift, 13 savings, and four rural banks. Joining them in the financial services subsector are 60 finance cooperatives, 23 pawnshops, five remittance centers and three micro-finance institutions.

Agriculture. In terms of land use, Naga remains an agricultural city. Of the city's total land area of 8,448 hectares, 4,550 (54%) were allocated to agriculture in 2000. But data from the City Agriculture Office (CAgO) shows that in 2014, only 3,198 hectares (70% of the total) were actually being used for agricultural production. Of these, 1,847 hectares are planted with rice, 1,139 hectares with corn, 15 with vegetables while 198 were used for livestock and poultry. (See Table 3.16.)

Meanwhile, the 2012 Registry System for Basic Sectors in Agriculture (RSBSA) data for Naga showed that 4,210 are working in the sector, broken down into 2,212 farmers (53%), 1,899 farm laborers (45%), and 99 fishermen (2%). In terms of sex, 3,379 (80%) are male while 831 (20%) are female. (See Fig. 3.20.) The total is 5% lower than the CAgO data for 2009. This means that on the whole, the sector provides employment for around 12% of the city's household population, two percentage points lower than three years back.

Fig. 3.20. Agricultural Workers By Type and Sex, Naga City



On the other hand, Naga has a thriving livestock and poultry industry where 10 commercial farms are the main players, an increase of 25% over the 2009 figure. In 2014, they raised a total of 1,686 heads of livestock and 290,000 heads of poultry, with an estimated value of P55 million.

Manufacturing. Naga has a relatively small industrial base. As pointed out above, the city's manufacturing sub-sector accounts for only 7.4% of the total economic activity, about five percentage points lower than the 12.5% in 2009 and the 14% in 2000.

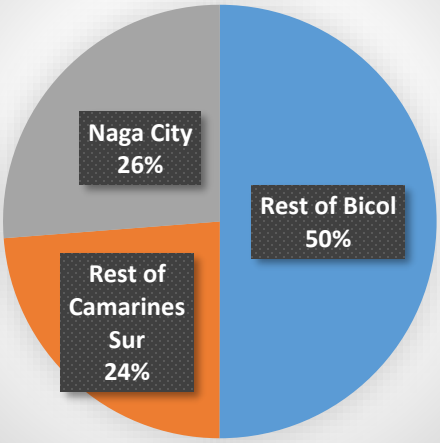
While a handful of specialized manufacturing activities such as bottling (Pepsi and Coca Cola), chicken dressing and cooking oil processing exist, most other firms are engaged in small to cottage-scale food processing, metalworks, furniture manufacturing, jeepney bodybuilding, auto shops, warehousing and storage that fall under one of 17 key industry classifications in the city.

Property development. Another key driver of economic growth in the city is its vibrant construction and property development subsector. Between 2010 and 2014, building construction grew by an annual average of 14% in terms of volume (from 95 to 128), and by 8% in terms of project cost (from P601.7 million to P775.9 million). (See Table 3.17.)

A total of 22 new subdivision permits were also issued during the period, an average of 4 to 5 new projects with a combined project cost of P283.2 million every year. Combined, the subsector accounts for 71% of new investments infused into the local economy, down from 79% during the preceding period.

Tourism. The local tourism industry in Naga continues to grow, especially with the disaggregation of data being pushed by the Department of Tourism. For 2014, a total of 976,822 tourists visited the city, 13% higher than the 859,743 recorded the year before. (See Table 3.18.) The number also represents 50% of the 1,861,010 tourists that visited Camarines Sur and 26% of the 3,724,073 tourists that went to Bicol for the year. (Fig. 3.21.)

Fig. 3.21. Comparative Tourist Arrivals, 2014



The city's accommodation facilities continued to increase substantially over the last 15 years, from only 22 hotels, lodging and pension houses and resorts in 2000 to 63 as of 2014, a 186% increase. It is also higher by 85% compares to the 34 recorded in 2010. In terms of combined room capacity, the expansion is more pronounced, reaching 1,924 in 2014 – an increase of 249% over the 551 rooms in 2000 and of 65% over the 1,169 in 2010. Notwithstanding the increased capacity, occupancy rates also increased by 7.5 percentage points from 49.8% to 57.2% during the same period.

Figure 3.22 maps the 13 socio-cultural and 3 historical tourism assets, including the renowned devotion to the Lady of Peñafrancia which celebrated its tercentenary in 2010 and continues to draw millions of pilgrims to Naga every year. In addition, another emerging draw is the City Government's governance innovations that regularly attract both domestic and foreign visitors. In response, the JMR Center was put in charge of organizing seminars that will address their needs.

Tourism plan. Building on the above assets, Naga has adopted a Metro Naga-focused tourism strategy built around the development of tourism circuits anchored on existing tourism attractions of towns belonging to the Metro Naga Development Council (MNDC).

The tourism consortium, the first of its kind in the country initiated by a local government unit, aims to ensure quality standards across various primary and secondary tourism enterprises. According to the RA 9593, the Tourism Act of 2009, and the Department of Tourism (DOT), primary tourism enterprises cover accommodation, tour operators, tourist transport providers, adventure parks, and eco-tourism facilities. Secondary tourism enterprises, on the other hand,

refer to restaurants, bars, coffee shops, museums, galleries, spas, souvenir shops and other related establishments.

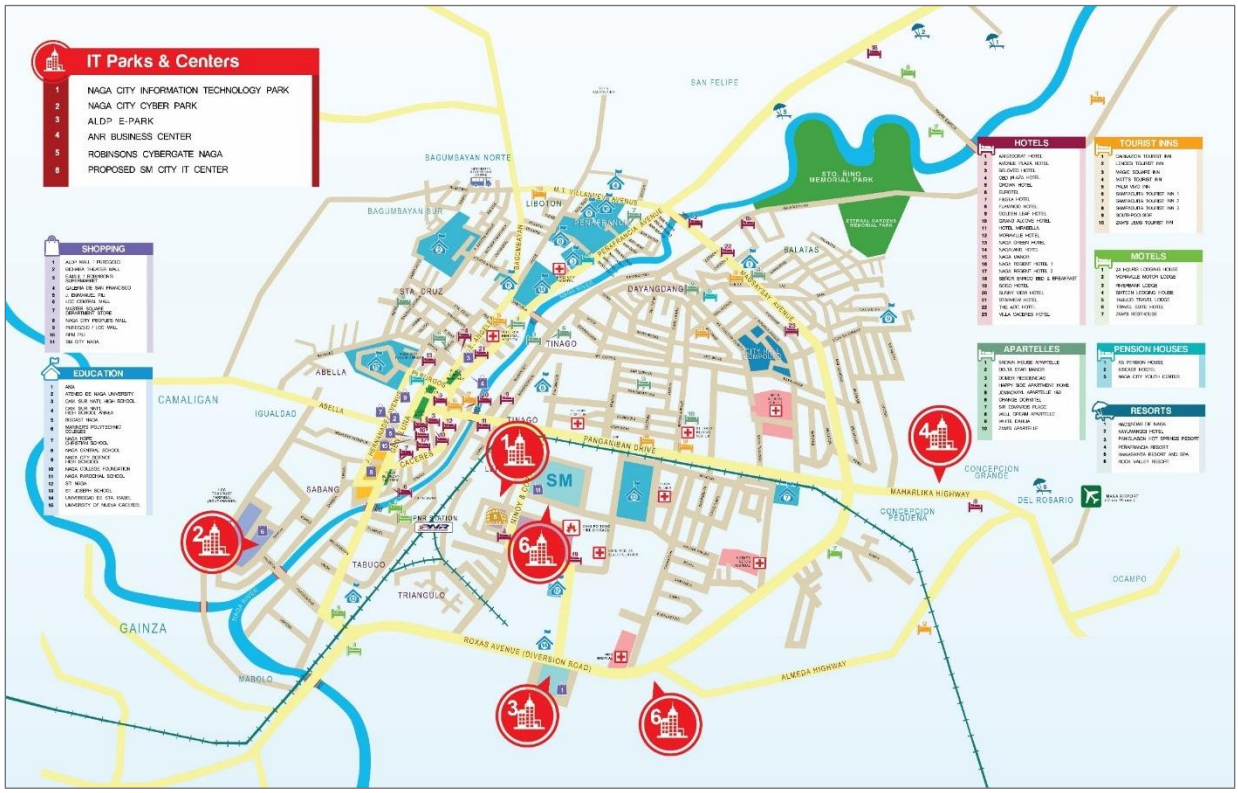


Fig. 3.22. Map of Naga City's tourism assets and attractions.

The MNDC and its allied Metro Naga Association of Travel and Tour Operators (MENATTO) has developed several key tourism products highlighting existing destinations in Metro Naga. Among the products are:

- 3 days, 2 nights Naga Excursion package (Mt. Isarog Natural park and urban tourism) – Haciendas de Naga, Panicuason Hot Springs Resort and Malabsay Falls, city heritage tour
- 2 days, 1 night Pilgrimage Excursion – Marian churches in Naga and historical churches in member municipalities of Metro Naga
- Whole day or half-day City Heritage Excursion – city tour of Naga and its rich culture and diversity
- 3 days, 2 nights Caramoan Excursion – two days island-hopping in Caramoan with one day heritage tour in Naga

Visitors to Metro Naga can also expect additional products and destinations in the future like the Bicol River Cruise, Doncilla Island bird-watching, and Metro Naga heritage tours.

Table 3.15. Business Permits Granted by Type of Economic Activity, Naga City. 2016

BUSINESS PERMITS	ECONOMIC ACTIVITY	NUMBER	PERCENTAGE
Primary			
	Agriculture, Hunting & Forestry	616	81%
	Fishing	139	18%
	Mining & Quarrying	4	1%
Primary Sub-Total		**759**	**8%**
Secondary			
	Manufacturing	139	45%
	Electricity, Gas & Water Supply	39	13%
	Construction	131	42%
Secondary Sub-Total		**309**	**3%**
Tertiary			
	Wholesale & Retail trade/repair of motor vehicles personal & household goods	4,271	51%
	Hotels & Restaurants	211	3%
	Transport, Storage & Communication	394	5%
	Financial Intermediation	360	4%
	Real Estate, Renting & Business Activities	823	10%
	Public Administration & Defense/ Compulsory Security	22	0%
	Education	72	1%
	Health & Social Work	256	3%
	Private Household with Employed Persons	0	0%
	Other Community, Social & Personal Service Activities	1,890	23%
	Extra-Territorial Organizations & Bodies	1	0%
Tertiary Sub-Total		**8,300**	**89%**
TOTAL		**9,368**	**100%**

Table 3.16. Existing Major Agricultural Crops By Area, Naga City. 2016

Major Crops	Location	Area (In Hectares)
1. Rice		
- Irrigated	Balatas	82.75
	Cararayan	99.82
	Carolina	237.25
	Con. Grande	63.00
	Con. Pequena	158.00
	Mabolo	103.00
	San Felipe	273.50
	Pacol	377.00
	San Isidro	230.00
-Non-irrigated	Cararayan	222.18
	Subtotal	**1,846.50**
2. Corn	Carolina	381.00
	Panicuason	240.00
	Cararayan	175.00

	Pacol	183.00
	San Isidro	145.50
	Del Rosario	8.00
	San Felipe	6.00
	Subtotal	**1,138.50**
3. Vegetables	Panicuason	15.00
4. Livestock and Poultry Farms	San Felipe, Pacol, Carolina and Panicuason	197.87
Total		**3,197.87**

Table 3.17. New Investments, Naga City. 2010-14

INDICATOR	2010	2011	2012	2013	2014
New Enterprises	287.00	246.28	587.45	399.49	419.23
New Building Permits (Commercial, Industrial & Institutional)	601.66	570.49	544.88	726.34	775.91
New Subdivision Development Permits	492.96	358.14	182.75	6.50	375.64
TOTAL	1,381.63	1,174.91	1,315.08	1,132.33	1,570.78
EMPLOYMENT GENERATION	5,527	4,700	5,260	4,529	6,282

Table 3.18. Tourist Arrivals, Naga City. 2013-14

MONTH	2013	2014	INCREASE/ DECREASE
January	57,642	57,711	0.1%
February	54,492	58,200	6.8%
March	75,842	83,946	10.7%
April	82,265	87,377	6.2%
May	88,705	95,258	7.4%
June	54,872	63,681	16.1%
July	62,209	66,274	6.5%
August	59,423	66,890	12.6%
September	107,557	129,159	20.1%
October	66,039	80,825	22.4%
November	65,537	80,335	22.6%
December	85,160	105,152	23.5%
Total	861,756	976,822	13.4%

Chapter 6

INFRASTRUCTURE AND ENVIRONMENTAL HEALTH

This short chapter provides an overview on infrastructure support and environmental health services in Naga City.

INFRASTRUCTURE

Roads and bridges. As of December 2015, Naga's road network has expanded to 195.7 kms, 31.4 more than the 164.3 kms recorded in 2000 – an increase of 19%. Of these roads, a total of 31.8 kms (16%) were built by the national government. (See Table 3.19.)

In terms of road type, 145.2 kms (or 74% of the total) are concreted; 30.4 kms (16%) are asphalted; 14.1 kms (7%) are gravel surfaced; while 6.0 kms (3%) are still earth road. Over the last 15 years, the share of asphalt-overlain roads showed the biggest increase, from 10 to 16% of the total, while concrete roads went down by 6 percentage points from 80 to 74%.

The number however does not include around 50 kms in private subdivision roads still to be turned over the city government. When these are considered, Naga would have a total road network of around 246 kms as of 2015.

Within the city, there are 13 city bridges, each with a 10-ton capacity, and six national bridges. Most of these bridges are found in the city center which is trisected by the Bicol and Naga Rivers. Over the last 15 years, three new bridges were added, two by the city and one by the national government.

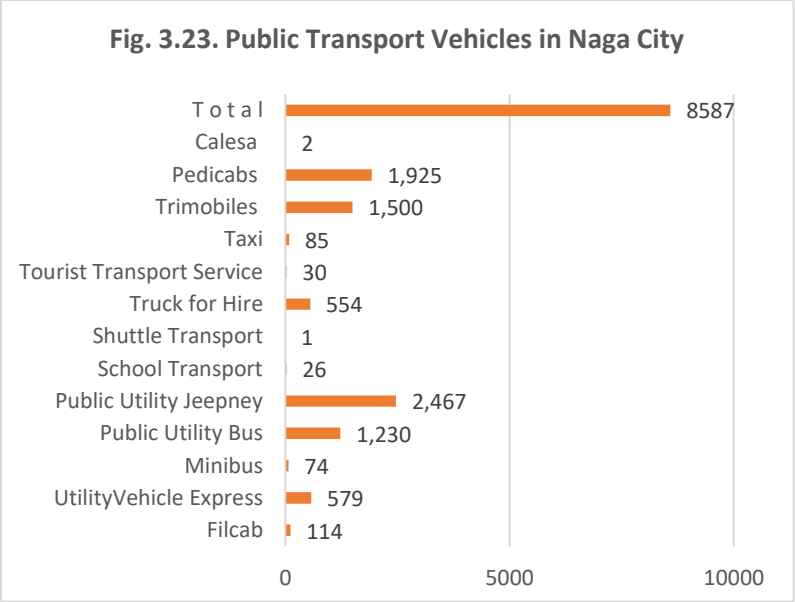
Road gap. According to the DILG Local Road Management Manual as well as relevant HLURB guidelines, the standard urban road to population ratio is 2.4 kms per 1,000 urban population. On the other hand, the standard rural road to rural land area ratio is 1.5 kms per 100 hectare of rural area. Applied to Naga at its 2015 population of 196,003, the city road network would be a maximum of 470 kms if all of its 27 barangays were considered urban, and a minimum of 126.6 kms if all of its 8,440-hectare land area were rural. As pointed out in the 2001 Comprehensive Land Use Plan (CLUP), the city has long exceeded the rural standard decades back.

But factoring in its population by 2030, which is projected to grow between 2.3 to 2.91% annually based on the last three censuses, the situation becomes more daunting.
Going by the DILG and HLURB standard for urban areas, Naga will have to double and even triple its current road network to attain the ideal of 662-723 kms. Thus, the city needs to bridge a road gap that stands between 220 kms for 2015 and as much as 477 by 2030.

Land transport. In 2013, Naga's public transportation system is mainly provided by around 8,587 units, an increase of 71% over the 2010 figure of 5,007. (See Fig. 3.23) It is broken down into the following:

- 1,304 aircon and non-airconditioned buses that ply inter-provincial routes within Bicol, as well as trips between Naga and Metro Manila, which account for 15%
- 693 Filcab and UV Express vans cover intra- and inter-provincial routes, mainly to Camarines Norte, Sorsogon and Albay, which account for 8%
- 2,467 public utility jeepneys (PUJs) cover routes to other towns in Camarines Sur and intra-city routes, which account for 29%

- 554 trucks for hire connecting Naga City to any point in the Philippines, mainly Luzon island, which account for 6%
- 27 school and 30 tourist transport service vehicles that account for 1%
- 85 taxi units representing another 1%
- 1,500 trimobiles serving mainly intra-city routes, whose number is fixed by a city ordinance, representing 17%, and
- 2 units of calesa and 1,925 units of pedicabs[1], which account for 22% of the total.



As of 2015, the total number of registered vehicles in Naga reached 35,044 units, 4% higher than the 33,761 registered in 2010. Of these, 30,856 (88%) are private, 3,729 (11%) are public utility, and 459 (1%) are government-owned vehicles. In 2010, the ratio is 93% private, 6% public, and 1% government. In terms of vehicle type, motorcycles continue to dominate city roads, accounting for 52-59% or almost 3 of every 5 registered in the city. Utility vehicles, which are mostly jeepneys, comprise the next biggest group at 21-25%, followed by cars and SUVs at 9-11%, trucks and buses at 4-5%, and trimobiles at 6-11%. (See Table 3.20.)

Air transport. By plane, Naga is about 45-55 minutes away from Metro Manila via Naga Airport which is located in the capital town of Pili, Camarines Sur some 12 kilometers from the city proper. PAL Express and Cebu Pacific field regular morning and afternoon flights to and from the national capital. Every week, around 35 flights serve the Naga-Manila route which allows greater flexibility to connect with other national and international destinations.

Legazpi Airport, which is about two hours away from Naga, can also be utilized in going to Manila or Cebu.

Rail and water transport. Operations of the Manila-Bicol run of the Philippine National Railways (PNR) have been on and off. Efforts to resume operations between Manila and Naga were constrained by accidents, destruction of key segments in the railroad system during strong typhoons, and pilferage of railroad track materials. The DOTC has conducted an audit to determine the safety and reliability of the system before resuming operations.

As a result, the Bicol commuter service was launched in 2009, between Tagkawayan, Sipocot, Naga and Legazpi. But after further service reductions, only the service between Naga and Sipocot was operational by 2013. In October 2015, service resumed between Naga and Legazpi, but the devastation of Typhoon 'Nina' again cut it short.

[1] Popularly known as "padyaks," which are supposed to cover only barangay and subdivision roads but have contributed to congestion of a few city and national roads where their services could not be dispensed with.

The advent and popularity of land transport has eliminated water transport services between Naga and its neighboring towns, reaching as far as Libmanan. The establishment of wharves along Naga River is also being pursued by the city government to jumpstart water transport services within the urban center in the context of its Integrated Naga River Revitalization Project.

Communication. Globe (which has recently acquired Bayantel) and PLDT (formerly Digitel) are the two major telecommunication companies that provide basic and advanced fixed-line telecommunication services in the city. In 2011, their combined subscriber base of almost 11,500 subscribers has pushed the city's fixed line telephone density to one for every three households.

The entry of the wireless telecommunication companies, now reduced to a duopoly between Smart and Globe, has accelerated growth of the local telecommunication industry. The 2007 Ateneo SSRC research shows that Nagueños have greater access to cellular service than landline, with every household owning two to three mobile phones on the average, some even have dual-sim cellphone units.

Internet access has also been increasing, powered by more accessible and affordable broadband services being offered by PLDT-Smart and Globe-Bayantel, as well as bundled offerings by local cable TV operators Skycable and Caceres Cable. Recently, new players like Cignal and Dream have joined the fray by offering direct-to-home satellite TV services. Cybercafes offering cheap internet services and games have also been mushrooming in the city, further enhancing greater access by local residents and visitors alike. Some service and commercial establishments, particularly hotels and restaurants, offer free wi-fi internet service to customers as a value-added amenity. The 2010 Census reflects this, showing that around 34% of the city's household population have internet access, with 17% accessing it from their home and the other 17% accessing it elsewhere. These are expected to have grown as the city government, in partnership with PLDT, has offered free wi-fi services in the three plazas at the downtown area as well as the Bicol Central Station.

The broadcast media in Naga has continued to grow over the decade. These are being provided by around 20 AM and FM radio stations, and five local television stations, ABS-CBN, GMA, PBN, UNTV and GNN. Also, two local cable TV companies provide up-to-date news, relevant information and entertainment to Nagueños. National dailies and local weekly newspapers are also available in the city.

Postal services are being provided by the Philippine Postal Corporation (PhilPost) with 24 staff and personnel for 2013. It also operates a mailing station located at the SM City and UNC Compound. Complementing it are seven messengerial companies (JRS Express, LBC Air Cargo, DHL, Daily Overland Express, FedEx, OCS and 2Go). However, the advent of internet-based technologies and social networking sites like Gmail, Yahoo, Hotmail, Google, MSN, Skype, Facebook and Twitter have affected these traditional communication services.

Waterworks. The waterworks system run by the Metro Naga Water District (MNWD) supplies the requirements of Naga and the four neighboring towns of Canaman, Camaligan, Gainza and Magarao. Its main water source comes from three springs located in Pili, Camarines Sur – the Anayan, Kalinisan and Rumangrap springs – and 18 operational deep well pumping stations located in strategic sites within its service area. Complementing the MNWD is the city government's Water Services Division (formerly called Task Force Tubig) that installs Levels I

and II water systems in key areas of the city, as well as the barangay-operated Panicuason Water Services Association (PAWASA).

Fig.3.24. Perspective of the MNWD Septage Facility in Sitio Caromatig. Carolina.

As of 2013, the MNWD water system has a total of 40,248 active connections, which is continuously growing at the rate of 157 average new connections per month. It is 23% higher than the 2010 level of 32,769, or an average annual growth of 8%. This is more than three times faster than the city's population growth over the same period. Average water consumption of domestic, commercial, industrial and government users reached 15.4 million cubic meters.

With the approval of its proposed environmental service charge, the MNWD is expected to offer septage treatment services by around 2018 on top of basic potable water provision, anchored on a treatment facility located in Sitio Caromatig in Barangay Carolina that is capable of handling 56 cu. meters of sludge per day. (Fig. 3.24.)

Power. Electric power services in the city is being provided by the Camarines Sur II Electric Cooperative (CASURECO II), one of the four electric cooperatives engaged in power retail in the province, and the second biggest in the Bicol region in terms of market size. Power is sourced mainly from newly privatized generating plants connected to the Luzon Grid being operated by the National Grid Corporation of the Philippines (NGCP).

Data from the National Electrification Administration (NEA) show that as of December 31, 2016, CASURECO II has achieved 100% energization of all barangays (259), 83% of all sitios (341 of 409), and 97% of all potential households (117,538 of 120,900) within its coverage area. In Naga, which accounts for around 65% of its market, it has energized all 27 city barangays.

One of the three mega-large electric cooperatives in Bicol, and second biggest in terms of sales behind ALECO, CASURECO II's finances have been improving. In 2014, it registered a P104.5 million net margin out of P1.842 billion sales, equivalent to 6%. This is more than a two-fold improvement over the 2010 level of 2.8%.

A lingering challenge is its 14.3% system loss for the 1st semester of 2016, which is marginally lower than the 15.5% registered in 2010 and 16.8% in in 2006. As a result, it failed to meet the 8.8% systems loss level targeted for 2010 and beyond under the DOE Power Development Plan, and even the 13% cap set by NEA. This, and a 91.8% collection efficiency that remains

below the 95% standard, are some of the reasons why CASURECO II was only rated B in the 2015 performance assessment by NEA, although an improvement over its C rating the year before. But it continues to lag behind the triple A-rated CASURECO I and IV and the double-A rated CANORECO which are tops in Bicol. (See Table 3.21.)

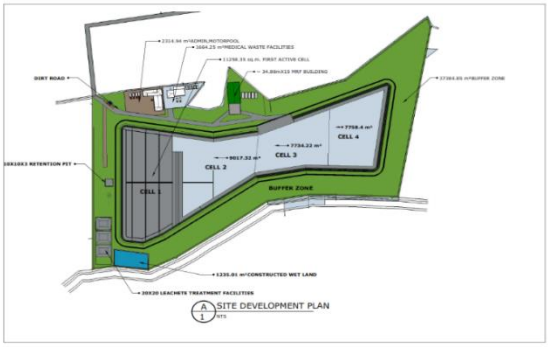


Fig. 3.25. Location and layout of the San Isidro SLF-cum-WTE

ENVIRONMENT

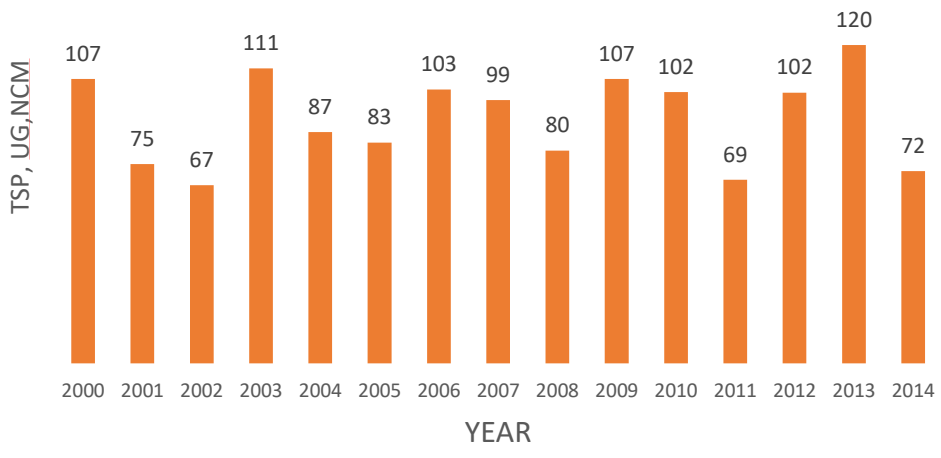
Solid waste management. In 2016, the city generated 108,019 cu. meters of solid waste. Out of this, 35,641 cu. meters were diverted, representing a 33% waste diversion effort. Of the waste diverted, 62% takes place at the community level, with the remaining 38% processed at the Materials Recovery Facility (MRF) of the Balatas controlled dumpsite. As a result, the facility accepted only 72,378 cu. meters for the year.

The profile of solid waste in the city also shows that food waste account for 30% of the total volume, followed by plastics at 18%, wood and yard waste at 15%, paper-based materials at 14%; glass, bottles and metals at 10%; textile at 5%; and miscellaneous waste at 9%.

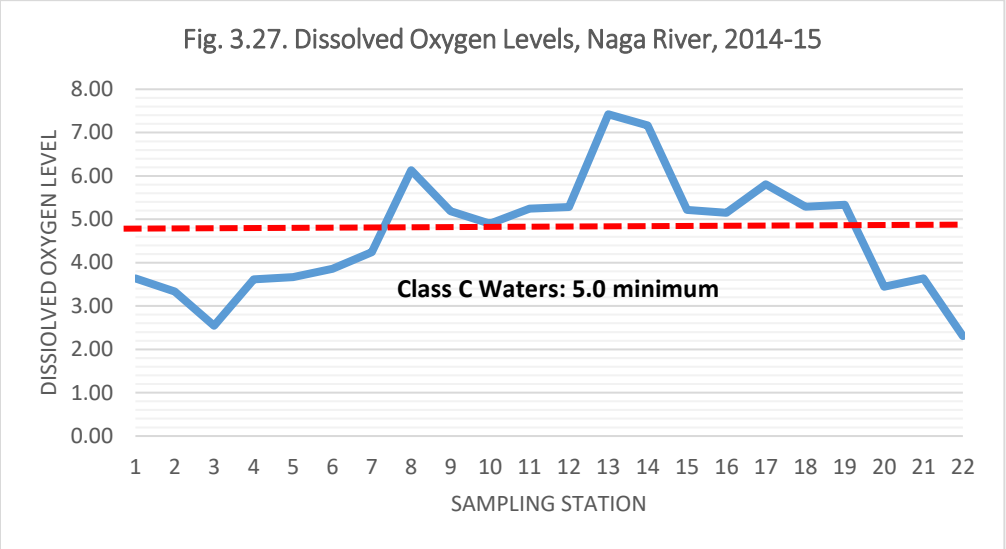
Solid waste are collected via the city's government's fleet of 15 garbage trucks which make 3 to 4 trips daily to cover ten routes on a daily basis. They are supported by 10 fixed barangay MRFs, with 12 more on the pipeline as well as five mobile MRFs to serve urban barangays with space constraints. Collected wastes are then delivered, processed and deposited at the 3.6-hectare Balatas dumpsite, which is programmed for partial closure within 2016.

Expected to take the place of the 55-year old Balatas facility is a 10-hectare sanitary landfill (SLF) in Barangay San Isidro that will double as a waste-to-energy (WTE) facility. It is targeted to open in 2018 as the Balatas dumpsite reaches

Fig. 3.26. Air Quality Monitoring in Naga City, 2000-14



its full capacity. (See Fig. 3.25.)



Air quality. As a pilot Airshed Area in the Bicol Region, weekly air quality monitoring through Hi-volume Sampling were made at Concepcion Pequeña, Magsaysay, and Panganiban crossing beside PNP Substation-1 to measure particulates that go with the air.

Since measurements were first taken in 2000, the city's air quality reading has been shifting between Fair and Good rating. In 2014, air quality reading improved by 40% compared to the last two years, from 120 to 72 microgram per cubic meter (μg/m³), equivalent to a Good mark. This mirrored a similar improvement in 2008 and 2011 which saw the city's air quality rating bounce back from a two-year decline from Good to Fair. (See Fig. 3.27.)

Water quality. At present, the current environmental situation of the Naga River remains challenging. Along the urban center, it is classified as Class C, based on intended Water Use Stream Classification Scheme of the Philippine government. The river's identification as Water Quality Management Area (WQMA) by the DENR is a good step to address this challenge.

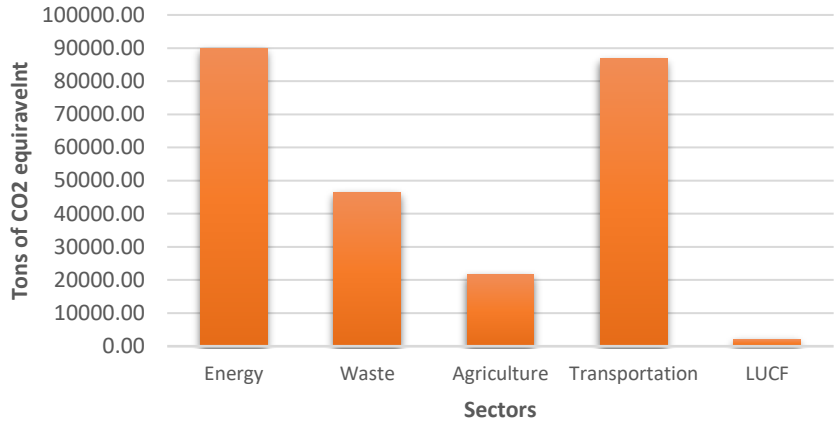
According to the 2014-15 water analysis, only half of the 22 sampling stations met the minimum of 5 for dissolved oxygen. Nonetheless, 18 of the 22 met the 10 mg/L threshold for Biological Oxygen Demand (BOD). More worrisome is that all stations registered very high levels of coliform bacteria, way above the 5000 most probable number (MPN)/100mL threshold. (Fig. 3.26.)

This qualifies its waters for irrigation of agricultural crops, the propagation and growth of fish and other aquatic resources; boating for recreation; and industrial water supply for manufacturing processes after treatment.

Greenhouse gas emission. Total emissions of Naga City, including the land use change and forestry (LUCF) sector, amounted to 246,640.13 tons. The Energy and Transportation sectors contributed almost the same amount in the total emissions at 36% (equivalent to 89,760 tons) and 35%, (86,776 tons) respectively; combined, they account for 71% of the total GHG emissions. Coming at third was the Waste sector with an emission of 46,288 tons of CO2 (19%) of the total, and Agriculture sector, which contributed 21,633 tons (9%). Finally, with a comparatively small area allotted to crop production and few livestock, the LUCF sector contributed only 2,183 tons (1%) of the total. (See Fig. 3.28.)

Considering the amount of carbon absorbed by the LUCF sector of Naga City (9,502 tons), which is very small to offset carbon emissions, the city's net carbon emission stood at 237,137 tons. This translates to a 1.4 ton per capita emission of CO2 equivalent, which is almost double than the World Bank estimated standard value of 0.7.

Fig. 3.28. GHG emissions in Naga City



SANITATION AND SEWERAGE MANAGEMENT PLAN

With an increasing population, the environmental situation of the Naga River has deteriorated, especially along the stretch of the proposed river revitalisation project. Based on DENR Administrative Order No. 34 Series of 1990 and the Intended Water Use Stream Classification Scheme of the Philippine government, the major part of the river is classified as Class D, while above the Magsaysay Bridge, Class C.

Situational analysis. The MNWD have 35,000 houses and 2,700 businesses connected to the piped water system. They estimate that 80% of these have some form septic tank. The CPDO estimates that about 20% of all connections have proper two or three chamber septic tanks. So all in all approximately 37,000 septic tanks are in use. Assuming a per capita water consumption of 60 litres per day, and a household of 6 people connected, that means a more or less only pre-treated effluent of 13,356 m³ every day, which seeks into the solid ground or is given into the drainage and creeks leading to the river. The remaining sludge is from time to time sucked out by private contractors.

The MNWD has constructed a sludge treatment plant in Barangay Carolina beginning in 2012, and is preparing to start operations. It is therefore assumed that proposed the system of waste water treatment shall focus the semi-clear effluent after the removal of most of the solids.
In looking at options that can be implemented within the planning period, three options were considered under the Sanitation study of the iNRRP project:

1. **The construction of septic tanks alone** such that all households were connected to a proper septic tank, including those who live in areas with no sanitation for which communal toilets will be considered.
2. **The development of traditional and high technology options** Including Anaerobic Treatment (UASB), Trickling Filter, Fixed Bed process, Active Sludge process, Sequencing Batch Reactor (SBR) and Membrane Bioreactor (MBR). and,
3. **The development of wetlands for secondary treatment**. The constructed wetland consists of ponds with selected marsh plants like vetiver acting as a bio filter.

Preferred solution. The sewerage system would consist of the septic tanks, which would be located such that the routine emptying would be possible. The liquid effluent would be run

through small bore pipes laid predominantly in the existing drainage canals to collector pipes that would transport the untreated effluent to the wetland areas. Pumps would be needed in some locations to lift the liquid effluent into the collector pipes, which would act on gravity flow to one of the four wetland areas identified. In addition, it is proposed that communal toilet blocks should be provided in areas where no sanitary toilets exist.

The need for properly constructed septic tanks, even to facilitate the effective operation of the proposed sludge treatment plant, makes such a proposal essential for all alternative systems being considered. The preferred option, based on cost, suitability given the existing plans of the MNWD, disruption and maintenance issues resulted in the wetlands being chosen as the preferred option.

Vacuum sewer. Another possible alternative technology is a vacuum sewer or pneumatic sewer system. It is a method of transporting sewage from its source to a sewage treatment plant. A single central vacuum station can collect the wastewater of several thousand individual homes, depending on terrain and the local situation.[2]

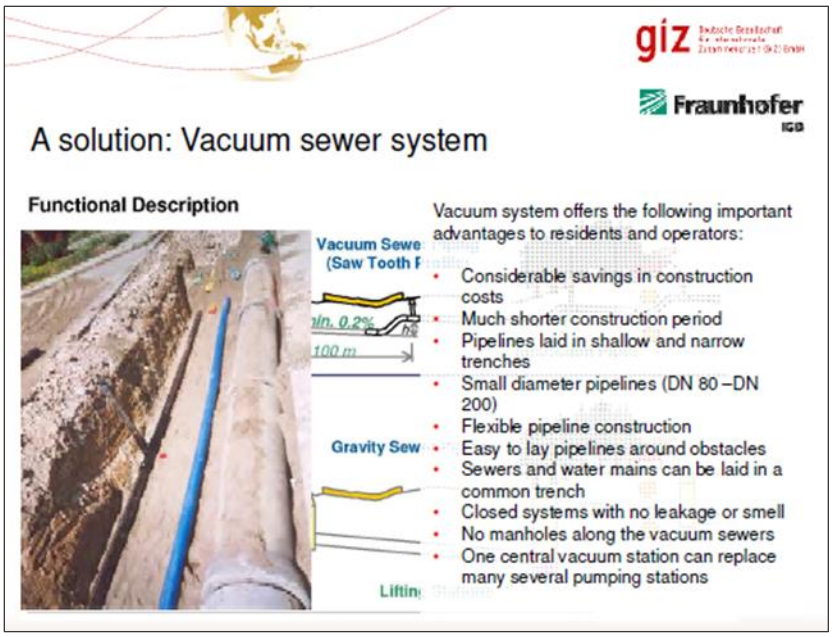
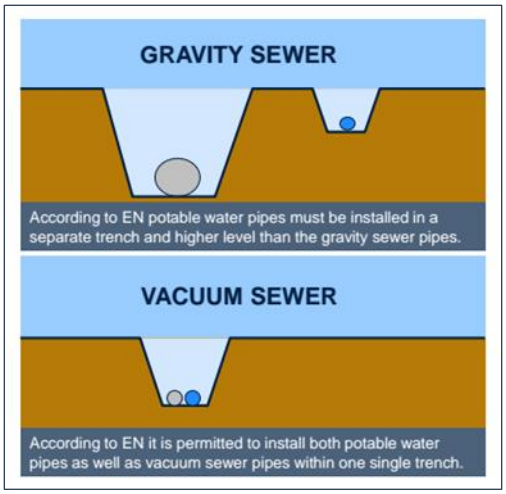


Fig. 3.29. Vacuum sewer schematic. Courtesy of the GIZ.

In the 20th century, vacuum sewer technology has improved significantly: fault-locating sensors have reduced operation and maintenance costs, and some operators now consider that vacuum sewers can be cheaper to run than conventional gravity sewers.



A GIZ study suggested that a vacuum sewer system instead of constructed wetland solution be implemented in Naga City. It is said to be 40% cheaper than conventional sewerage, with possible sales from the conversion of sludge into energy further reducing tariff. As the identified duty bearers under Republic Act No. 9275, otherwise known as the Philippine Clean Water Act of 2004, the city government and the MNWD, together with potential investors from the private sector, can tap a grant from the national government through DPWH's National Septage and Sewerage Management Program (NSSMP) to fund up to 40% of the capital expenditures.

[2] "Vacuum sewer," Wikipedia, https://en.wikipedia.org/wiki/Vacuum_sewer

Table 3.19. Inventory of Roads, Naga City. 2015

Road Class	Surface Type				Total (in kms)
	Concrete	Asphalt	Gravel	Earth	
National	1.4	30.4			31.8
City	143.8		14.1	6.0	163.9
Total	145.2	30.4	14.1	6.0	195.7

Source: City Engineer's Office

Table 3.20. Registered Motor Vehicle by Kind/Type, Naga City. 2010-15

Type of Vehicle	2010	2011	2012	2013	2014	2015
Cars	2,136	2,600	3,293	2,543	289	2,866
Utility Vehicle	8,197	8,637	8,370	7,035	6,245	7,286
Sport Utility Vehicles	668	665	800	763	840	1,063
Buses	92	31	23	13	32	215
Trucks	1,251	1,240	1,807	1,305	1,395	1,469
Tricycles	2,598	2,211	2,315	3,784	3,975	3,813
Motorcycles	17,654	21,800	24,211	19,695	11,902	18,259
Trailer	12	8	10	21	4	73
TOTAL	32,608	31,192	40,829	35,159	24,682	35,044

Table 3.21. Comparative Performance Indicators, Bicol Electric Cooperatives. 1st Semester 2016

ELECTRIC COOPERATIVES	INDICATORS									
	Cash General Fund	One Mo. Working Capital	Coll. Eff.	GENCO As of Jun 2016	NGCP As of Jun 2016	Profitability	Net Worth 2016	Net Worth 2015	Net Worth 2014	System Loss
CASURECO I	56,457	39,063	100	Res-Current	Current	6,426	317,421	406,822	208,636	11.62
CASURECO IV	133,594	37,580	97.07	Current	Current	15,141	690,128	629,865	558,473	11.88
CANORECO	168,166	82,593	95.83	Current	Current	2,706	388,328	383,768	349,910	11.10
FICELCO	7,828	36,567	99.65	Current	N/A	10,514	301,681	291,756	275,016	14.00
SORECO I	35,026	29,081	86.49	Res-With Arrears	Current	7,317	313,941	338,279	294,742	13.5
SORECO II	46,959	58,859	88.99	Res-With Arrears	Current	27,293	526,581	394,132	250,419	12.96
CASURECO II	265,024	169,200	91.81	Current	Current	68,357	675,113	623,556	856,036	14.26
ALECO	121,861	242,470	66	With Arrears	With Arrears	2,524	(119,658)	(49,559)	141,786	22.79
CASURECO III	53,298	57,513	90.37	Res-With Arrears	Current	28,049	(487,668)	(507,948)	(473,148)	19.14
MASELCO	(24,696)	44,900	86.48	Res-With Arrears	N/A	(36,496)	225,405	234,386	217,052	23.74
TISELCO	10,454	4,013	NS	Res-With Arrears	N/A	3,191	123,764	123,096	40,376	17.49

Chapter 7

SPECIAL AREA STUDY: HERITAGE DISTRICT

This chapter provides an overview on proposed Ciudad de Naga Caceres Heritage District that seeks to leverage the city's status as one of the oldest cities in the Philippines.

As pointed out in Chapter 1, out of the ancient Naga, the Spaniards built Nueva Cáceres to distinguish it from its namesake in Spain. It had a city government as prescribed by Spanish law, with an ayuntamiento and cabildo of its own. At the beginning of the 17th century, there were only five other ciudades in the Philippines.

Heritage district. Building on the Bongat administration's thrust to enhance awareness of local cultural heritage as a means of boosting tourism, the Nueva Caceres Heritage Movement, Inc. (NCHMI) proposed to establish the Ciudad de Nueva Caceres heritage district in the city center through a resolution adopted on February 18, 2016.

The NCHMI, a tourism organization that seeks to promote general heritage consciousness in the city, sought the help of Dr. Danilo Gerona, a renowned Bicol historian and NCHMI member, in drawing up the map of the proposed heritage district. (See Fig. 3.30.)

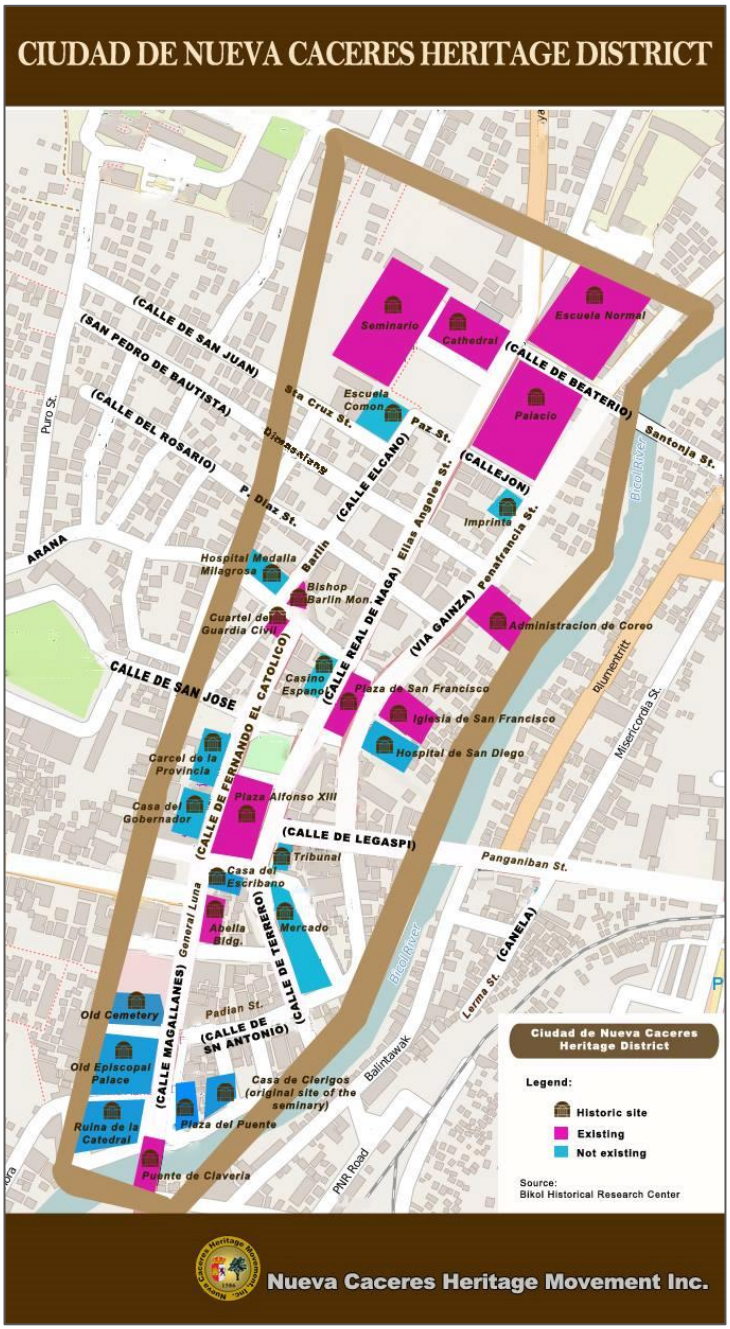


Fig. 3.30. The proposed heritage district.

Boundaries and historical sites. The district largely encompasses the Central Business District I and is bounded by Ateneo Avenue to the north, Igualdad (now J. Hernandez Avenue) to the west and Naga River to the east and south. Spread across the district are 27 historical sites, 10 of which are still existing. These are Escuela Normal (now Universidad de Sta. Isabel), Seminario (Holy Rosario Minor Seminary), Catedral (Naga City Metropolitan Cathedral), Palacio (Archbishop's Palace), Administracion del Correo (the Philamlife property hosting the old Post Office building), Bishop Barlin Monument, Cuartel de la Guardia Civil (Naga City Police headquarters), Plaza de San Francisco (Plaza Quince Martires),

Iglesia de San Francisco (San Francisco Church), Plaza Alfonso XIII (Plaza Rizal), Abella Building and Fuente de Claveria (Tabuco Bridge).

On the other hand, the 17 historical sites that no longer exist are the Ruina de la Catedral, the old Episcopal Palace and the old Cemetery (which are located in what is now the Naga City People's Mall), Plaza del Fuente (Plaza Oragon), Casa de Clerigos (the original site of the seminary is what is now the Benito Commercial building), Mercado (Aristocrat Hotel up to Regent Hotel), Casa del Escribano (where the UCPB, BPI Family Savings Bank and former New England Restaurant now stand), Tribunal (former Naga City Library building), Casa del Gobernador and Carcel de la Provincia (LBRDC, BDO and PNB buildings), Casino Español (McDonald's and Bigg's Diner, in front of Quince Martires), Hospital Medalla Milagrosa (Barlin Satellite Market), Escuela Comun (Grageda Apartment), and Imprenta (current Philamlife Building).

The NCHMI also seeks to install street signs bearing current and hispanic street names within the district, like Via Gainza (Peñafrancia Avenue); Calle Magallanes and Calle de Fernando El Catolico (General Luna), Calle El Cano (Barlin), Calle Real de Naga (Elias Angeles Street), and Calle de Beaterio (Santonja) – a proposal that drew support from the National Historical Commission of the Philippines.

REVITALIZING THE HERITAGE DISTRICT

To improve the livability and vitality of the heritage district, an urban renewal project focusing on the heritage district shall be developed and implemented during the planning period. The proposed project builds on the idea that city centers of typical Asian cities like Naga can be renewed by stakeholders working together to reimagine what is possible; visualize them by mobilizing young architecture and engineering students from local schools; focus and deliver on key renewal projects as strategic wins; and build on these wins to gradually implement reforms in the wider urban district.

Among others, it will have the following components, based on recommendations by the NCHMI and other stakeholders:

- **Mobility enhancement.** This involves traffic calming strategies, especially around the three major plazas within the district, coupled with the development of pedestrian-centered streets, plazas and corridors are focused on people. It will also require the construction of a pedestrian bridge that will connect Lerma and Dinaga. Combined, these will enable individuals and families to engage in a wide variety of activities without worrying about vehicle traffic and the safety hazards of cars zipping by. Residents can socialize, shop, use public transit and bicycles, as well as generally meander and explore areas specialized just for foot traffic. Figure 3.310 presents the pedestrianization scheme for the city center.

- **PWD-friendly pedestrianization.** Side by side, the mobility scheme described above shall also be guided by and compliant with Batas Pambansa 344, which requires buildings, institutions, establishments and public utilities to install PWD-friendly facilities and other devices.

- **Terminal reconfiguration.** Existing intra-city jeepney and trimobile terminals shall be reevaluated and reconfigured, and preferably replaced by loading and unloading points, to further promote walkability within the heritage district.

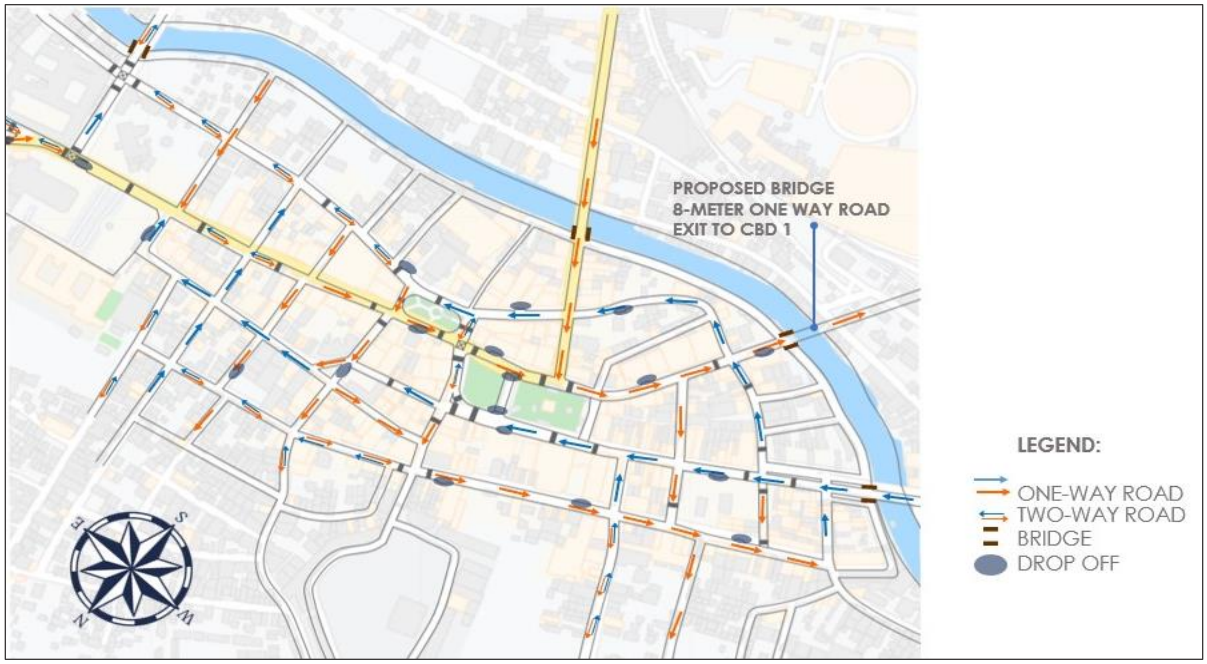


Fig. 3.31. The CBD 1 pedestrianization scheme. Prepared by the UNC College of Engineering and Architecture

- **Street naming, streetlights improvement.** In line with the spirit of Section 13, Article IV of Republic Act No. 10066, also known as the "National Cultural Heritage Act of 2009," the conversion of conventional streetlights within the district into wrought iron street lamps will explored. Side by side, resident experts within the NCHMI will also be consulted in regard to the planned design for the proposed dual street naming scheme described above.

- **Parks and plaza upgrading.** The three major parks within the district – Plazas Rizal, Quezon and Quince Martires – will also be upgraded into more people and child-friendly areas, with attractive open spaces covered with permeable pavements to reduce urban heat. (See Fig. 3.32)

- **Riverside revitalization.** Since the historic Naga River borders the heritage district, the city will build on improved security brought about by flood

Fig. 3.32. The Centro Naga Pedestrianization Project. With funding support from DBM.

protection structures constructed by the national government to promote activities like river transport and tourism to restore vitality in the district's riverfront areas.

- **Underground utilities.** A key component of this urban renewal initiative is a project that will relocate underground the existing overhanging utility lines, preferably under a public-private partnership arrangement.

- **Heritage district ordinance.** At the policy level, a heritage district ordinance consolidating all guidelines that will govern development within the area and protect its heritage assets will be pursued, spearheaded by the NCHMI in consultation with stakeholders.

- **Others.** Finally, implementation of adaptive reuse of cultural properties, and the continuing documentation of sociocultural practices, especially built around the strong hispanic influence on Naga, will also be pursued in line with the mandates of RA No. 10066.

Chapter 8

SPECIAL AREA STUDY: GREEN GROWTH AND TRANSIT-ORIENTED DEVELOPMENT

Finally, this chapter presents the city's green growth and transit-oriented development strategies, anchored on emerging developments at the national and local level.

Transit-Oriented Development

Transit-oriented development (TOD) is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport. It promotes a symbiotic relationship between dense, compact urban form and public transport use. In doing so, TOD aims to increase public transport ridership by reducing the use of private cars and by promoting sustainable urban growth.

TOD typically includes a central transit stop (such as a train station, or light rail or bus stop) surrounded by a high-density mixed-use area, with lower-density areas spreading out from this center.

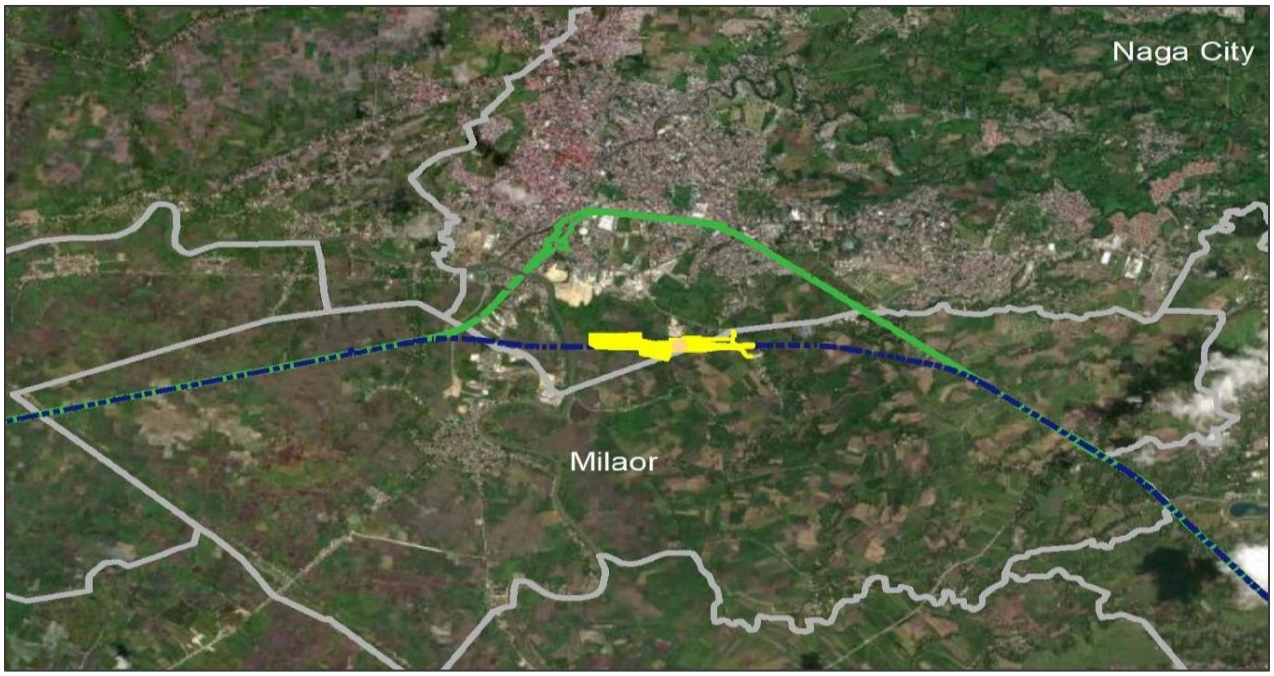


Fig. 3.33. The proposed new PNR alignment. The green line is the existing alignment, while the dark blue line represents the new alignment. The yellow portion represents the new station.

The PNR South Long Haul Project is a priority project of the national government that seeks to establish an inter-city rail line in southern Luzon. It is part of the larger Luzon Rail System, a network of long-distance standard-gauge lines being built by the Philippine National Railways throughout Luzon. The line will initially begin at Banlic station in Calamba, Laguna and terminate at Daraga, Albay, with planned extension to Matnog, Sorsogon.

The proposed new alignment of the PNR line in Naga City involves the abandonment of its existing line and the construction of a new one that passes through most of the southern CBD 2

in Barangay Tabuco, including the construction of a new Naga City terminal. (See Fig. 3.33). With the ongoing construction of the P480-million Almeda-Mabulo Bypass road by the DPWH, there is a need to readjust the alignment and land use allocation for this key project.

Building on the above, the city shall implement a TOD strategy built around this new terminal and its proximity to the new bypass road, which will provide for non-motorized transport (NMT) facilities, especially protected bicycle and pedestrian lanes. The bypass road will not only connect Almeda Highway to the Maharlika Highway in Barangay Mabulo, but will also provide an alternate access to the planned Bicol River Esplanade and the 2.3-hectare People's Park and Recreation Center (PPRC). This connection will ensure that the southern CBD 2 will be ringed by NMT facilities, making it ideal to anchor the city's TOD strategy.

The city's draft Local Public Transport Route Plan (LPTRP) has incorporated these key features and strategies in defining both the motorized and non-motorized transportation services and facilities in Naga. Naga's TOD scheme is illustrated by Figure 3.34 below.

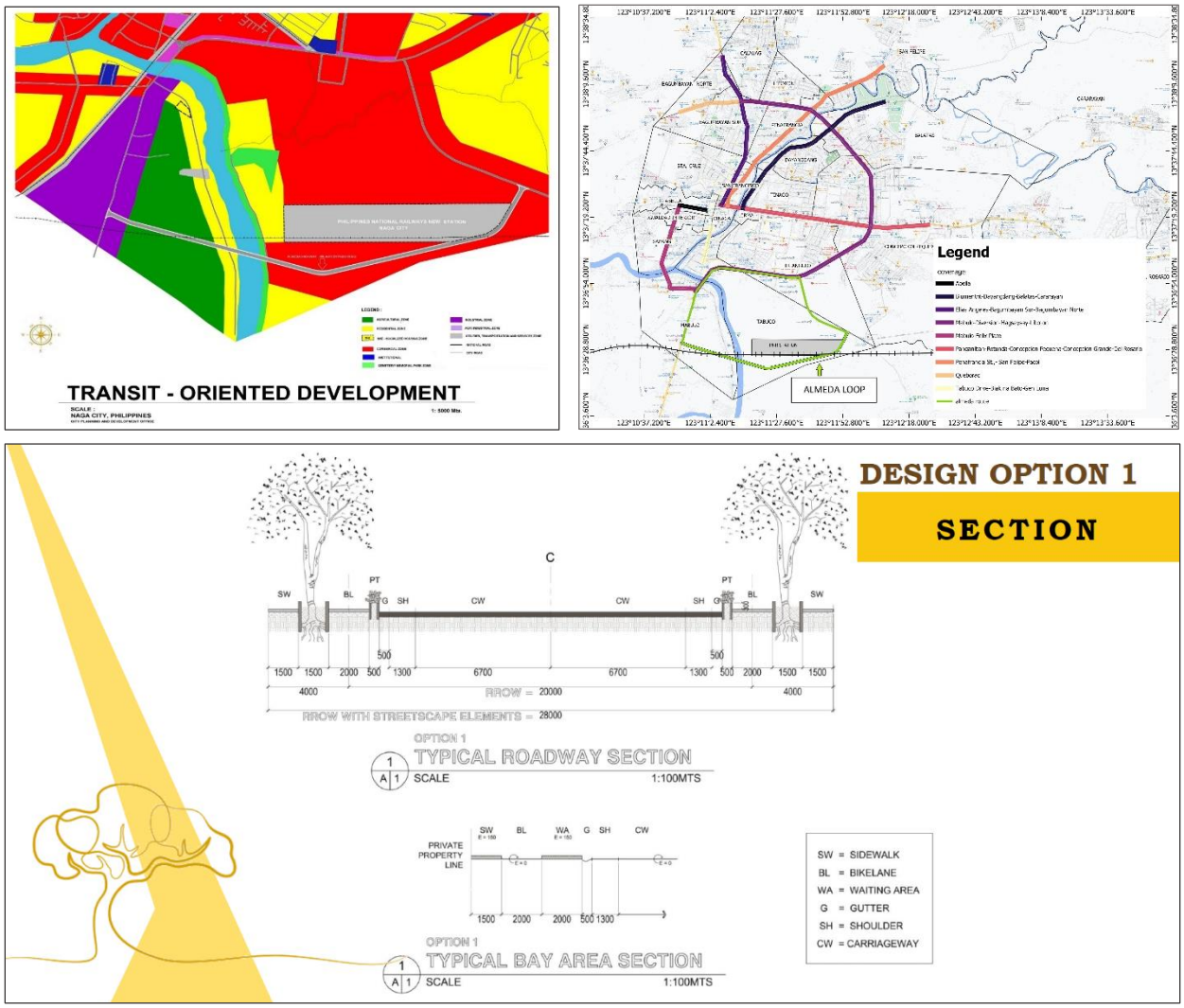


Fig. 3.34. The proposed TOD scheme in Naga, built around the new Almeda-Mabulo Bypass Road and the PNR's South Long Haul Project in Naga. It includes the proposed land use allocation (top left), route plan for the Bicol riverfront area (top right), and the roadway crosssection showing both the motorized and NMT facilities (bottom).

A proposed masterplanning activity under the city's Catalytic Project Plan (CPP) for its green growth strategy is the critical next step to further flesh out the city's TOD scheme. (See Fig. 3.33 on page 66). But as with typical TODs, high-density mixed-use area is expected to dominate the new PNR station, with medium-rise developments that will feature condominiums, hotels or a combination of these, together with offices spaces, shopping areas and other commercial activities in the lower floors, are expected to rise in the area.

Green growth

As pointed out above, the TOD scheme is actually one of the anchors of the city's green growth strategy, developed with the help of World Bank technical assistance through the League of Cities of the Philippines.

Table 3.22. The Logic of Naga's Green Growth Strategy

Pillars Specific actionable themes to achieve the Green and Resilience Commitment	**Recommendations** Measures which can help achieve any of the pillars	**Enhanced Recommendations** What are we prioritizing and what is a good target measurable outcome	**Projects** Identified projects which can be pitched for funding the future
1. Liveable Communities	1.1 Put up more parks and public space 1.2 Strategic land banking for the social housing sector	1. All households are within 15-minute walk from a park or recreational space 2. Relocating all informal settlers households into safer shelters with access to opportunities (10,000 households now → reduce to 3,000 households by 2030)	1. Bicol River esplanade and mixed-use river front development 2. Strategic city road network development 3. Socialized low-rise housing projects 4. Development of (a) urban mini-forests (Forests in our Midst or FOM project) in the urban areas; and (b) mangrove rivers and cascading retention ponds in the peri-urban areas of Naga.
2. Employment Opportunities	2.1 Opening growth areas for investment 2.2 Seamless ease of doing business	3. Reduce unemployment from 4% to 2% by 2030 4. Increase investment in the industrial sector from 1B to 10B	
3. Sustainable Development	3.1 Improve access to quality social services 3.2 Upgrade urban mobility in both motorized and non-motorized transport 3.3 Protect water resources by promoting water harvesting intitiatives	5. Reduce GHG emissions from 237,000 tons to 120,000 tons annually by 2030	

Pillars Specific actionable themes to achieve the Green and Resilience Commitment	**Recommendations** Measures which can help achieve any of the pillars	**Enhanced Recommendations** What are we prioritizing and what is a good target measurable outcome	**Projects** Identified projects which can be pitched for funding the future
4. People and Community Empowerment	4.1 Further strengthen cutting-edge institutions to promote people and community empowerment		
5. Heritage and natural assets conservation	5.1 Promote walkability in the city's heritage district		

Guided by the vision of sustaining Naga as "Maogmang Lugar," the city seeks to implement a "sponge city" urban water management strategy, based on the following five pillars of green growth: (1) Liveable Communities, (2) Employment Opportunities, (3) Sustainable Development, (4) People and Community Empowerment, and (4) Heritage and natural assets conservation.

The evolution and logic of Naga's green growth strategy is described under Table 3.22 and Fig. 3.35. As such, this strategy will be anchored on the following key projects:

- Bicol River esplanade, PPRC and mixed-use river front development built around a floodable park
- Strategic city road network development, anchored on the TOD scheme described above
- Socialized low-rise housing projects that will provide accessible housing supply for shorter work-to-home trips for the labor force, and
- Development of (a) urban mini-forests (Forests in our Midst or FOM project) in the urban areas; and (b) mangrove rivers and cascading retention ponds in the peri-urban areas of Naga.

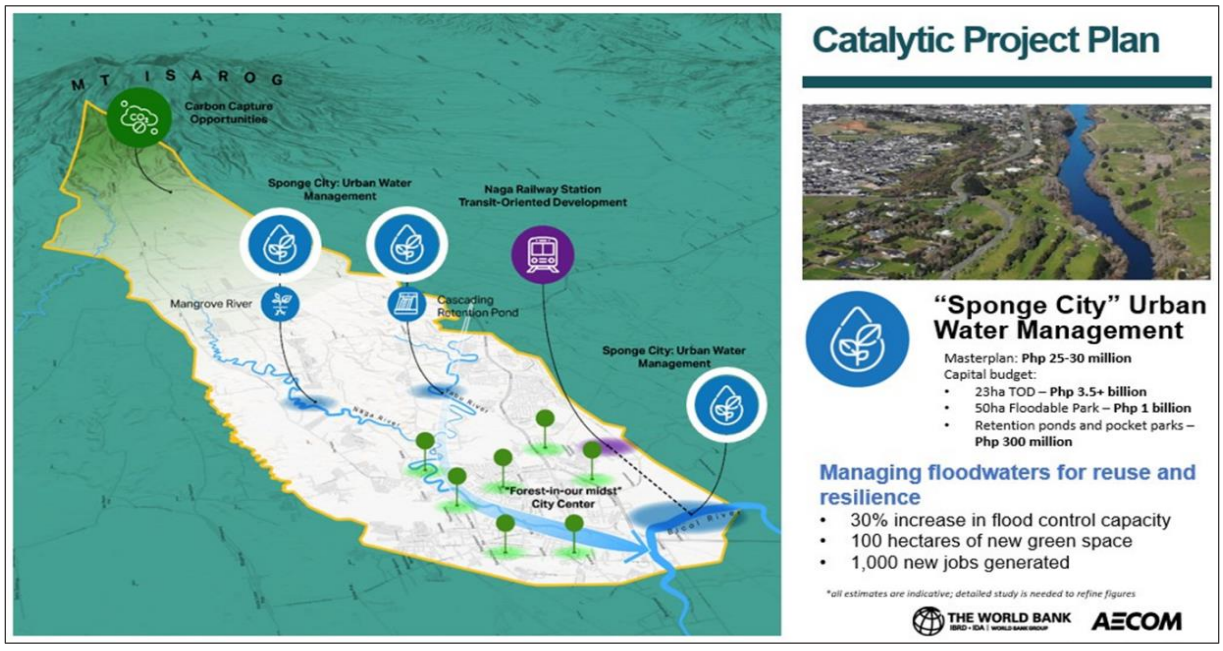


Fig. 3.35. Naga City's project to implement a "sponge city" urban water management strategy