

## Urban Planning and Traffic Congestion in Labasa Town

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### *Abstract*

*It is becoming evident that smaller towns are today facing somewhat similar problems as large cities. Traffic congestion is one such problem. Traffic related delays affect productivity and output. Traffic congestion, overcrowding, lack of parking space, urban mobility, shortage of buildings for office space, unavailability of flats for rent, long lines at check-out counters in supermarkets and sometimes poor customer services are the hallmark of small towns with poor planning. Public transit is one of the major means of transport for commuters in Labasa. Congestion in a small town such as Labasa is becoming a major concern. Traffic related delays and excess fuel consumption leading to environmental problems add to commuter discomfort and frustration. It is argued in this paper that in the small town of Labasa, traffic congestion reflects poor urban planning.*

### Introduction

Development of urban centres unfold many opportunities, changes and challenges. In metropolitan centres, these are more complex and sometimes difficult to overcome. It is becoming evident that smaller towns are today facing somewhat similar problems but on a smaller scale. Traffic congestion, overcrowding, lack of parking space, urban mobility, shortage of office space, unavailability of accommodation space, long lines at check-out counters in supermarkets and sometimes poor customer service are making their entry into many small towns.

Traffic congestion in small towns reflects poor urban planning. It may or may not impose challenges depending on its urban development pattern, number of vehicles, location of ports and facilities, population size, etc. Such complexities in large cities are more common and raise potential for disruptions largely emanating from ineffective management

(Roderigue, 2013). Ineffective management and leadership is the cause of congestion, transport disruptions including accidents, overcrowding, crime and unemployment, exorbitant rent and sometimes tough regulations. Inefficiencies mean loss - loss of valuable time, money, resources and productivities.. Roderigue stated 'urban productivity is highly dependent on the efficiency of its transport system to move labour, consumers and freight between multiple origins and destinations'. Pick up and drop off points designated in the main street and limited use of back streets add more furore to smooth traffic flow.

Traffic congestion in Labasa town has significantly grown since 2014 and has become a major concern now. Delays, excess fuel consumptions, environmental pollution, commuter discomfort and frustration are now common features of people movement in Labasa Town. Conventional thinkers believe that there is no way of solving traffic congestion. So they usually end up either limiting entry to vehicles or making streets one way. An example of similar approach taken is the Jaduram Street in Labasa which is believed to be one of the main causes of traffic congestion in Labasa town. The more limitations authorities place on mobility- be it pedestrians or vehicles, the more it affects people and business. It can mean serious impact on some businesses while others may enjoy better turnover as people and traffic are directed through the street nearer to their establishments.

This paper examines the causes of traffic congestion in Labasa Town, and assesses the extent to which traffic congestion affects daily commuters. It also suggests some possible solutions.

### Traffic Congestion

Traffic congestion in metropolitan cities is argued to be good indicators of growth and prosperity of the city. More traffic means more people which in turn mean more business. Anthony Downs in *Still stuck in Traffic* (2005) argues that bad traffic is a good sign for cities, especially large cities, and integral to how modern societies function. Similar ideas are put forward by those who believe that cities must not control congestion as it will then force people to use alternative travel methods such as bicycling , walking, or car-pooling. Those holding this school of thought believe that it is a way to break the automobile's grip persuading them to carpool or take public transit (Samuel, 1999). Samuel asserts that it is futile to solve congestion through public transit and car – pooling and that it is not going to work out. The idea of carpooling has so far not worked for any town or city in Fiji.

Some new studies have identified 'tipping points' at which congestion become drags on a city's economy. Badger writes about Matthias Sweets findings, which suggests that 'higher levels of congestion are initially associated with faster economic growth but above a certain threshold, congestion starts to become a drag on growth'. Badger states that congestion slows down job growth and that fixing the congestion problem using resources when it reaches the tipping point is economically inefficient (Badger, 2013). Sweet has rebutted Downs's view that bad traffic may not necessarily indicate growth or become a good sign for cities above a certain threshold. It may unfortunately reflect a point where urban planners are left with no other ideas to keep congestion under control, thus letting congestion to subtly worsen. It has thus become imperative to resolve urban traffic congestion especially in those cities and towns where it is more bad than good.

Traffic congestion has many related effects. The impact on environment from pollution and subsequently on health due to longer time in queues adds to another (uncalculated) cost. The stop-go acceleration-deceleration driving pattern and the slow vehicle speeds of driving increases fuel consumption Robinson (1994). Robinson states that fuel consumption is high at low speeds. Commuters and business organizations feel the effect of this but are helpless.

It is accepted that traffic congestion, especially at peak times, is inescapable in large urban areas all over the world' (Downs, 2004). This tends to be generally true for metropolitan cities but for small towns of populations in thousands only, traffic congestion should not become critical; it must remain manageable.

'Congestion is a complex phenomenon, influenced by socioeconomic, technical and human factors' (World Road Association, 2010). These factors if not considered into urban planning at various stages tend to pose grave problems - not just congestion but a host of other relative problems such as migration of skilled people in search for better work locations elsewhere, growth of squatter settlements closer to economic and productive locations as people search for employment opportunities which in turn has potential to increase crime and create pressure on urban services and utilities. Traffic congestion exacts a terrible social and economic toll on society (Taylor, 2002) and contributes to significant spatial effects (social diseconomies of congestion) (Robinson, 1984). Small towns which lack expertise and dynamic governance will end up facing unprecedented challenges later including backlash from various sectors for poor decision making and failures in managing traffic congestion.

Pacific islands and LDC's have their own issues of governance and political authority, financing infrastructure development and resource control. Many Pacific Islands are experiencing greater than national average growth in urban populations. Urban population growth usually adds pressure to limited resources, leads to growth of informal housing which affects further development. Continuing addition of unskilled and uneducated youth population increases social problems such as crime, prostitution, begging, drug peddling etc. Failure to consider future population growth in decision making is bound to create urban woes.

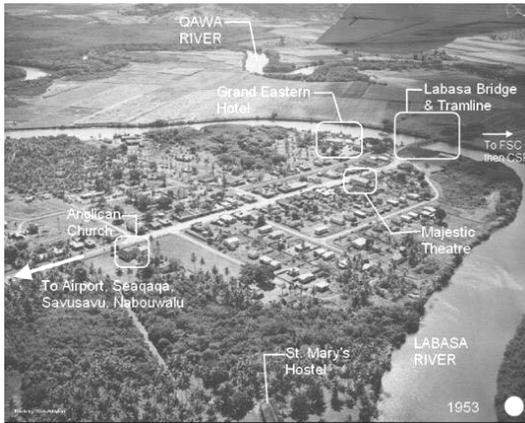
In developing countries, there are increasing number of towns and cities where traffic congestion is bad. Major towns in Fiji face increasing problem of congestion with manifestly negative impacts.

### **Labasa Town and Population Growth**

Most towns in Fiji are estuary towns. The main purpose of establishing towns at river banks or delta regions was for transportation accessibility. Rivers played crucial roles in transportation of goods; many continue to do so now to some extent. The impact of, and even the extent of fluvial geomorphological perturbation such as siltation, deposition and flooding arising out of deforestation (mangroves and highland forests), upstream and river bank development, watershed mismanagement etc., seemed to have eluded early town developers nationwide.

Labasa was proclaimed a township in 1939. A few stores were established and with the exception of a few vehicles, people usually visited the place on horse backs, on foot from long distances, or used punts. The Colonial Sugar Refinery (CSR) and its tramline route provided means for some to reach the town. Much of the place where the town sits now was covered in mangroves and bush. Figure 1 shows area and google maps of Labasa. The Colonial Sugar Refinery (CSR) and its tramline route provided means for some to reach the town. The CSR tramline was also used by vehicles. Today, only locomotives use the bridge as the wooden structure is no longer there.

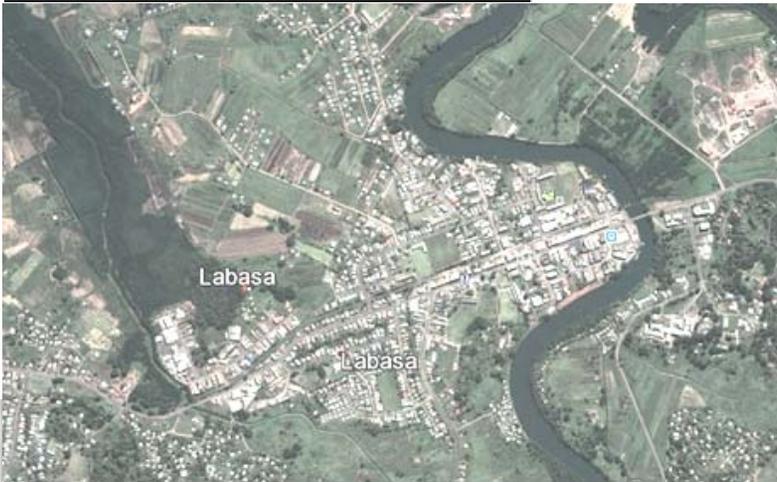
Initially the town was known as Nasea. Establishment of shops slowly took place along the main road in 1960's. The town was fairly empty on weekdays and Sundays; until the mid 1990's, one could easily see people from one end of the town to another. By mid-1990's, the effects of rural-urban drift became noticeable with increasing people-density in the town; one of the causes of this was non-renewal of sugar cane land leases in rural areas after the coup of 1987. Traffic densities began to be more marked in the town area after 2010.



**Fig 1:**  
**Labasa Pictures**

**Top:**  
Labasa Town, 1953.

**Middle:**  
Labasa Town, now  
(googlemap)



**Left:**  
Labasa Bridge, 1950

During the 1996-2007 intercensal period, the Northern division experienced a significant population decrease, losing 25% of its rural Indian population largely from the cane belt areas of Macuata (FBoS, 2007: 3). Macuata province further recorded a decline in population between 2007 and 2017 by 8.9%. Between 2007 and 2017, Bua province recorded a 9.1% population increase while Cakaudrove recorded a 2.3% increase (Table 1).

**Table 1. Northern Division Population, 2007-2017**

	2007	2017	Percentage change
Bua	14,176	15,466	9.1%
Macuata	72,441	65,983	-8.9%
Cakaudrove	49,344	50,469	2.3%
Total	135,961	131,918	-2.9%

(Source: Fiji Bureau of Statistics, 2007, 2017)

The urban and peri-urban population of Labasa recorded increases between 1996 and 2007. With land leases in rural areas not being renewed, many farmers left to settle in peri-urban areas of Labasa or moved to Viti Levu hoping to find employment. There was a 16% increase in urban and peri-urban population. in the 1996-2007 period (Table 2)

**Table 2: Population growth for individual Urban areas (those with an incorporated city/town) during the 1996-2007 intercensal period**

(Source: 2007 Census of Population and Housing No. 45, 2008)

Urban Area	Subdiv. of Urban Area	Census Population		Intercensal Population Change			Doubl. Time (Yrs)
		1996 (Nr)	2007 (Nr)	Abs. (Nr)	Rel. (%)	r (%)	
Labasa	All	24,095	27,949	3,854	16.0	1.3	52
	Town	6,491	7,706	1,215	18.7	1.6	45
	Peri-Urban	17,604	20,243	2,639	15.0	1.3	55

Labasa town is comparably a small urban centre serving one seventh of Suva's population. In 2007, its urban population was 7,034 with peri-urban population of 27,949 (Fiji Bureau of Statistics, 2007). The overall decrease in the Northern division population (shown in Table 3), was due to the exodus of Indians from Macuata province which was

the main cane belt area of Vanua Levu where the province lost 25 percent of its rural Indian population (Census of population and housing, 2008).

**Table 3: Population of Northern Division**

	1986	1996	2014e	% Change, 1986- 2014	% Change, 1996- 2014
<b>Urban</b>	19,409	30,051	33,641	73.3%	11.9%
<b>Rural</b>	109,745	109,465	98,861	-9.9%	-9.7%
<b>All</b>	129,154	139,516	132,502	2.6%	5.0%

(Source: BoS Population Census, 1996; and FBoS Release No. 99/2015 Population and labour force estimates of 2014, p 5.)

The huge decline in rural population between 1996 and 2014 meant resettlement either in urban and peri-urban areas within Labasa or in Viti Levu. As Table 3 shows, urban population saw a substantial increase between 1986 and 2014. The intercensal rate of growth for the urban sector between 1986 and 1996 in the Northern division (4.4 percent per year) was, as Table 4 shows, higher than that in the Central division (2 percent per year) and Western division (3.3 percent per year).

**Table 4: Population Size and Growth in the Rural and Urban Areas of the four Divisions between 1986 and 1996**

Division	Geogr Sector	Census Population		Intercensal Pop. Change		
		P <sub>1986</sub> [nr]	P <sub>1996</sub> [nr]	Abs. [nr]	Rel. [%]	r* [%]
Total Fiji	All	715,375	775,077	59,702	8.3	0.8
	Rural	438,350	415,582	-22,768	-5.2	-0.5
	Urban	277,025	359,495	82,470	29.8	2.6
Western Div	All	283,349	297,184	13,835	4.9	0.5
	Rural	203,705	186,114	-17,591	-8.6	-0.9
	Urban	79,644	111,070	31,426	39.5	3.3
Central Div	All	260,110	297,607	37,497	14.4	1.3
	Rural	85,033	82,979	-2,054	-2.4	-0.2
	Urban	175,077	214,628	39,551	22.6	2.0
Northern Div	All	129,154	139,516	10,362	8.0	0.8
	Rural	109,745	109,465	-280	-0.3	0.0
	Urban	19,409	30,051	10,642	54.8	4.4
Eastern Div	All	42,762	40,770	-1,992	-4.7	-0.5
	Rural	39,867	37,024	-2,843	-7.1	-0.7
	Urban	2,895	3,746	851	29.4	2.6

(Source: Fiji Population census, 1996.)

Today, working class families prefer to move to suburban or urban

areas to reduce travel time and for accessibility to work, market and supermarkets. These no doubt, create urban problems. The movement to urban areas is integral to peripheral capitalist development combined with declining quality of life in rural areas (Naidu and Matadradra, 2014). Rural areas continue to be neglected with poor roads and transport inconsistencies, electricity and water accessibility issues, small economic base etc. The movement then tends to give rise to urban problems. Rapid urbanization has created complex problems especially for developing nations. However, this may not only be confined to developing nations. Population estimates highlight that, slightly more than half (50.7%) of Fiji's population is urban.(FBoS, 2015). Rodrigue mentions that the larger the city, the greater its complexity and the potential for disruptions when this complexity is not effectively managed (Roderigue, 2013). Lack of space, high rent, traffic congestion, crime, growth of informal sector, squatter housing and slums, overcrowding, large class size in urban schools and environmental challenges usually grip large cities.

Traffic congestion is one of the biggest challenges in large urban agglomerations usually above a threshold of 1 million people. (Roderigue, 2013). Congestions may be related to one or two sets of conditions - either inefficiencies within the traffic flow system or the demands placed on the system, or to a mixture of both (Robinson, 1984). The inability of municipalities to plan for development and traffic flow, together raises serious concerns. When new developments such as cinema, shopping mall, hotels or supermarkets are set up in the heart of a city or town, it requires careful considerations on the implications of traffic flow and additional traffic in future. Unfortunately such developments have been allowed to take place in the town without any concern for traffic flow or parking spaces.

Ironically, none of the cities and towns in Fiji have such populations, yet they are gripped by serious traffic congestion issues. . Labasa town is the main centre in Vanua Levu and serves people of the Northern Division. Since 2014, it has been facing greater levels of traffic congestion; it is, we propose, comparatively a very small town to be plagued by traffic congestion.

### Labasa Traffic

In order to examine the extent of traffic congestion in Labasa town, a survey was conducted. The simple structured and non-structured interview method, combined with thorough observations, informal discussions and listening to stories of those affected, was utilised to

gather the information necessary on this. The approach taken was much like a social constructionist approach. This approach is one where all so called 'realities' are conceptual in nature, a product of our own personal 'baggage' (values) and the relationship we have with the object of our experience (eg. a person, product, event or situation for that matter). 'Qualitative research design from a social constructionist mindset might lead to new methods of inquiry or perhaps a greater emphasis on story-telling ... the participant- research relationship in narrative research' (Roller and Lavrakas, 2015).

40 respondents were interviewed for this purpose using structured questionnaires. The questionnaire in English language was translated in local languages (Hindi and *i taukei* where required). The respondents were daily road users. Talking to and listening to stories of commuters and drivers gave very useful insight to the traffic congestion issue. Confidentiality was clearly assured to the respondents which enabled getting in-depth information and freely participating respondents. Each interview took approximately 15 minutes although in some instances, the stories and additional information related to the issue took much longer. Social constructionist and qualitative research is a natural marriage, wedded by a mutual respect for the complexities of the human experience and the idea that any one facet intertwines with some other facet (Roller and Lavrakas, 2015).

## Results

Traffic congestion in Labasa town is common during peak hours. The factors for congestion are identified were

- Closure of Jaduram Street to all traffic except busses;
- Increase in vehicle numbers on the road;
- Absence of by- pass road(s);
- Road repair works during peak hours; and
- Town school patrols.

### Closure of Jaduram Street to all Non-bus Traffic

In October 2014, the Fiji Roads Authority commenced upgrading of the Labasa bus stand. The bus stand was riddled with pot-holes, dust and uneven surface. The upgrading was welcomed by the people of Labasa as this development was thought to improve bus bay area and passenger safety. Previously, commuters had to walk in between parked busses after disembarking. After the completion of the bus stand, the authorities

partially closed down one road (Jaduram Street) to all traffic except busses. This closure is between the bus stand and the Charan Jeath Building which has the BSP at the ground floor. This led to traffic being diverted through the Labasa market taxi stand while one way of Jaduram street became reserved exclusively for buses for picking and dropping passengers (see Fig 2). This led to denoting Jaduram Street a one way street from town end restricting entry to all non-bus traffic. Fiji Roads Authority stated that 'this change is the result of discussions between Labasa town council, the bus operators association and taxi association' (Fiji Roads Authority, 2014). The message was that the decision was jointly arrived at by various stakeholders. But as is widely known and accepted, any decision without expert advice or technical study to explore the impact it will have on traffic flow, can only be detrimental.

**Figure 2: Labasa Town Showing Traffic Flow and Congestion**



(source: googlemaps)

- No entry in direction except for buses (Jaduram St.)
- Vehicle flow
- Hot spots for traffic build-up & congestion
- ▭ Labasa Bus stand

[Due to the partial closure of Jaduram St., vehicles are forced to enter through the taxi stand between the old and new markets travelling towards Civic centre, further into Jaduram St. The market taxi stand passage is congested at any given time and is further aggravated during peak hours. Traffic lines stretch up to Qawa Bridge on one side and Naseakula village on the other side.]

The closure saw build-up of traffic on both ends of the town at peak hours. Busses were allowed to use one side of this street after renovation of the bus stand while other vehicles had no entry into this street from the main street end. Initially when Labasa bus stand commenced upgrading in October 2014, public perception was that all buses would be accommodated at the renovated bus stand leaving Jaduram Street clear to traffic flow. During the opening ceremony in December 2014, it was highlighted that this one million dollar upgraded bus stand can accommodate 25 buses (Drauna, 2014). But the heavy investment did not make the bus stand congestion-free. The only good thing that came out from this was a solid water-logging-free foundation for the bus stand area. The major problem that emerged as a direct consequence of this was the massive build-up of traffic in the town in the mornings, afternoons and lunch hours. The pace of traffic flow through the Town was reduced significantly. In addition, as many as half a dozen police officers had to be deployed to try to control and direct traffic flow during mornings and afternoons; their presence is more than doubled during ministerial and state official visits to the North, which in recent months has increased significantly. Police presence, however, does not make any difference to the flow, as the no-entry rule continues.

The one way market taxi stand lane has limited capacity for smooth vehicle flow. This creates long queues towards the Hospital end of town and affects traffic flow on the town end. Historically, the town's urban morphology evolved from unstructured haphazard development. Some examples are the lack of pedestrian crossings in town, the (still) congested bus stand and market place, the absence of any bypass road across the river, and the mixture of shops, industrial establishments, offices, malls and hotels in the main town and back streets. As these amenities grew, no thought seemed to have been given to allocate park or recreational area for public within the main town.

The congestion also creates specific difficulties for non-motorized means of people movement. The only space allocated for pedestrians is the footpath on the main street and one parallel side street, while every street or lane is used by vehicles. A lack of consideration for walkways, crossing lights, recreational facilities, wheel chair paths for physically challenged people and public toilets are common features of Labasa (as well as of numerous other towns in the Pacific). The 'green town concept' seems to be still not understood. A person standing opposite the ANZ bank near the service station, for example, would literally never be able to cross the road without jaywalking if the person were to enter town. Such

problems emerge because of poor planning as well as disregard for pedestrians in the physical design of infrastructure and facilities development (Roderigue, 2013). Any law to combat jaywalking must first consider accessibility to crossings at key locations.

Across the river, within a distance of around 100 metres from the bus stand are the buildings which house the courts and most government departments. Sadly, there is not a single crossing for pedestrians around this heavy public movement area. Jay-walking has become the norm here.

Labasa Town has also not accepted the idea of decentralization of services and facilities. Decentralization can reduce urban pressure and create growth of another centre. In 2016, some work was commenced to decentralize. A shopping mall is under construction out of the main town in Naseakula and a supermarket has been relocated from main town to Naiyaca subdivision. Work is also commencing on a proposed cinema and shopping mall in Naiyaca subdivision. Apart from this, Labasa has seen hotels, supermarkets, post office, restaurants and departmental stores confined to the main street occupying the town main street. In typical monocentric model, bulk of the employment is held by the town. These, however, would not create as many problems were alternative and efficient public transport available and building requirements, particularly on vehicle parking, green zones, etc., strictly followed. But Labasa has seen none of these for decades.

Additional traffic congestion becomes the norm during sporting events, and carnivals; the venue for these is right in the town. So far, no serious discussion has taken place or policy proposed on relocating the sporting complex thereby diverting traffic away from the Town.

'Cruising' also hurts congestion. Given the absolute shortage of parking spaces within an nearby the town, many drivers keep driving while looking for parking space in the main town and/or waiting in vehicles while their passengers do the chores. Such cruising and/or 'waiting' create additional delays and impair local traffic circulation (see also Roderigue, 2013).

Labasa town is located around a single main street with so called back roads on either side of the main street. The back roads intersect the main road. While it does provide some relief to drivers, they ultimately get caught up in the traffic jam at main roads when they exit. Table 5 shows the average time spent in traffic jams in the town. The average time spent travelling a distance of 2km is 26 minutes during morning peak hours while the same distance during off peak hours takes 2 minutes. There is very little difference in travel time in the morning and afternoon during peak hours.

**Table 5: Average Time Spent in Traffic January, 2018**

	Qawa Bridge to market	Naseakula village to market	Korotari end Y corner to market	Siberia-Hospital junction to market
Distance	2 km	1.9km	0.8 km	0.7km
Morning (7.30-8am)	26.1 min (jam starts from Qawa bridge)	22 min (jam starts from Naseakula village)	12 minutes (jam from y corner)	16 min (jam from hospital-Siberia road junction).
Speed	26.1/60= .435. 2/.435=4.6km/h	22/60= 0.36 1.9/0.36= 5.3km/h	12/60=0.2 0.8/0.2=4km/h	16/60= 0.26 0.7/0.26= 2.7km/h
Average Speed	4.6km/h	5.3km/h	4km/h	2.7km/h
Afternoon (4-5.00pm)	14.8 minutes	17 minutes	9 minutes	15 minutes
Time taken during off peak hours	2 Minutes.	3 minutes (passing through 4 town crossings).	2 minutes (passing through 3 crossings).	2 minutes. (No traffic light; one main road intersection)
Time Loss: morning	24.1 min	19 min	10 min	14 min
Time Loss Afternoon	12.8 min	14 min	7 min	13 min

### Increase in Vehicle Numbers in Labasa

Increases in vehicles on roads in Labasa have also contributed to the problem of congestion. While additional vehicles registered in Labasa until 2016 shows only a slight increase (Table 6), not all vehicles registered at Labasa are regulars in Labasa Town during peak times. In addition, not all vehicles in Labasa Town during peak times were registered in Labasa.

There is as yet no study on additional/new vehicle movement in Labasa town during peak times. But as a general note, one can state that with increased vehicles on the roads, the chances of increased vehicles in Labasa Town during peak times are also high.

**Table 6.: Vehicle Registration; June & December, Selected Years**

Month	Vehicles Registered (month)*
June 2013	51
Dec 2013	39
June 2014	36
Dec 2014	53
June 2015	46
Dec 2015	51
June 2016	70

\* An estimated 540 vehicles were registered in 2013, 540 in 2014, 588 in 2015 and 720 in 2016.

(Source: Land Transport Authority, 2016)

### Absence of bypass roads

Labasa Town is characterised by a single road passing through the town and crossing the Labasa River to link the western part of Labasa / Vanua Levu to the Eastern part, including the divisional hospital, FSC mill, a number of timber mills, courts, and a number of Government administrative offices. The absence of any bypass road means that all traffic, including heavy goods vehicles carrying sugar cane cargo and logs, has to move through the main road. This has been a major issue of traffic management in Labasa. Bypass roads have great potential to significantly increase traffic flow through the town, thereby greatly reducing waste of productive time, and inconveniences of heavy goods vehicle movement across the town.

The absence of a by-pass road across the town creates *system inefficiencies*. 'System inefficiencies are due to mix-up of different types and size of vehicles (including pedestrians), converging of vehicles into limited capacity inner urban streets or presence of many intersections' (Roderigue, 2013). The Labasa River divides the Island into East and West. There is no motorable bridge across the River at any location which can link the two parts; the Labasa town bridge is the only one doing so. This is a major system inefficiency.

This problem, however, is not a new problem for Labasa town. It is certainly not the cause of the more recent traffic congestion problem, except to the extent that additional vehicles moving to cross the river, including cargo vehicles of various types, would add to the congestion problem.

**Road Repairs during Peak Times**

A notable fact in Labasa has been that the Fiji Roads Authority and/or its authorised contractors carry out road repairs in the town area without due notice to commuters and/or businesses. This does not allow commuters to plan their travels adequately. Repairs and maintenances during peak times holds traffic more than necessary. Road repairs during peak hours, and these too, without due notice to commuters, is a sign of undue, and possibly excessive, authority bestowed to the Roads Authority in managing Fiji's roads. Repair and maintenance during peak times can also be seen as a sign of poor work planning at best, and as an abuse of its powers at its worst.

**Town School Patrols**

There are 3 schools in the main town, one primary and two secondary. These have their road patrols each morning (7.30am-8.00am) and afternoon (2.30pm-3.00pm), equipped with stop peddle signs and manned by students/children who take direct instructions from their supervising teachers through whistles and signals. There is, so far, no operations manual which has been developed and/or adopted by the Fiji Roads Authority or other competent authorities on the use of these signs and the specific operation processes.<sup>1</sup>

School patrols, however, have been ongoing for many years. While these do affect traffic times, the recent traffic congestion experience in Labasa Town since 2014 can not be attributed to this factor.

**Consequential Effects of Traffic Congestion**

There are numerous consequential effects of traffic congestion. These include loss of time, increase in fuel consumption and cost; atmospheric pollution, firm/organisation productivity losses; and stress. To date, no study has been done on the effects of traffic congestion on these factors for either Labasa or any other congestion situation in Fiji. . A preliminary finding at the Fiji National University Campus in Labasa reveals that on average, 50% of students arrive late to the first class in the morning. Full assessment of the effects of the Labasa congestion is beyond the scope of this paper. However, a preliminary assessment is

<sup>1</sup> Interview responses pointed out that vehicles are stopped to allow for as few as two to three students to cross the roads, thereby taking at least 3 minutes of traffic time.

done using broad traffic indicators on the cost of the loss of travel time and loss of fuel due to traffic congestion.

**Loss of Travel Time**

The loss of travel time due to traffic congestion has a significant impact on fuel consumption, as well as the environment. Vehicles continue to consume fuel while on the road. Table 7 shows the vehicle movements during peak times.

**Table 7: Vehicle Movements, Peak Times**

	Qawa Bridge to market	Naseakula village to market	Korotari end Y corner to market	Siberia-Hospital junc to market
Distance	2 km	1.9km	0.8 km	0.7km
<b>Morning 7.30-8.00am</b>				
Light Goods (< 2 tonnes)	185	201	65	157
Heavy Goods (> 2 tonnes)	30	32	24	19
<b>Afternoon 4.00-5.00pm</b>				
Light goods	250	427	117	201
Heavy Goods	61	51	33	38

Table 8 shows the daily loss of time for each of the segments of the congestion stretch and the total time loss. On an average of 2 people per vehicle, total daily time loss is 926 hours per day. At an average wage of \$10.57/hour, the daily loss is \$9,799. For an average of 286 days per year, the value of the loss is \$2.8m. For a total urban/peri-urban population of 35,000 for Labasa, the average loss of value of time is \$80 per person per year. This can be regarded as an added tax burden on each person, man, woman, and child; an average of approximately \$360 per family.

**Fuel Loss**

We also provide a preliminary estimate of the fuel loss due to this congestion. On the basis of the results in Tables 5, 7 and 8 above, and the

assumptions made as per this note<sup>2</sup>, the total loss of fuel for light goods is \$2,256 per day, while for heavy goods, the loss is \$641 per day. For the annual 286 days involved in congestion, the total full loss is \$0.83m per year. For the 35,000 estimated population, this averages to \$107 of fuel loss per family per year.

**Table 8: Time/Money Loss**

	Qawa Bridge to market	Naseakula village to market	Y corner to market	Siberia-Hospital junction to market	Total
Vehicle Movement					
Morning	215	233	89	176	713
Afternoon	311	478	150	239	1,178
Time Loss					
Morning (min)	24.1	19	10	14	
Afternoon (min)	12.8	14	7	13	
Tot :Morn (hrs)	86.4	73.8	14.8	41.1	216.0
Tot: Aftn (hrs)	66.3	111.5	17.5	51.8	247.2
\$ loss					
Morning/day	\$ 1,826.8	\$ 1,560.8	\$ 313.8	\$ 868.7	\$ 4,570.11
Afternoon/day	\$ 1,403.5	\$ 2,359.4	\$ 370.2	\$ 1,095.4	\$ 5,228.46
Assumptions: (1) average of 2 persons per vehicle; (2) vehicle use presumed for average of middle income earners; annual salary of \$20,000 assumed. (3) 5.5 days per week ; total of 286 days per year.					

<sup>2</sup> The following assumptions are made for this:

1. A light goods vehicle (less than 2L engine capacity) uses \$7.89 worth of fuel (unleaded) per hour in a less than 10km/hour speed, and the current market price of fuel is \$2.12/litre.
  2. A heavy goods vehicle (over 2L engine capacity) uses \$9.47 worth of fuel (diesel) in a less than 10km/hour speed, and the current market price of fuel is \$1.90/litre.
  3. The ratio of hybrid vehicles to gasoline vehicles passing at one point in the main town is 10 Hybrid vehicles to 47 gasoline vehicles (2018 Survey data). Thus for light goods vehicles, the fuel loss is adjusted downwards by 15%.
- Labs dealing with road research in developed countries have more specific figures, but so far we have not come across any such figure for developing countries with the vehicle mix as for Fiji on their roads. More research in this area is necessary.

### ***Exhaust Emissions, Health and Environment.***

Vehicles in Labasa are predominantly run on gasoline; in 2018, a maximum of 17% of all light goods vehicles travelling on Labasa town roads were hybrid cars. Thus, with the majority of vehicles running on gasoline and diesel, significant exhaust fumes are emitted by vehicles caught in the traffic jams. Studies in UK have shown a link between air pollution, pregnancy complications and childhood illness. (O'Hare, 2018). Medical research in the UK reveals

direct links between vehicle-generated pollutants and the triggering and exacerbation of respiratory, cardiac and neural conditions. Poor air quality could be contributing to thousands of early deaths every year in the United Kingdom, with a commensurate loss to the economy through lost days at work and increasing NHS expenditure (TRL, 2018).

A compelling finding done in UK on half million infants suggests that pregnant mothers exposed to air pollution from London's busy roads are more likely to give births to babies that are underweight and smaller than they should be. The authors further suggested that cutting down average fine particle pollution emitted by the city's road traffic by just 10% could prevent around 90 babies a year (3% of cases) being born under weight.

There has been no research on the impact of exhaust emissions and health of people in Fiji. What is known, however, is that in 2010, the prevalence of low birth weight (of less than 2,500 grams) was 8.2% in Central division compared to 1.8% in Northern Division (UNICEF Pacific, 2011). The Central division has high traffic volume and thus high exhaust emissions which could be one of the likely causes of low birth weight. There is an urgent need for studies on exhaust emissions and baby weights in particular and general health more widely.

### **Discussion**

Human activity patterns almost everywhere have largely remained similar despite a myriad of social and economic changes that are occurring (Headicar, 2015). Work hours, schools hours, family transport mode and car ownership, and dwelling in urban and sub urban areas, have all remained the same. There is hardly any shift in these human activity patterns which could reduce traffic flow impact. Commuting behavior has not changed among people; the monocentric model (White, 1999) has remained a key feature of Labasa town. People continue to do shopping in

weekends and afternoons because major shops are not open after 6pm, and often also after 5pm. In-commuting (Headicar, 2015) is common daily as workers converge to the main centre in the mornings and rush out in the afternoons. Flexible work or flexi-time processes are not in general practice in Labasa.<sup>3</sup>

Labasa town serves people of three provinces; Macuata, Bua and part of Cakaudrove. The combined population of these 3 provinces stood at 98,861 in 2015 (FBoS, 2015). It is estimated that Labasa town serves approximately four thousand people including school children on a daily basis. Comparably this number is small and cannot be compared with larger urban areas. Serving such a small population and having major traffic congestion issues is a specific and clear reflection of poor traffic management system, poor planning and system inefficiencies. Labasa town has grown in a haphazard manner with only one central street. Shortage of parking space, the partial closure of an important street (Jaduram Street) in 2014, absence of by-pass road(s) and lack of incentives for decentralization are key challenges for the town. It is the responsibility of towns to cushion the impact of any increased traffic. This requires competent planning.

The following are proposed as some measures which will tackle the traffic congestion problem in the town.

First, and as an immediate measure, Jaduram Street has to be opened to all traffic (both ways). As an immediate related matter, the part of Jaduram Street being used as a bus station needs to be reverted to traffic use. However, if the buses which are allowed on the street as a bus bay, cannot be accommodated elsewhere, then in the short term, these buses could be allowed continued usage of a part of the street for most of the day other than at peak hours during which period the street would be opened to regular two way traffic. This will significantly reduce the bottleneck situation created around the market taxi stand and market area. But a lasting solution is for the bus station to be relocated. In fact the notion of 'bus station' needs to be revisited. Serious consideration needs to be given to 'bus stops' as against 'bus stations' for commuter buses, with bus stations being taken out of the immediate town centre. The development of additional space for bus stands/stations would need courageous decision making. One possible location could be across the Labasa Bridge (opposite Labasa court house). This location could be

<sup>3</sup> The idea of flexi-time originated in 1967 in Germany. Countries like Fiji have not explored this important variation to work and productivity process. Flexi work hours bring numerous benefits to urban areas and their residents.

established for all buses coming from the FSC and Hospital ends of the town. These buses could drop off and pick passengers during peak times (7.00-9.00am and 3.00-6.00pm) from this new location while continuing to utilize the main bus stand during off peak hours (9.00am-3.00pm). This will mean developing proper railings on both sides along the Labasa Bridge for people to safely cross the bridge.<sup>4</sup>

The second cluster of solutions concerns parking space in the town. Developing new parking lots (and associated convenience facilities) is the responsibility of municipal authorities. Availability of parking spaces out of the main road will reduce 'cruising' which is seen as contributing to traffic congestion during peak hours. Developers and decision makers also need to consider vertical development, including multi-storey parking facilities. A more manageable solution than multi-storey car parks, however, is the creation of outside town centre car parks and an efficient commuter system between the park and the town centre. This will keep a significant proportion of vehicles out of the town centre / main road. Fiji has no town with such a feature; Labasa may provide an actual lab where this could be experimented.

The third cluster concerns increasing roadage in and out of the town. Creation of a bypass road in this context is absolutely vital. Presently people need to cross the main town to access either side of the River, even though they would have no desire or need to be in the town or cross the town. A by-pass road will see a significant volume of traffic, particularly heavy goods and cargo traffic, diverted out of the main street thereby providing a sustainable contribution to the solution for congestion. The current situation could also pose a serious risk to Labasa, as the only bridge across the town is subjected to heavy traffic flow with increased activity; if this bridge were to suddenly become overburdened, it would result in significant disruption to public access of hospitals, government institutions, places of work, and needs of industry, communities and people.<sup>5</sup>

<sup>4</sup> Currently, the bridge does not provide enough safety for people walking across the bridge; with the increase in the number of people using the bridge, risks of a serious disaster are rising.

<sup>5</sup> In heavily populated cities, bypass roads may be seen to create further congestion occurring through a process known as traffic 'induction' (European Commission Report). Many urban planners believe that creating bypass road is a traditional method to solve congestion, holding that it is a simple supply-demand approach where additional road is provided to meet traffic demand. In small towns such as Labasa, however, the bypass road is an ideal solution to diverting unneeded traffic away from traffic congestion, thereby reducing traffic congestion.

Fourth, the lasting solution, in addition to the above, lay in encouraging and supporting decentralization. Opening up and developing land away from the CBD into suburban centres would provide significant benefits in terms of dealing with traffic congestion, as well as has many associated benefits.<sup>6</sup> Decentralization will ultimately lead to growth of suburban areas, reduce overcrowding, congestion and travel cost of workers, raise accessibility of people to work, shopping, entertainment, and tackle the host of other problems listed above that are consequential to congestion. For decades, urban transportation policy and practitioners favoured a model of analysis that prioritized 'mobility' and fixing traffic congestion by making it easier for vehicles to move around through an over emphasis on road construction; the latter does not seem to be working (Puentes, 2015). As Puentes suggests, if traffic congestion cannot be solved through traditional means than the feasible idea is to think about the ends and not the means. He suggests an innovative idea of making accessibility for people easier rather than mobility of vehicles easier. It is important to look at total transportation options available. Puentes mentions that many urban plans look into changing or altering routes, restricting vehicle access, etc., but few look into making economic accessibility better. Even the limited decentralization of Suva city saw growth of other centres around Suva; this reduced the pressure on city streets and facilities. Decentralization helps a centre solve its unemployment problem as well; it creates opportunities to set up small businesses (for example vegetable and root crop stalls, food and snacks businesses, hair dressing services, cleaning and other ventures).

Fifth, there is a need to think of creating pedestrianized areas in the town. Pedestrianized areas provide accident free environment to public and reduces traffic congestion. It may work well in areas where there is no traffic congestion. Pedestrianized areas may consider allowing bicycles to encourage urban population to use energy efficient modes of transport. This concept however, may be slow to materialize in Labasa given the lack of space to create pedestrianized areas, the priority given to

<sup>6</sup> Businesses benefit from lower cost of land and could occupy low horizontal buildings instead of tall vertical buildings, low goods and transport costs through reduced traffic congestion of the CBD, and lower wage pressures (White, 1999). Monocentric urban model has led to increasing urban and sub urban population and rural depopulation hence the perceived idea of no development or delayed development of rural areas. People get away from busy congested central areas to a more peaceful, clean and quiet environment either because towns and cities fail to solve traffic congestion or they hold the belief that 'bad traffic' (Downs, 2004) indicates a town's prosperity and a successful economy.

other pressing urban challenges, as well as due to climatic factors (for example, frequent rain).

## Conclusion

So far, authorities in Government and Labasa Town have not come up with any sustainable solution to overcome traffic congestion in the town. On the contrary, the plan they implemented from 2014 actually drastically increased traffic congestion in the town. Commuters continue to endure daily hardships. Direct and indirect costs of congestion are considerable. Our preliminary estimates shows that on average, loss of time for Labasa residents stands valued at approximately \$360 per family per year, while loss of fuel amounts to approximately \$107 per family per year. These two costs alone create a burden of approximately \$470 per year per Labasa urban and peri-urban family. Costs from additional factors like vehicle wear and tear, loss of leisure time, stress, loss of organisational/firm productivities, and associated health and environmental have not been quantified, but are expected to be significant. There will, thus, continue to be increasing demands for the resolution of traffic congestion problem. Public demand for comfortable and reliable roading and vehicular movement systems is not likely to diminish. In addition, demands for public transport with extended shopping hours and easy accessibility to urban economic activities is expected to rise.

A number of measures have been adopted by other urban areas in dealing with traffic congestion. Some studies have proposed that in order to make urban traffic flow easier, urban parking space must be minimized and pedestrianized areas created. Some have suggested carpooling and alternative travel methods, while others believe that it is pointless to solve congestion through public transit and car-pooling and that it is not going to work out. The traditional approach of providing supply to meet demand, i.e., providing additional road space is no longer always appropriate. Others have argued that increasing flow of traffic through existing transport systems create congestion, social diseconomies, and increased costs of wasted time and pollution. Different cities have different urban development models, structure, population and economy. What works in one city may not work best for another. It all goes down to governance and the ability of governments to efficiently act on traffic related problems. Government systems differ as do approaches towards political authority and the way resources are controlled. It is in this that one can find clues on why some countries and cities find it easier than

others to provide new and efficient transport infrastructure.

The Labasa town traffic problem is relatively a far simpler problem to solve. A small town such as Labasa should never experience such traffic congestion as it is experiencing presently. The immediate step feasible is to deal with the Jaduram Street closure for non-bus traffic from the main road. Creation of additional parking spaces, by-pass road(s) across Labasa River, and decentralisation are all relatively easy to implement. These activities are not technologically new. It is a lack of courage and will to implement serious traffic management solutions that seem to be the major hurdle. At root, however, remains the problem of neglect of Labasa by successive governments. In the absence of any decentralised system of government in Fiji, it remains the responsibility of the national government to deal with not only the traffic problem in Labasa, but also with the entire human settlements issue for Vanua Levu.

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