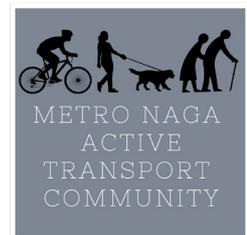




MOBILITY AWARDS' 2022 Citizen Bike Count:

Naga City Results



Organized by:

Metro Naga Active Transport Community and Oragon Bikers Inc.

In partnership with:

Local Government of Naga City
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The Climate Reality Project Philippines
350.org Pilipinas
MNL Moves
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Danny Sumalabe



Introduction

This report summarizes the results of the Naga Bike Count Project that was held on June 24, 26 and 27 wherein 40 volunteers, government personnels, and active mobility advocates in partnership with the Local Government of Naga City counted people-on-bicycles in 11 locations (*Annex 1*).

The Naga Bike Count Project is an initiative organized by the Metro Naga Active Transport Community and Oragon Bikers Inc. in partnership with the convenors of the Mobility Awards.

We attempted to capture the following information:

1. How many cyclists cross city borders and use our bike lanes?
2. How many are women? How many are men?
3. How many are wearing helmets, how many are not?
4. When is the busiest hour?
5. Which routes are riders using?

It aimed to contribute to the establishment of baseline data gathering and monitoring to support planning and citizen's advocacies for investments for more inclusive and sustainable transportation options for cities and communities.



What did we count?



A. People on bicycles!

This refers to pedal powered 2-wheeled bicycles, 3-wheeler bicycle (three users would count as three cyclists), recumbent bike users, street vendors using bicycles, pedicabs, hand cyclists, tandem bikes.



B. Gender Distribution and Helmet Use

Apart from counting the volume of cyclists and pedestrians, the count also disaggregated cyclists according to sex, and also recorded the helmet use of cyclists.



C. Turning Movements

The volunteers counted **108 movements across the 11 locations** during the count survey. The volunteers were stationed on screenline, T-junctions, and in 4-corner intersections.



- **Screenline counts** - Screenline counts are done by establishing a visible or invisible line across a roadway or sidewalk and counting the number of cyclists who pass over that line. Often, screenline counts indicate direction of travel for cyclists. They are used to identify trends in volume and factors influencing cycling



- **T - junctions** - are turning movement counts are done where two roadways intersect, capturing turning or travel direction of cyclists.



- **Intersection counts** - Intersection turning movement counts are done where more than two roadways and/ or major commercial driveways meet. At minimum, these counts capture turning movement counts.



The count was done during the peak hour periods of 6:00 AM to 8:00 AM in the morning and 4:00 PM to 6:00 PM in the afternoon in order to capture riders who cycle, walk, and use other modes of non-motorized transport or personal mobility devices who get to work. The assumption behind the peak hours selected is attributed to the traditional working hour variant of a Filipino worker scheduled from 9:00 AM to 5:00 PM, Monday through Friday, and from observations of volunteers that bulk of cyclists pass through city roads as early as 5:00 AM.



How did we count?

The Bike Count Project is an event conducted by volunteer counters on standardized count sheets adapted from the **US National Bicycle and Pedestrian Documentation (NBPD) Project**¹ (*Annex 1*). The Bike Count Project is considered a short-duration count program which is one of the two basic elements of a bicycle and pedestrian count program done in other countries.

Prior to the count, volunteer orientations were conducted so volunteers can familiarize themselves with the count form, and to also level off on how the count can be synchronized.



Where did we count?

There were **11 count sites** (*See Annex 2*) for Naga City considering borders connecting exit and entry points across neighboring cities, historical count locations, areas with bike lanes and bike facilities, high collision areas, major streets near transit, and locations as recommended by respective LGUs. The count locations were also determined by the availability and number of volunteers per city [See Table 1].

The count was conducted in 10 (Location ID: NC 01-10) last June 24. On June 26 and 27, Bagumbayan Boundary (Location ID: NC11) was included in the count.

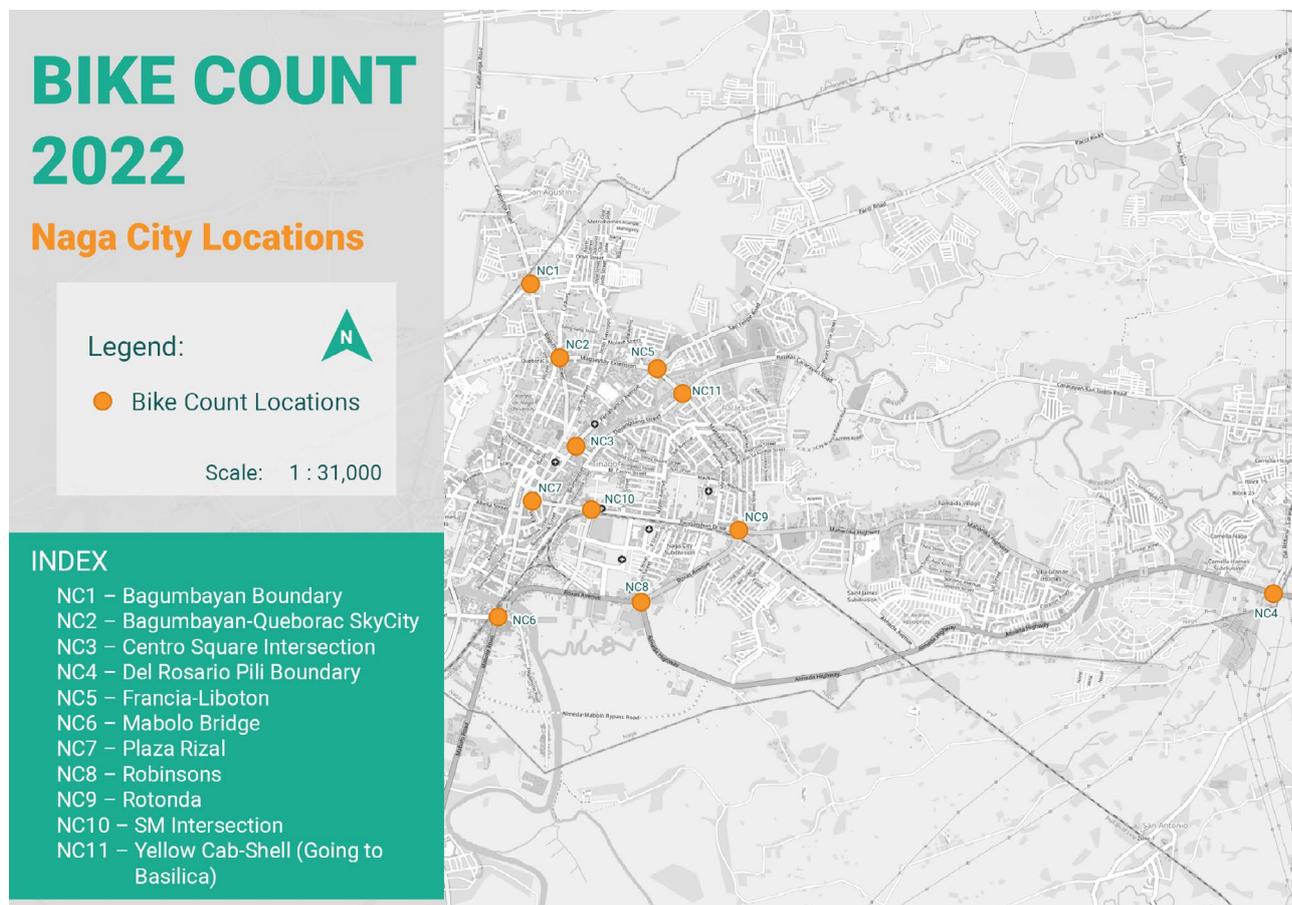
Table 1. Distribution of Count Location and Volunteers in Naga City

| Location ID | Count Location | Location Type | Minimum No. of Volunteers Assigned (Per day and hour) |
|-------------|--------------------------------------|---------------|---|
| NC1 | Centro Square Intersection | Intersection | 2 |
| NC2 | Francia-Liboton | Intersection | 2 |
| NC3 | Bagumbayan-Queborac-SkyCity | Intersection | 2 |
| NC4 | Yellow Cab-Shell (Going to Basilica) | Intersection | 2 |
| NC5 | Panginiban Drive Rotonda | Roundabout | 2 |
| NC6 | SM Intersection | Intersection | 2 |
| NC7 | Del Rosario-Pili Boundary | T-Junction | 2 |
| NC8 | Robinsons Mall (Going to Diversion) | T-Junction | 2 |
| NC9 | Plaza Rizal-Naga Optical | T-Junction | 2 |
| NC10 | Mabolo Bridge (Gainza) | T-Junction | 2 |
| NC11 | Bagumbayan Boundary | Intersection | 2 |

¹Complete information on the project is available at bikepeddocumentation.org.



Where did we count?



Map 1: Naga City Count Locations



What can we analyze from the count?

We equate the number of people on bicycles on the road to their contribution on:

- (a) Generating cumulative savings from fuel costs avoided;
- (b) How they can practically reduce fossil fuel consumption on our roads.

We used the number of cyclists counted to illustrate the benefits of active transport using the key formula and key assumptions:

| Unit | Definition | Assumptions |
|--|---|---|
| Total No. Of Cyclists (passenger) per Day | Total number of cyclists data was collected | |
| Equivalent No. of Cars on the road | This represents the total number of cars that would have been replaced, if passengers opted to cycle instead | Average Occupancy of a Car - 1.7 (MUCEP 2012-2014) |
| Equivalent No. of Motorcycles on the road | This represents the total number of motorcycles that would have been replaced, if passengers opted to cycle instead | Average Occupancy of a Motorcycle - 1.2 (MUCEP 2012-2014) |
| Estimated Fuel Cost Savings per KM of Avoided Car and Motorcycle costs | This represents estimated fuel costs savings in 1 KM. This was avoided since passengers opted to cycle instead. | <p>Savings (PHP/KM) = fuel consumption per kilometer (L/vkm) x fuel price (PHP/L) x Number of vehicles (v)</p> <p>Average fuel consumption per kilometer of Toyota Vios 1.5 = 0.065L/KM</p> <p>Average fuel consumption per kilometer of Yamaha NMax 125 = 0.022 L/KM</p> <p>Average Gasoline Price Per Liter (June, 2022) = ₱81.02 (Statista, 2022)</p> |
| Estimated Tons of CO2 Emissions Avoided | This represents the total emissions avoided driven in 1 KM since passengers opted to cycle instead. | <p>T_CO2 = Emission factor of vehicle (g/vkm) x Distance Traveled by vehicle (km) x Number of vehicles (v)</p> <p>Emission factor of vehicle (Toyota Vios 1.5 MPG) = 158.5 g/vkm</p> <p>Emission factor of vehicle (Yamaha NMAX 125) = 52g/vkm</p> <p>Emissions considered are only CO2. We do not include other emissions such as NOx, PM, etc.</p> |



Limitations of the count

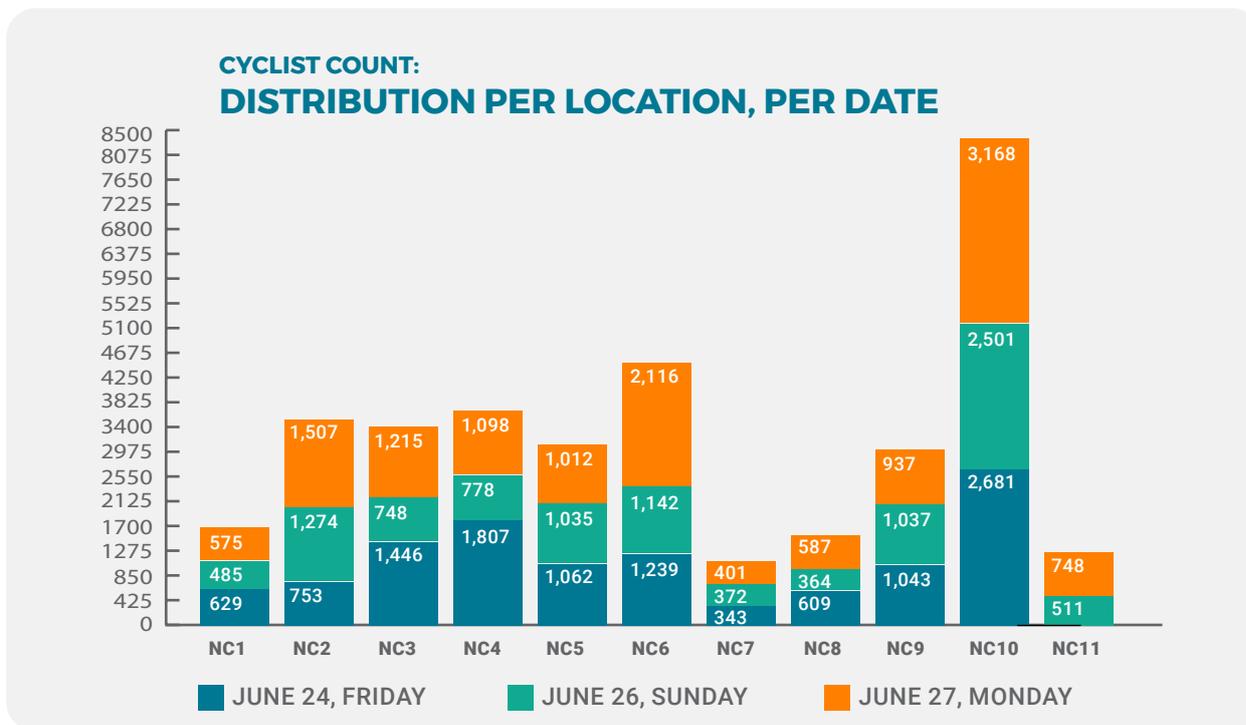
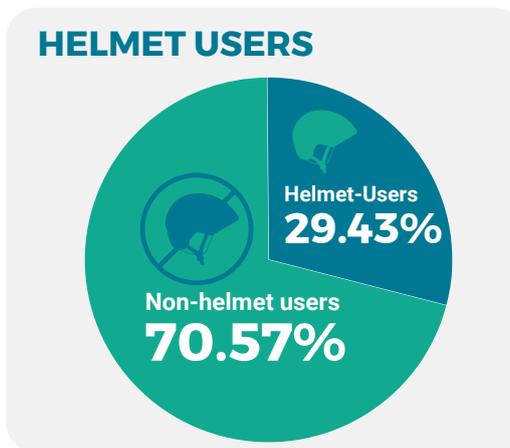
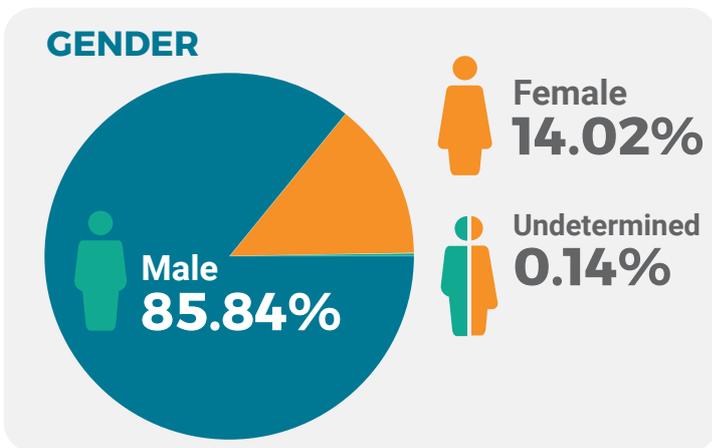
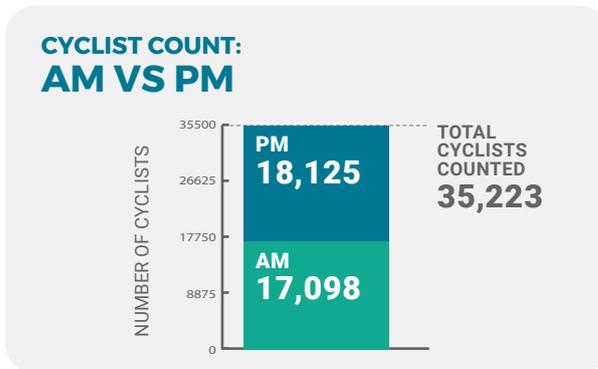
The count was implemented still within the COVID-19 pandemic period as an operating context. Although there were already gradual removal of restrictions, we still observed basic health and safety protocols, and observed physical distancing during the actual count. This affected the quality and accuracy of several data gathered.

Other limitations include lack of manpower and resources to do a 16-hour count, which would have been the ideal in order to estimate the annual average daily bicycle and/or pedestrian traffic.

Essentially, the long-term goal of the count program is for local government units to adopt a consistent and permanent bike-pedestrian count program that integrates technology including automatic sensor counters and potentially the use of artificial intelligence. However, it will take time and resources, hence, the importance of manual count programs.

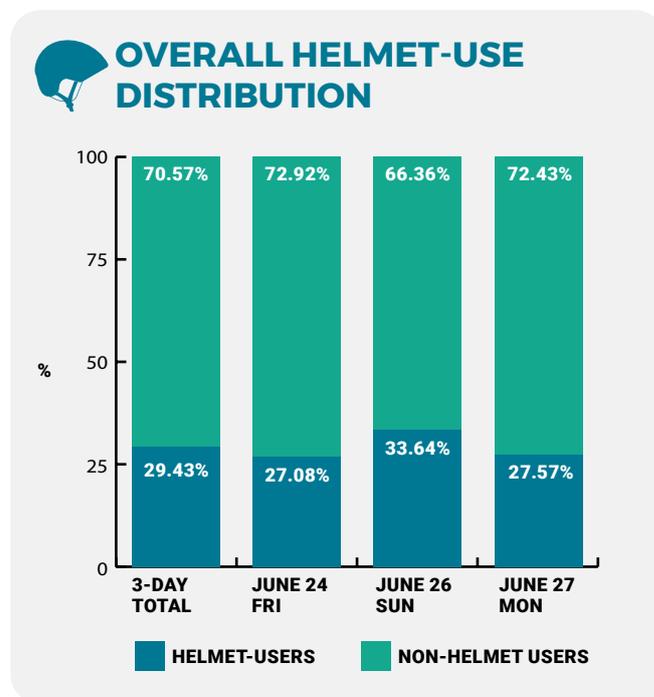
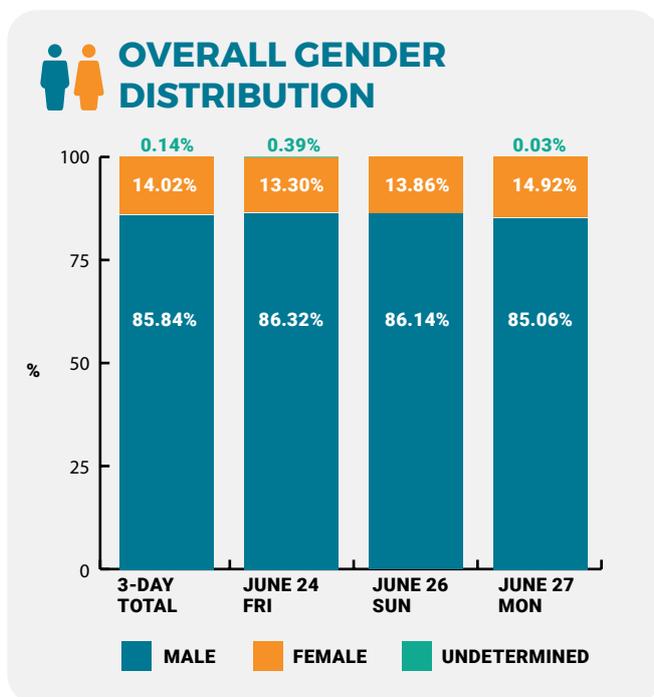


Count Results



NC1: Centro Square Intersection; NC2: Francia-Liboton; NC3: Bagumbayan-Queborac-SkyCity; NC4: Yellow Cab-Shell (Going to Basilica); NC5: Panginiban Drive Rotonda; NC6: SM Intersection; NC7: Del Rosario-Pili Boundary; NC8: Robinsons Mall (Going to Diversion); NC9: Plaza Rizal-Naga Optical; NC10: Mabolo Bridge (Gainza); NC11: Bagumbayan Boundary

Count Results

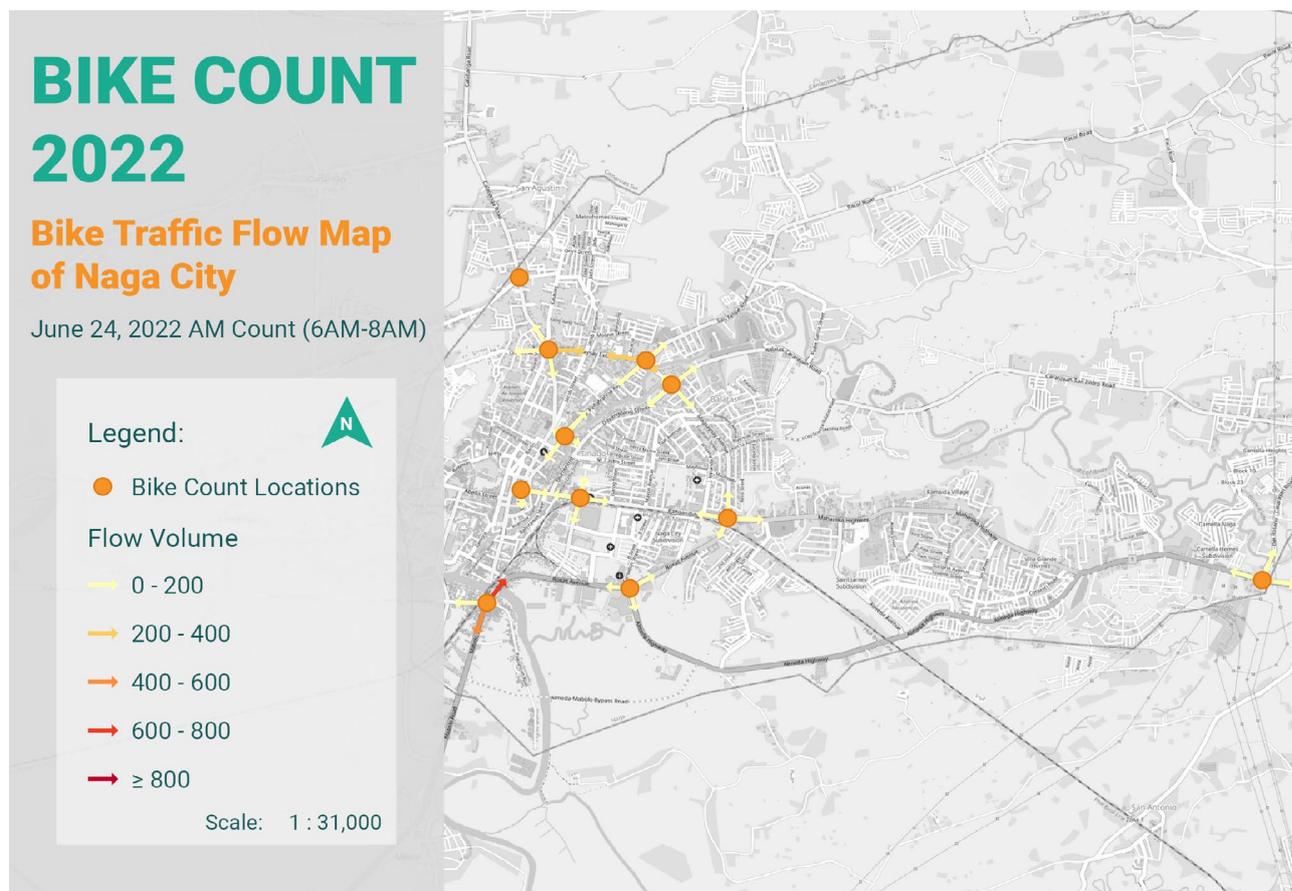


The number of women on bicycles counted within Naga City may be lower compared to the number of men on bicycles counted because of the prevailing perceptions that the roads are unsafe for cyclists and women in particular.

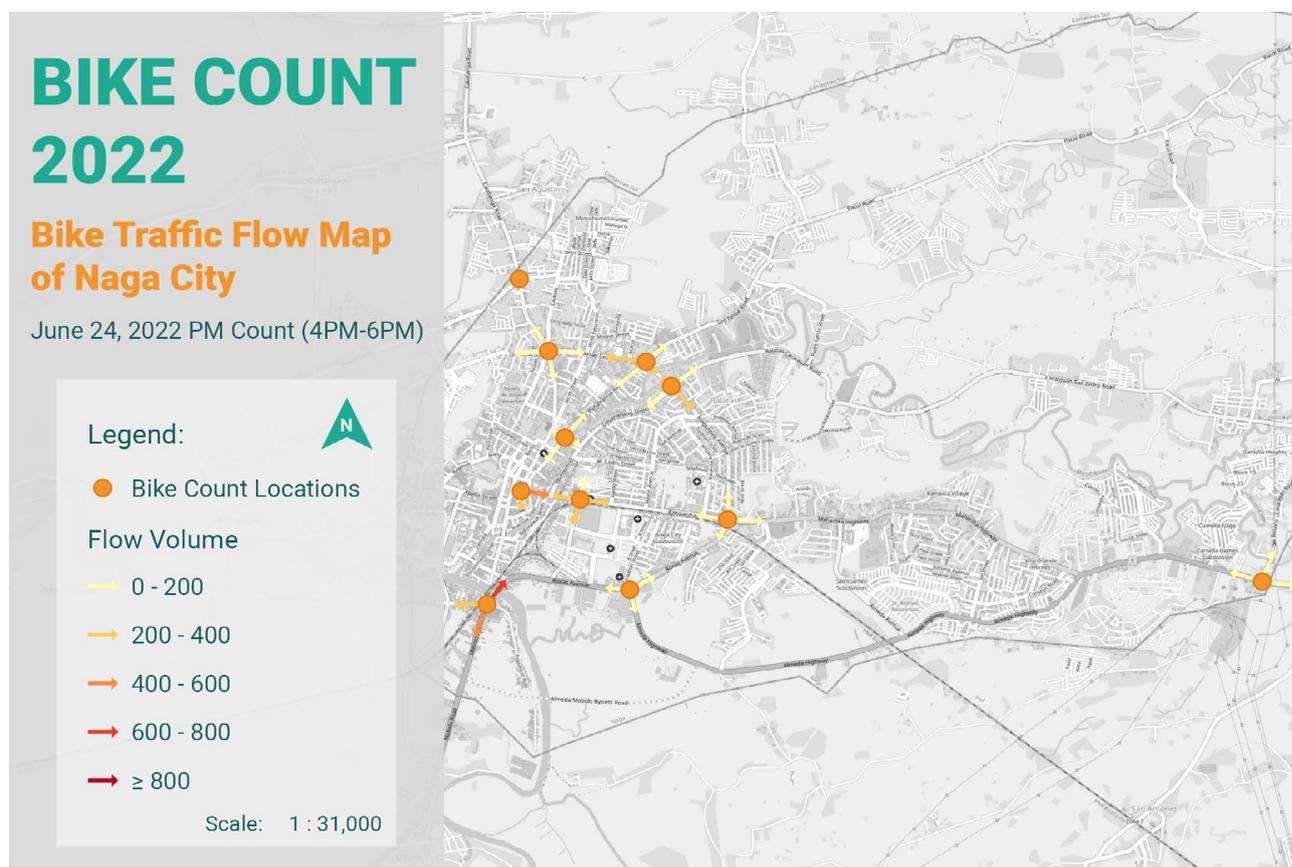
However, there are still a good amount of women cycling in Naga City compared to other cities! Naga City is a small city where the distance of establishments from one's residence averages less than 10 KM. The close proximity of establishments to residential areas facilitate shorter trips which can be a factor that encourage more women to cycle to their destinations. Moreover, the continued support of Naga City government in advocating for active transport plays an in encouraging Nagueno to use bicycles as a mode of transport.

On helmet use, most recreational and athletic bikers wear helmets. Novice bikers, those biking to work, and those who use biking for short errands do not use helmets as much because of the short distance they travel.

Bike Traffic Flow



Map 2: Bike Traffic Flow of Naga Cyclists on June 24 AM Count (6AM-8AM)



Map 3: Bike Traffic Flow of Naga Cyclists on June 24 PM Count (4PM-6PM)

BIKE COUNT 2022

Bike Traffic Flow Map of Naga City

June 26, 2022 AM Count (6AM-8AM)

Legend:



● Bike Count Locations

Flow Volume

0 - 200

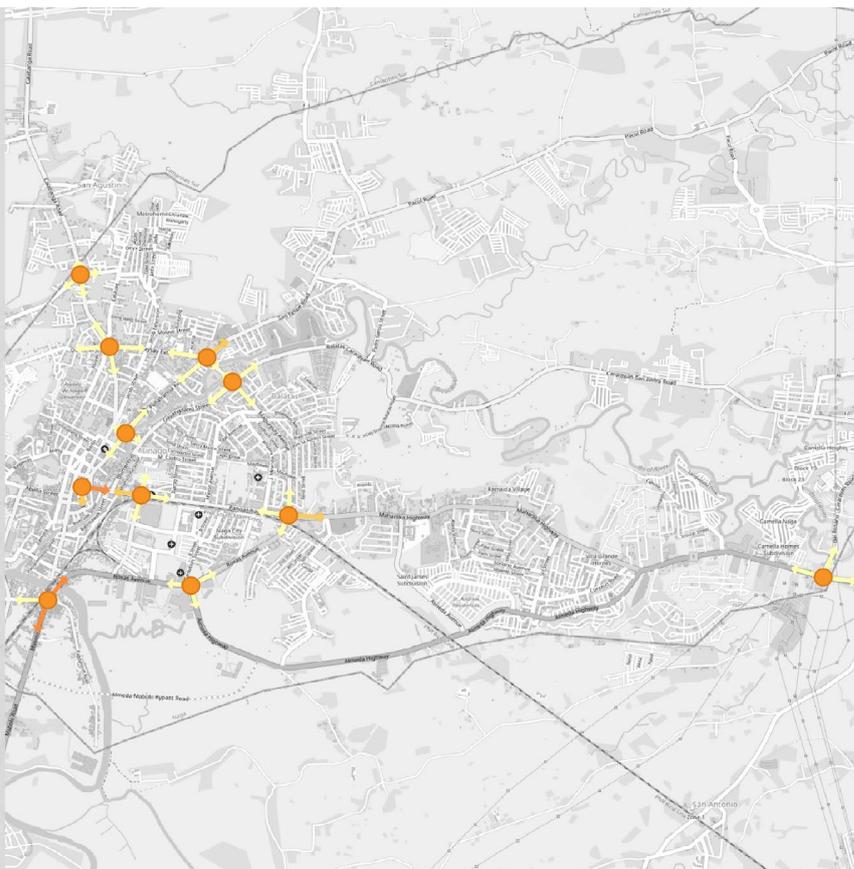
200 - 400

400 - 600

600 - 800

≥ 800

Scale: 1 : 31,000



Map 4: Bike Traffic Flow of Naga Cyclists on June 26 AM Count (6AM-8AM)

BIKE COUNT 2022

Bike Traffic Flow Map of Naga City

June 26, 2022 PM Count (4PM-6PM)

Legend:



● Bike Count Locations

Flow Volume

0 - 200

200 - 400

400 - 600

600 - 800

≥ 800

Scale: 1 : 31,000

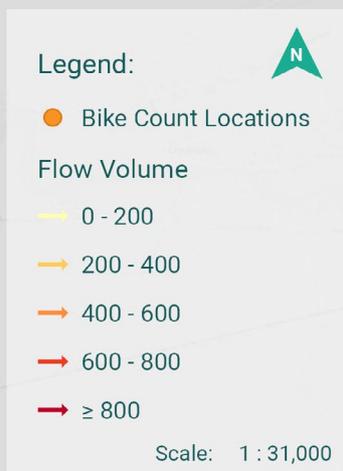


Map 5: Bike Traffic Flow of Naga Cyclists on June 26 PM Count (4PM-6PM)

BIKE COUNT 2022

Bike Traffic Flow Map of Naga City

June 27, 2022 AM Count (6AM-8AM)

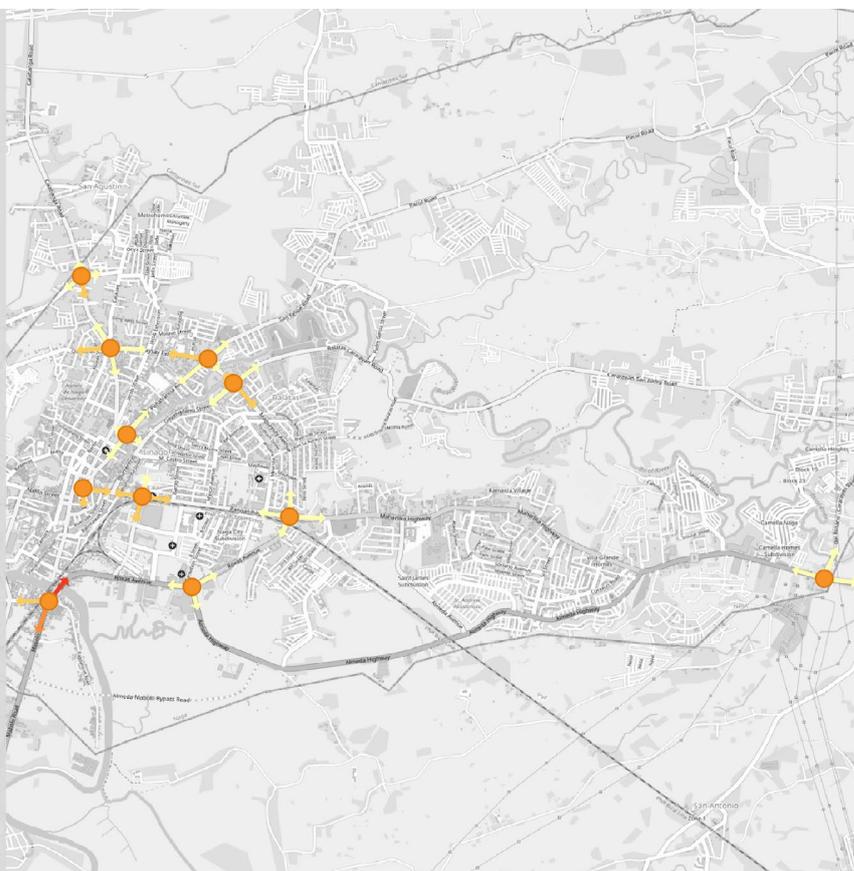
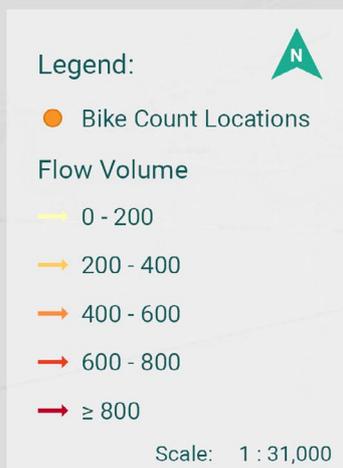


Map 6: Bike Traffic Flow of Naga Cyclists on June 27 AM Count (6AM-8AM)

BIKE COUNT 2022

Bike Traffic Flow Map of Naga City

June 27, 2022 PM Count (4PM-6PM)



Map 7: Bike Traffic Flow of Naga Cyclists on June 27 PM Count (4PM-6PM)

It was observed that a high number of people riding bicycles in Naga pass through boundaries of adjacent municipalities especially at Canaman-Naga border and Milaor-Naga border. Thus, improvement in the active transport infrastructure will benefit not only Naguenos but also the residents of nearby municipalities who account for the significant foot traffic and other economic activity in Naga.

The number of bikers in Plaza Rizal - Naga Optical (NC9) belongs to the top areas frequented by cyclists. The protected bike lanes around Plaza Rizal played an important role in attracting more cyclists to bike around it especially during the weekend.

Potential contribution of cyclists on the road

What does the 35,523 of people-on-bicycles mean?

- More people are moved by bicycles, compared to cars and motorcycles. 35, 223 people on bicycles during the three-day count is equivalent to 20,719 cars or 29,353 motorcycles taken off the road.
- As bicycles do not consume gasoline or diesel as fuels, the 35,223 people riding on bicycles were able to save PHP 62,783 - PHP 187,495 worth of fossil fuels per kilometer. These estimates do not include savings from regular maintenance, parking and mortgage.
- Using GHG emissions reported by known car and motorcycle brands, it is also estimated that the 35,223 cyclists were able to avoid 2 to 3 tons of CO₂-emissions per kilometer.

| Count Date | Total No. Of Cyclists (passenger) per Day | Equivalent No. of Vehicles Avoided | Estimated Daily fuel costs Savings (per KM) | Estimated TONS OF CO ₂ Emissions Avoided (in a 1 KM drive) |
|----------------------|---|------------------------------------|---|---|
| June 24 (Friday) | 11,612 | 6,831 | ₱61,152.28 | 1.08 |
| June 26 (Sunday) | 10,247 | 6,028 | ₱53,963.78 | 0.96 |
| June 27 (Monday) | 13,364 | 7,861 | ₱70,378.83 | 1.25 |
| Overall Total | 35,223 | 20,719 | ₱185,495 | 3 tCO₂ |

*Average occupancy rate of a car is 1.7 passenger, MUCEP (2012-2014)

| Count Date | Total No. Of Cyclists (passenger) per Day | Equivalent No. of Motorcycles Avoided | Estimated Daily fuel costs Savings (per KM) | Estimated TONS OF CO ₂ Emissions Avoided (in a 1 KM drive) |
|----------------------|---|---------------------------------------|---|---|
| June 24 (Friday) | 11,612 | 9,677 | ₱20,697.69 | 0.52 |
| June 26 (Sunday) | 10,247 | 8,539 | ₱18,264.66 | 0.46 |
| June 27 (Monday) | 13,364 | 11,137 | ₱23,820.53 | 0.60 |
| Overall Total | 35,223 | 29,353 | ₱62,783 | 2 tCO₂ |

*Average occupancy rate of a motorcycle is 1.2 passenger based on MUCEP (2012-2014);



Key Recommendations

1. **Local Government Unit to install protected bike lanes in both side streets frequented by bikers and these bike lanes must be connected.**
2. **Local Government to improve infrastructure at the intersections. Bikers are at a disadvantage at the current set up at the intersections.** They must be able to safely cross intersections.
3. **Bike count should be an institutionalized and funded bi-annual program of the City.** The two bike counts per year will greatly help in the city's planning and implementing active transport initiatives.
4. **City to invest and Integrate Automated Counters in Bike Counts:** Implementing a permanent count program is crucial in order to accurately estimate the annual average daily traffic of cyclists. The first two years of the manual count provides a snapshot of the actual volume of traffic which is able to aid the need in determining high priority count locations for cyclical counts.

In the long term, integrating the use of automated counters facilitated by local government units is highly recommended. A permanent counter is an automated device in place 24 hours per day, 365 days per year. Its purpose is to gather a continuous record of how bicycling changes over time and over external factors such as weather and infrastructure, policy changes.

5. **Bike Count organizers expand the count window to 3 hour:** ideally 5AM - 8AM in the morning and three hours in the afternoon: 4PM - 7PM. There should at least be two counts (one weekday and weekend) to compare the mobility of the people during weekdays and weekends. It is recommended to conduct it during Mondays, Friday, Saturday, or Sunday.
6. **For Bike Count organizers to increase Location Coverage:** including secondary roads and more entry and exit points in the city. All boundaries of a city must be covered so that we know the movement of the bikers who move-in and move out of the city. This way we can use the data to lobby with several municipalites to synergize their active transport initiatives.
7. **Recommendations on the Bike Count Trainings:** Several dry runs must be done prior to the actual counting because it helps volunteers to be familiar with the area and to look for strategic places where they can count safely. It is best to tap the same volunteers for the same area because of the familiarity on the process and the place of the count.

For more accurate data and for validation purposes, each bike count team must have cameras to record the area they are count. It is also recommended that the team in an area be composed of at least 3 members, 1 for the bike flow, 1 for the gender and helmet use, and 1 spotter or reliever in case the volunteer goes to the restroom or eat. Distribution of load among the team is highly suggested as follows: different people could count different genders, different people could count those with or without helmets, volunteers could have focused counting on one line, and a counter and a note taker being designated. Additionally, it is ideal for there to be both a point person and an experienced bike counter present in each group.

It is also recommended to provide more resources to volunteers additional resources such as counter clickers, clipboards, and tumblers for hydration to avoid the use of plastic bottles. Budget for dry runs and orientations before the actual count is also beneficial.

- 8. Conduct Supplemental Studies to Understand Cycling Behaviors and also Generate more baseline Data:** One of the highlights of the bike count is documenting the significant gender gap in everyday cycling that needs to be addressed urgently.. More studies should be done to learn and understand the unique cycling needs and preferences of women in an urban context.

Another key area for study and action is bicycle users' behavior. Turning movement counts are useful for traffic impact studies and safety studies. These counts are used to determine exposure rates at high collision crossings, as well as to retime or reconfigure traffic signal phasing. Rather than penalizing what are seemingly illegal bike traffic flow such as counterflowing, policymakers, traffic planners and others need to collect data on cycling movements, relate it to cyclists needs and preferences to produce better bike facilities like bidirectional bike lanes, bike, and pedestrian bridges, end-of-trip facilities (bike parking), etc.

Likewise, more accurate data on savings and GHG emissions can be generated if there is a baseline data on the average distance traveled by people riding bicycles, and comparison be done using average trip distance of other modes of transport particularly motorcycles and cars.



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Annex

Annex 1: Bike Count Forms

| Table Count Form | | |
|------------------|-------|--|
| LOCATION: | DATE: | TIME: × 06:00am - 08:00am × 04:00pm - 06:00pm |
| WEATHER: | NAME: | |
| NOTES: | | TOTAL NO. CYCLISTS COUNTED: |

| Time Interval | MALE | | FEMALE | | NOT DETERMINED | |
|---------------|-------------|-----------|-------------|-----------|----------------|-----------|
| | With Helmet | No Helmet | With Helmet | No Helmet | With Helmet | No Helmet |
| 00:00-00:15 | | | | | | |
| 00:15-00:30 | | | | | | |
| 00:30-00:45 | | | | | | |
| 00:45-01:00 | | | | | | |
| 01:00-01:15 | | | | | | |
| 01:15-01:30 | | | | | | |
| 01:30-01:45 | | | | | | |

Figure 1. Table count form

| Diagram Count Form (Screenline) | | |
|---------------------------------|-------|--|
| LOCATION: | DATE: | TIME: × 06:00am - 08:00am × 04:00pm - 06:00pm |
| WEATHER: | NAME: | |

▲
North

Bound to:

Bound to:

Notes:

TOTAL NO. CYCLISTS COUNTED:

Figure 2. Diagram count form

Annex 2: Naga City Bike Count Locations

| Location ID | Location | Location Type |
|-------------|--------------------------------------|---------------|
| NC1 | Centro Square Intersection | Intersection |
| NC2 | Francia-Liboton | Intersection |
| NC3 | Bagumbayan-Queborac-SkyCity | Intersection |
| NC4 | Yellow Cab-Shell (Going to Basilica) | Intersection |
| NC5 | Panginiban Drive Rotonda | Roundabout |
| NC6 | SM Intersection | Intersection |
| NC7 | Del Rosario-Pili Boundary | T-Junction |
| NC8 | Robinsons Mall (Going to Diversion) | T-Junction |
| NC9 | Plaza Rizal-Naga Optical | T-Junction |
| NC10 | Mabolo Bridge (Gainza) | T-Junction |
| NC11 | Bagumbayan Boundary | Intersection |

