



MOBILITY AWARDS' 2022 Citizen Bike Count:

Davao City Results

Everyone Counts, everyone matters!



~Our Daily Habit to Save the Planet~



Organized by:

Cycle for Life Davao, Bike Rack Davao, and United Cycling Adventure Society Inc.

In partnership with:

Local Government of Davao City
The Institute for Climate and Sustainable Cities
The Climate Reality Project Philippines
350.org Pilipinas
MNL Moves
Pinay Bike Commuter Community

Editorial board:

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Maria Golda Paz Hilario, Institute for Climate and Sustainable Cities

Calculations on the observations:

Jephraim Manansala, Institute for Climate and Sustainable Cities
Marion Lois Tan, Institute for Climate and Sustainable Cities

Graphic Design:

Joseph Manalo, Gerimara Manuel, Rosalie Agustin

Correspondence:

mobility@icsc.ngo; info@icsc.ngo

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Abduhnazer Jaladil	Jussel Rose Paghubasan
Annabelle Suello	Karim Elijah
Ariz Bacalan	Kelly Saturinas
Benedict Aguilar	Laura Elizaga
Blessy Marie Siapno	Larry Solon
Ceazar Javellana	Lawrence Miñoza
Charmy Padilla	Lenard Maga
Christian Amper	Leo Elrey Parreño
Dave Bernales	Liza Elsie Parreño
Dave Catam-Isan	Ludilyn Andico
Dexter Prieto	Marilou Tutor
Dhanica Jane Ochea	Men-Chelle Catindig
Eduardo Martin Zaldivar	Mildred Corbo
Edwin Liray	Mildred Corbo
Francis Jon Locsin	Monica Ayala
Ginalyn Buelis	Nerissa Cabriadas
Illuminado Jr. Quinto	Ofelia Maestrado
Irene Limpao	Rafael Aron
Jan Michael Santos	Rosel Paghubasan
Jap Paña	Roy Gomez
Jared Samson	Teffanie Vallecer
Jared Samson	Virginia Guarino
Jasper Mesias	Vislyn Bajo
Jeffrey Remollo	Vivian Quimpan
Jerson Oducayen	Virginia Muico
Josel Paghubasan	



Introduction

This report summarizes the results of the Davao Bike Count Project that was held on July 15 wherein 49 volunteers and active mobility advocates in partnership with the Local Government of Davao City counted people-on-bicycles in 19 locations (Annex 1).

The Davao Bike Count Project is an initiative organized by the Cycle for Life Davao, Bike Rack Davao, and United Cycling Adventure Society Inc. in partnership with the convenors of the Mobility Awards.

1. Mobilize community resources especially volunteers' and citizen's time, skills and expertise to count who bike in their cities;
2. Provide analysis on data through a report paper to be released in July., Information generated aims to inform local transport planning and monitoring of road infrastructure, and other potential opportunities that the city can optimize;
3. Share results to the general public for more evidence-based communication and;
4. Share adapted tools and methodologies on the bike count to cities and local government units (LGUs) in a consistent manner through collaboration with city LGUs.

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 **38 movements across the 19 locations** during the count survey.



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) Project¹** (*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 **19 count sites** for Davao City considering borders connecting exit and entry points across neighboring city, historical count locations, areas with bike lanes and bike facilities, high collision areas, major streets near public transport transit, and locations recommended by respective LGUs. The count locations were also determined by the availability and number of volunteers per city [See *Table 1*].

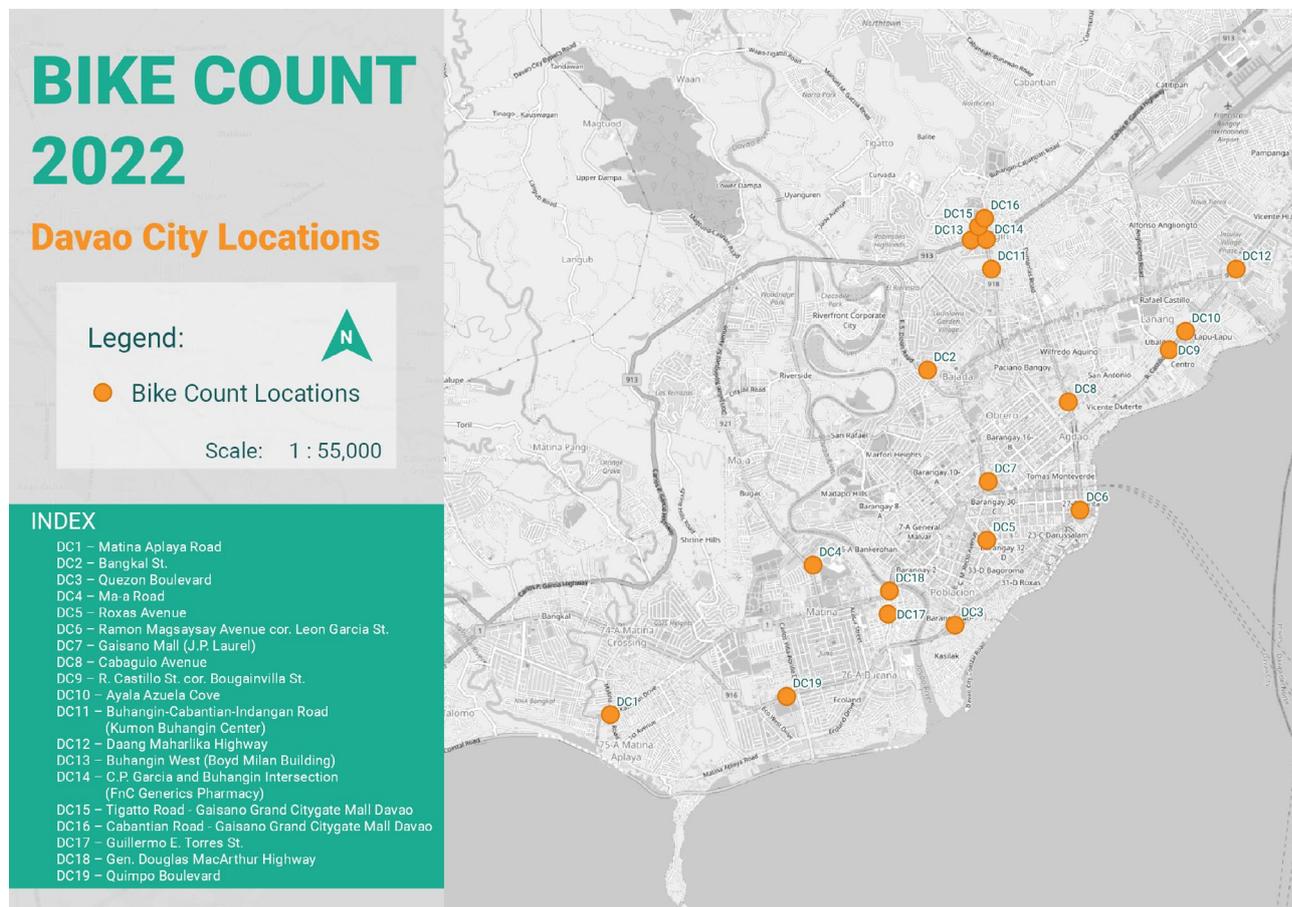
Table 1. Distribution of Count Location and Volunteers in Davao City

Location ID	Count Location	Location Type	Minimum No. of Volunteers Assigned (Per day and hour)
DC1	Matina Aplaya Road	Screenline	2
DC2	Bangkal St.	Screenline	2
DC3	Quezon Boulevard	Screenline	2
DC4	Ma-a Road	Screenline	2
DC5	Roxas Avenue	Screenline	2
DC6	Ramon Magsaysay Avenue cor. Leon Garcia St.	Screenline	2
DC7	Gaisano Mall (J.P. Laurel)	Screenline	2
DC8	Cabaguio Avenue	Screenline	2
DC9	R. Castillo St. cor. Bougainvillea St.	Screenline	2
DC10	Ayala Azuela Cove	Screenline	2
DC11	Buhangin-Cabantian-Indangan Road (Kumon Buhangin Center)	Screenline	2
DC12	Daang Maharlika Highway	Screenline	2
DC13	Buhangin West (Boyd Milan Building)	Screenline	2
DC14	C.P. Garcia and Buhangin Intersection (FnC Generics Pharmacy)	Screenline	2
DC15	Tigatto Road - Gaisano Grand Citygate Mall Davao	Screenline	2
DC16	Cabantian Road - Gaisano Grand Citygate Mall Davao	Screenline	2
DC17	Guillermo E. Torres St.	Screenline	2
DC 18	Gen. Douglas MacArthur Highway	Screenline	2
DC 19	Quimpo Boulevard	Screenline	2

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



Where did we count?



Map 1: Bike Count Locations in Davao City



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 economic savings and;
- (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) × Distance Traveled by vehicle (km) × 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) = 54g/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 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-ped 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.



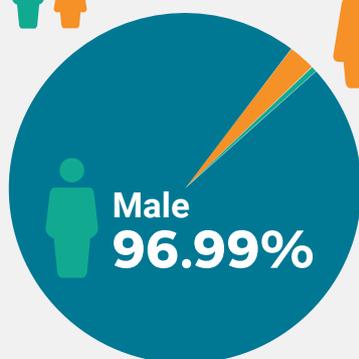
Count Results

Total No. of Cyclists Counted

9,065



GENDER



Female
2.67%

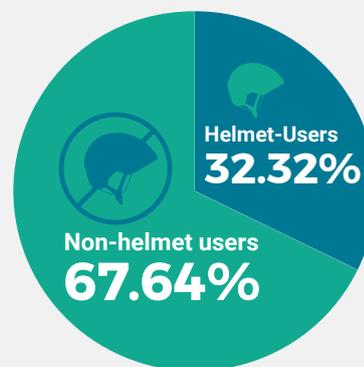


Undetermined
0.34%

Male
96.99%



HELMET USERS

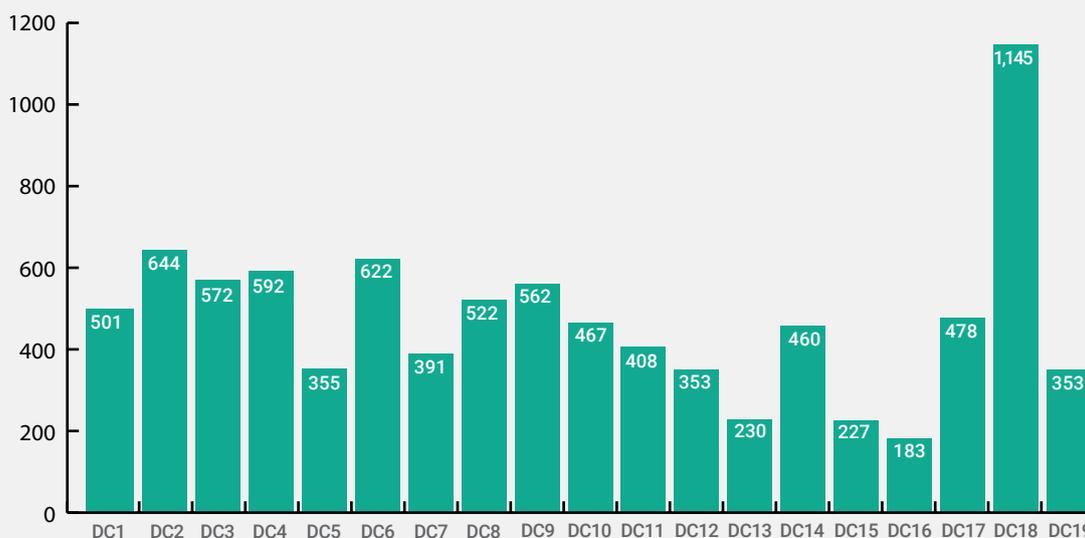


Helmet-Users
32.32%

Non-helmet users
67.64%



COUNT RESULTS PER LOCATION



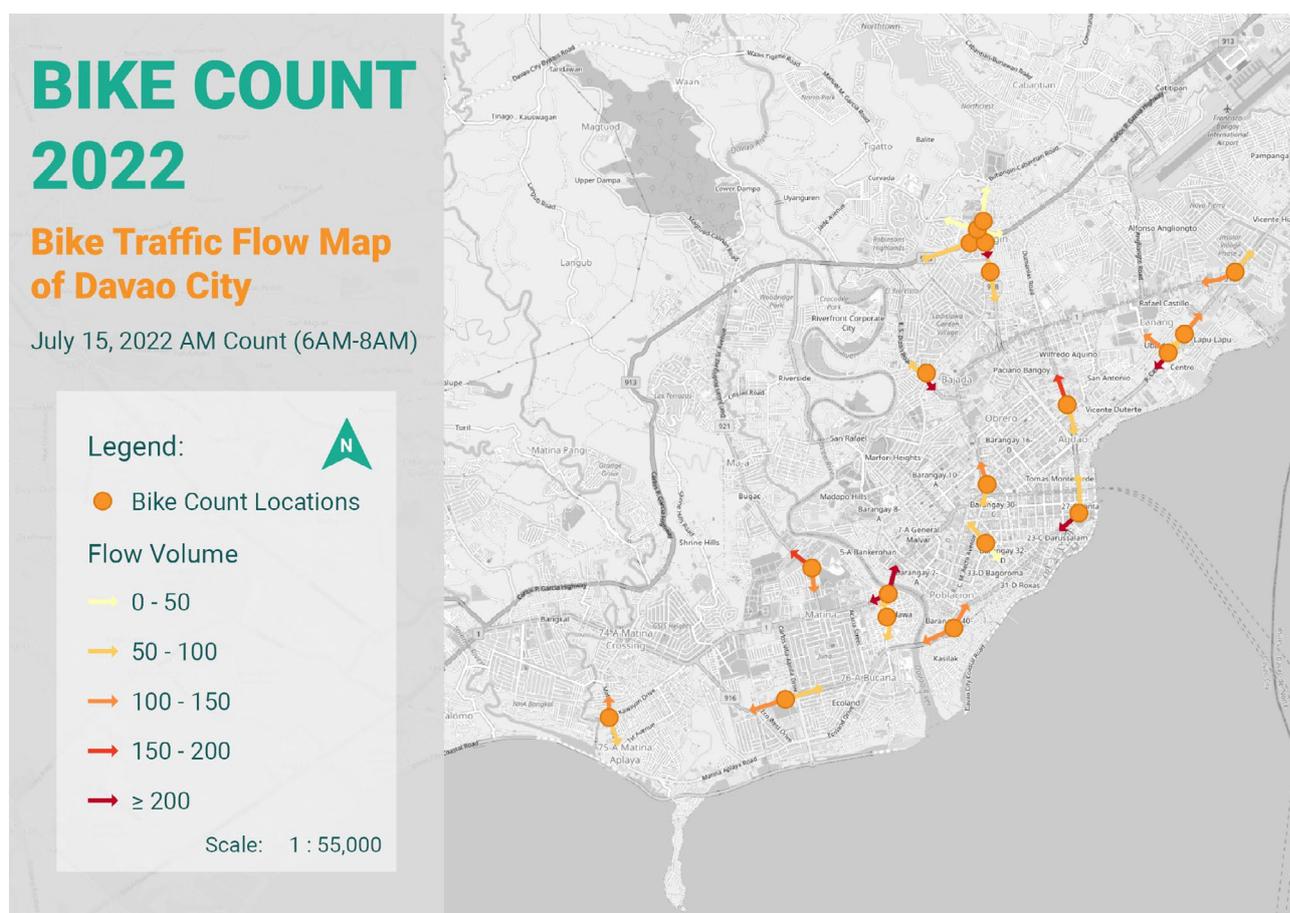
DC1: Matina Aplaya Road; DC2: Bangkal St.; DC3: Quezon Boulevard; DC4: Ma-a Road; DC5: Roxas Avenue; DC6: Ramon Magsaysay Avenue cor. Leon Garcia St.; DC7: Gaisano Mall (J.P. Laurel); DC8: Cabaguio Avenue; DC9: R. Castillo St. cor. Bougainvillea St.; DC10: Ayala Azuela Cove; DC11: Buhangin-Cabantian-Indangan Road (Kumon Buhangin Center); DC12: Daang Maharlika Highway; DC13: Buhangin West (Boyd Milan Building); DC14: C.P. Garcia and Buhangin Intersection (FnC Generics Pharmacy); DC15: Tigatto Road - Gaisano Grand Citygate Mall Davao; DC16: Cabantian Road - Gaisano Grand Citygate Mall Davao; DC17: Guillermo E. Torres St.; DC18: Gen. Douglas MacArthur Highway; DC19: Quimpo Boulevard



Count Results

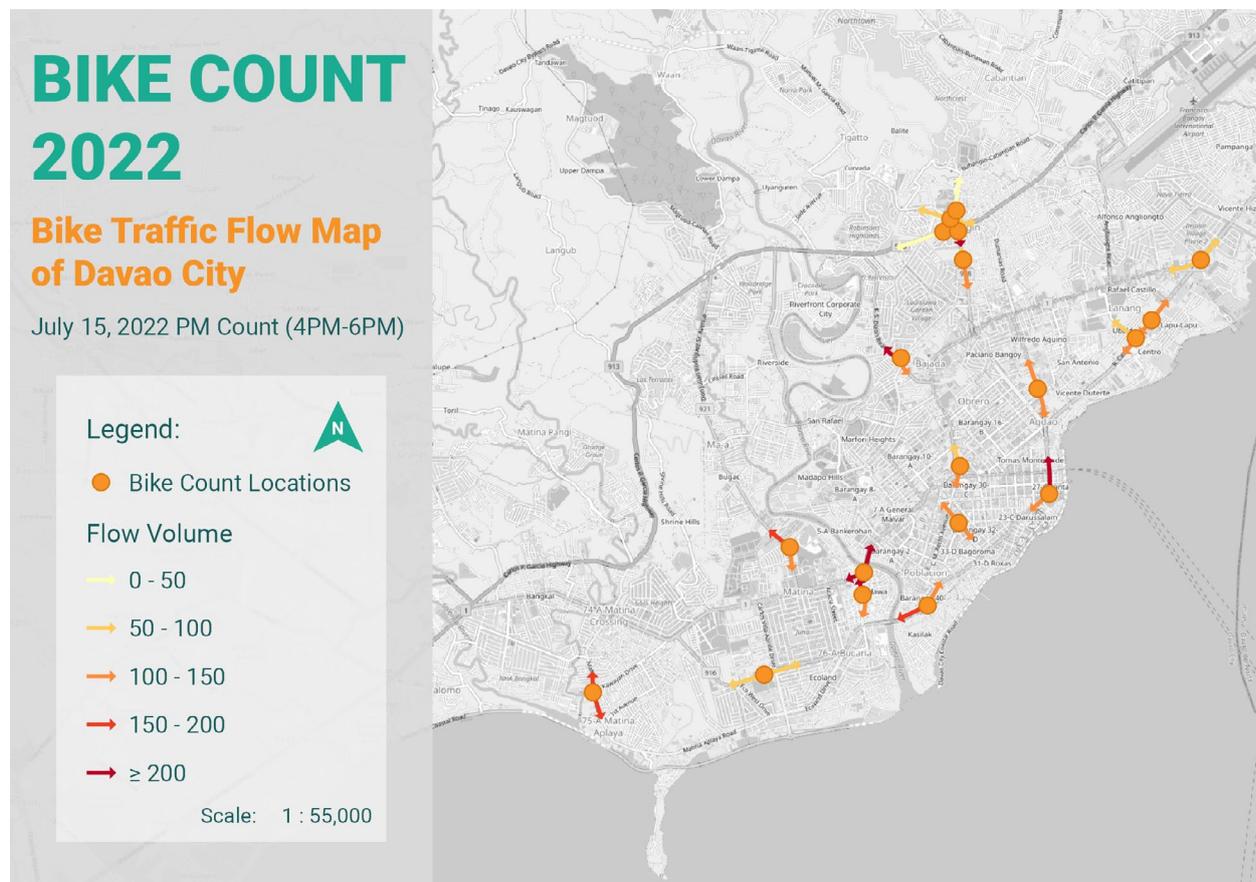
- Gen. Douglas MacArthur Highway (DC18), also known as MacArthur Highway, had the highest number of bicycle riders with 1,145 individuals counted in the span of 4 hours. MacArthur Highway has available bike lanes throughout its 1.8 KM stretch. It is also the shortest route going to the districts of Matina and Ma-a. It is also the main access to the city proper where the Davao Public Market is located including commercial districts in the city.

Bike Traffic Flow



Map 2: Bike Traffic Flow of Cyclists Counted in Davao City n July 15, 2022 from 6AM - 8AM

Bike Traffic Flow



Map 3: Bike Traffic Flow of Cyclists Counted in Davao City on July 15, 2022 from 4PM - 6PM

Potential contribution of cyclists on the road

What does the 9,065 of people-on-bicycles mean?

Mode	Equivalent No. of Vehicles (cars and motorcycles) Taken off the road by bicycles	Estimated Daily fuel costs Savings (per KM)	Estimated TONS OF CO2 Emissions Avoided (in a 1 KM drive)
 Car	5,332	₱28,081.77	0.85 tCO2
 Motorcycle	7,554	₱13,464.85	0.41 tCO2

**Average occupancy rate of car is 1: 1.7 passenger, while average occupancy rate of motorcycle is 1: 1.2 passenger based on MUCEP (2012-2014);*

- More people are moved by bicycles, compared to cars and motorcycles. 9,065 people on bicycles the July 15, 2022 count is equivalent to 5,332 cars or 7,554 motorcycles taken off the road.
- As bicycles do not consume gasoline or diesel as fuels, the 9,065 people riding on bicycles were able to save an accumulated ₱13,464.85 - ₱28,081.77 worth of fossil fuels per kilometer driven. These estimates do not include savings from regular maintenance, parking and mortgage.
- Using GHG emissions reported by common car and motorcycle brands, it is also estimated that the 9,065 cyclists were able to avoid 0.41 - 0.85 tons of CO2-emissions per kilometer. For lack of data on average trip distance of cyclists in Davao City, total CO2-emissions from fossil fuel use was not derived in this report.



Key Recommendations

1. **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.
2. **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.

Investing on automated counters by local government units is highly recommended especially in dedicated bike lanes that had the highest number of pedal traffic. 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.

3. **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 implement manual Bike Counts during Mondays, Friday, Saturday, or Sunday.
4. **Preparation is key.** The success of manual bike count is contingent on the commitment and turn out of volunteer counters. Volunteer orientations and training are key, and enough lead time should be devoted for the preparations.
5. **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 municipalities to synergize their active transport initiatives.
6. **Recommendations on the Bike Count Trainings.** Several dry run simulations be done prior to the actual count to help volunteers familiarize with the area and to scout for a strategic count station where they can observe the traffic and movements of cycling public.

For more accurate data and for validation purposes, it is recommended to form a bike count team in each observation station or count location. It is ideal that they be equipped with cameras to record the area where they are counted, and with click counters. It is also recommended that the team in an area be composed of at least 3 members: 1 member to be assigned to count using bike flow directional movements, another member to capture different genders and the last member to capture helmet use.

In case there are enough volunteers, it is ideal that the fourth volunteer be assigned as an alternate to relieve a team member in case the volunteer goes into health break. If the count will be repeated in the next season, or in the next year, it is ideal to assign that an experienced bike count volunteer be assigned in each team to coach and mentor new volunteers.

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. It is also ideal that budgets and resources are allocated to organize dry runs and orientations before the actual count, and after the count to allow debriefing and data consolidation.

- 7. Conduct supplemental studies to understand cycling behaviors and also generate more baseline data.** The Bike Count highlighted the significant gender gap between men and women. There is a need to accelerate measures to address this, especially that bicycles have emerged as a reliable transport option that supplements the challenges of an already crowded public transport system.

While the bike count is limited to those who rode their bicycles during the peak commuting hours, the bike data further suggests that more work needs to be done to encourage more women to cycle as mobility or trip choice. 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 reconfigure traffic signal phasing. Rather than penalize what are seemingly illegal bike traffic flow such as counterflowing, policymakers, traffic planners and traffic management personnel 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 can be done using average trip distance of other modes of transport particularly motorcycles and cars in Davao City.



References

Bicycle and Pedestrian Count Programs: Summary of Practice and Key Resources. (n.d.). Retrieved August 4, 2022, from https://www.pedbikeinfo.org/cms/downloads/PBIC_Infobrief_Counting.pdf

Biona, J.B. Manuel & Mejia, Alvin & Tacderas, Mark Angelo & Cruz, Nathaniel & Dematera, Kathleen & Romero, Jane. (2017). Alternative Technologies for the Philippine Utility Jeepney A COST-BENEFIT STUDY. 10.13140/RG.2.2.21019.57128.

Institute for Climate and Sustainable Cities (2019). #PHmobility: Active mobility survey in Metro Manila. Retrieved October 17, 2022, from icsc.ngo/active-mobility-survey/

Fajardo, Joselle Marie (2022). #ShareTheRoadWithHer: Evaluating Women's Landscape Preference of Cycling Infrastructure in Quezon City Based on Mobility Needs

Japan International Cooperation Agency (JICA) & Department of Transportation and Communications (DOTC). (2015, December). The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines: MMUTIS Update and Enhancement Project (MUCEP). <https://openjicareport.jica.go.jp/pdf/12247623.pdf>

Average retail price of one liter gas in the Philippines from 2019 to 2022, (2022). Published by: Statista Research Department, Retrieved October 17, 2022 from <https://www.statista.com/statistics/1306971/philippines-average-fuel-retail-price-per-liter/>

Yamaha NMAX 125 - Features and Technical Specifications". www.yamaha-motor.eu.



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: Davao City Bike Count Locations

Location ID	Location	Location Type
DC1	Matina Aplaya Road	Screenline
DC2	Bangkal St.	Screenline
DC3	Quezon Boulevard	Screenline
DC4	Ma-a Road	Screenline
DC5	Roxas Avenue	Screenline
DC6	Ramon Magsaysay Avenue cor. Leon Garcia St.	Screenline
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