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Research article

Sustainability assessment for the transportation environment of Darjeeling, India

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ABSTRACT

Darjeeling is an important tourist hill town of West Bengal, India. It suffers from an acute problem of transportation, particularly during its peak tourist seasons due to limited road space, inadequate public transport facilities and indiscriminate use of automobiles. This hill town was originally designed for a population of 10,000, but over the years, it has come face-to-face with rapid urbanization, a rising population of both tourists and residents and intensifying motor vehicle usage. These factors together are posing a threat to its transport environment. This study identifies the Sustainable Transport Indicators (STIs) available in the existing literature to identify the critical stretches using Analytical Hierarchy Process (AHP) based on experts' consensus. It was found that the experts placed emphasis on the mobility of the town, talking about vehicular impact on air pollution and encroachment of roads as the main issues affecting the sustainability of the transport environment. Thereafter, policy-level interventions have been suggested in accordance with the identified sustainability issues. We trust that other tourist hill towns with issues similar to Darjeeling could easily emulate the study methodology to assess their transport environment sustainability, or replicate on the lines of the recommended policy interventions.

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1. Introduction

Darjeeling, a small hill town in West Bengal, India, is a major destination for domestic and international tourists. In 2014, around 0.65 million domestic and international tourists visited Darjeeling (Gorkha Territorial Administration, 2015). The view of the mighty Kanchenjunga, Tiger Hill and just the scenic beauty of the town are the factors that draw in the tourists every year.

However, the pristine nature of Darjeeling has changed over the years — and is now not what it used to be. As time progressed, tourism grew along with migration of people from surrounding areas. Darjeeling consequently morphed into an urban center. Its urban core is characterized by congestion of major streets, pollution, overcrowding and other infrastructural problems, such as inadequate supply of water, sewage and sanitation issues. All these factors lead to an adverse situation and threaten the sustainability of this tourist hill town. The use of automobiles in the hill town is

greatly dictated by the movement of both the tourists as well as residents. Hence, pressure on the transport infrastructure is evident from both quarters.

Tourism and tea cultivation are two major contributors of economy for Darjeeling (Bhutta, 2014). However, congestion and problems related with transport infrastructure will eventually create a negative impact on tourism, and thus, not desirable.

It has been observed from tourist perception surveys that visitors find Darjeeling to be overcrowded, congested and unpleasant, particularly due to incessant traffic jams in the heart of the town (Bhattacharya, 1992). Since Darjeeling is a tourist town with economy directly linked with tourism, the transportation environment must be a sustainable one that can cater to both the residents and the tourists.

Also, Darjeeling is a geographically constrained urban area with very limited scope for provision of new infrastructure. Thus, “lower-cost and smaller-scale interventions in the realm of infrastructure provision” would go some way in promoting a more sustainable form of development (Mell and Sturzaker, 2014). Thus, policy-level interventions to subvert the ongoing unsustainable practices in Darjeeling could be the key to its development as a

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prosperous tourist hill town.

Sustainable transport planning recognizes that transportation decisions affect people in many ways. Thus, a variety of impacts and objectives should be considered in the planning process. Several researchers (Henderson, 1996; Litman, 2007) have addressed sustainability aspects in transportation, and have identified indicators that might measure sustainability under different categories. Black et al. (2002) have shown how the sustainability of a transport system could be assessed using sustainability indicators after reviewing a range of international studies, and pointed out the importance of geographically based indicators and transportation land use policies. Litman (2007) has defined a sustainable transport system on the lines of social, economic and environmental impact on its surroundings — something that is substantiated by Schilleman and Gough (2012), where they say “a balance must be created between all three parameters and an integrated planning approach to be drawn”; these researchers draw attention to the fact that the three potential dimensions (i.e. economic, social and environmental) of impact must be simultaneously assessed to properly evaluate sustainability.

This study attempts to solve the transportation problem of Darjeeling by providing a framework for assessing the sustainability of the existing transport environment using sustainability indicators. It is followed by an Analytical Hierarchy Process (AHP) on the experts' opinion of these indicators to arrive at potential areas of intervention. At the end of the study, policy-level interventions have been discussed in line with the AHP results.

2. Study area

2.1. Demography and physical characteristics

Originally built for a population of 10,000 (Mell and Sturzaker,

2014), Darjeeling municipality consists of 32 wards and is spread over an area of 7.34 sq. km. The physiography varies from 1981.20 m to 2286 m above mean sea level, with Ghoom being higher in altitude than Chaukbazar area. The population in the municipal area is 0.11 million (Office of the Registrar General and Census Commission, 2011) and the annual tourist (domestic and foreign) influx has been pegged at 0.35 million, 0.4 million, 0.35 million, 0.45 million for 2005–2006, 2006–2007, 2007–2008 and 2008–2009, respectively (Bhunia, 2015).

In terms of land use, residential (66.83%) holds the major share followed by commercial (14.17%) (Darjeeling Municipality, 2008). The transportation land use is 4.45%, which is lower than the norm (5–6%) specified by the URDPFI (Ministry of Urban Development, 2015) guideline for a “large hill town (population > 100,000)”. The central part of Darjeeling, which is composed of wards 10, 21 and 24, has a major share in the commercial land use. Ward numbers 19, 20 and 25 have a higher share of mixed land use.

This part of Darjeeling is a major trip-attracting zone of the town for the residents. The outer wards of the town are more agriculture in nature, owing to the presence of tea gardens. Fig. 1 shows the location of Darjeeling in the northeastern part of India.

2.2. Transportation infrastructure and prevalent unsustainable transport practices

Hill Cart Road (NH-55) and Lebong Cart Road are the two major arterial roads of the city. Ladenla Road, Robertson Road, Gandhi Road, NC Goenka, and Bazar Cart Road are other major roads that witness heavy vehicular traffic.

Government reports say (Darjeeling Municipality, 2008) only 55% of the existing road stretches are motorable bituminous, while 16.11% are non-motorable bituminous. The rest of the roads are either concrete or “kutchha” (unmetalled) roads of narrow width,

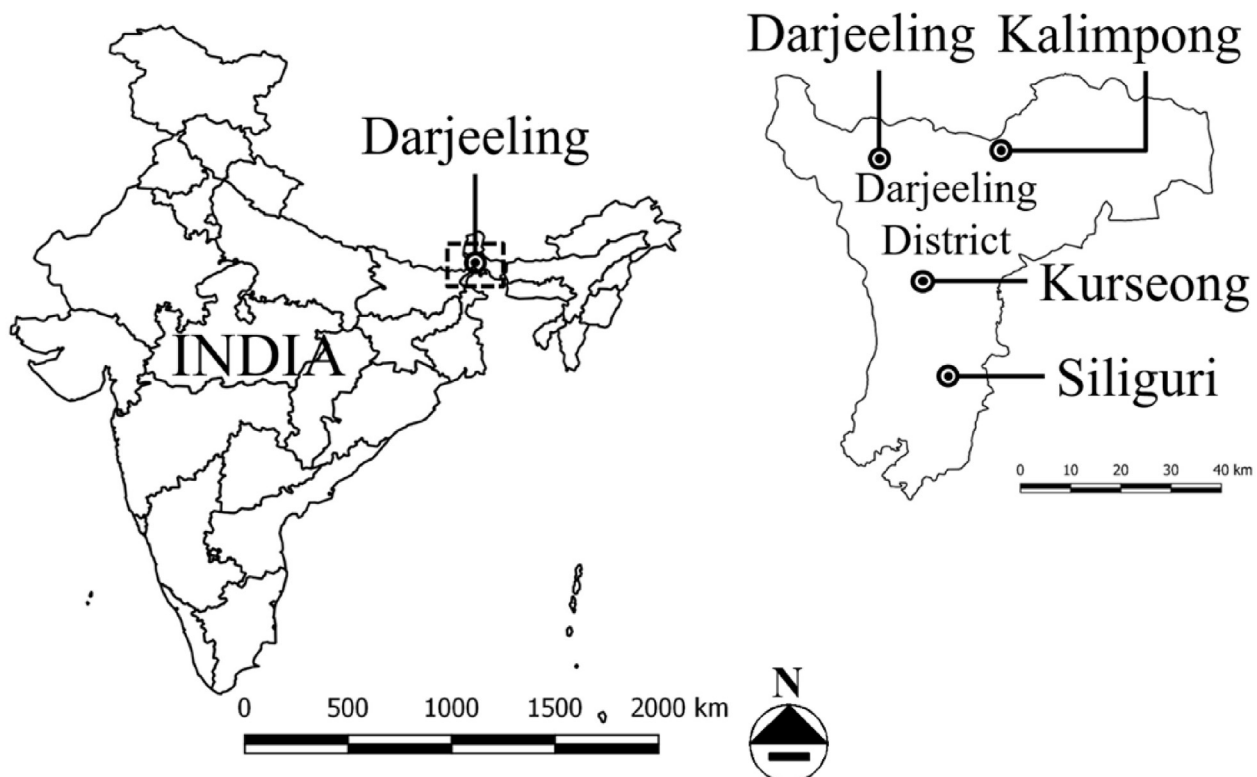


Fig. 1. Location of Darjeeling town in the north eastern part of India.

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