

## TRAIL BRIDGES IN NEPAL: BRIDGES TO PROSPERITY

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**ABSTRACT:** Trail bridge technology is a cost effective technology that significantly enhances access to trade, markets, education, health services and improves the livelihoods of rural, poor peoples and thus contributes to poverty alleviation in Nepal. With lack of road access in past and present, foot bridge technology carries a larger scope contributing to the development of country. With the significant contribution from locals, NGOs and INGOs like Helvetas Swiss Inter co-operation, trail bridge construction in Nepal has now got a paramount importance. Still, foot bridge technology suffers from critical and challenging aspects of longevity and safety. The evolution of the modern trail bridges has been characterized by epic struggles to achieve the aim of development at local level. There have been many failures, conflicts from “people’s war” along the way, but progress continues. This article focuses and analyses a long history of modern trail bridges of Nepal which created a way to improved livelihoods, enhanced access and prosperity.

**KEYWORDS:** Enhanced Access; Foot Bridges; Improved Livelihoods; Poverty Alleviation; Trail Bridge Technology

### 1 INTRODUCTION

The origins of the trail bridges go back a long way in history. Primitive timber footbridges and steel footbridges were forebears to today’s modern trail bridges structures. For centuries, communities have been involved in construction of trail bridges across rivers, gorges, and major trade routes. The first recorded trail bridge was built in 1907/08 by Rana Epoch with a span of 39.6m. But the process of constructing trail bridges in a systematic and planned manner began only in 2021 BS (1964/65) that included Swiss support which is the most successful development partnership organization. By end of 2004 more than 3000 trail bridges have been constructed including 2230 bridges through Swiss support with an overall length of more than 180 kilometers. Every day some 700000 people and 150000 animals now cross rivers safely. In September 2015,

Department of Local Infrastructure and Agricultural Roads (DoLIDAR) celebrated completion of 6000 trail bridges. Such advancement in trail bridges has not only made our life easier but has also implemented the will of a society. These structures have saved millions of walking hours, people can visit to hospital in district headquarter, go to near markets, children can go to school more easily and conveniently. So trail bridges are the lifelines for the people living in mountainous and remote areas. Such structures express the culture, society, and the individual in time and space. Present day trail bridges of Nepal are the best example of cost effective design and can facilitate the sustainable use of resources found in local areas. Such bridges are focusing on environment friendly methods. With the contribution of indigenous, building systems with modern engineering practices, Helvetas/SDC (Swiss Association for International Cooperation) in collaboration with Nepalese Government have developed and standardized a relatively simple technology of trail bridge construction. Trail bridges have also focused on improving rural mobility. By making Trail Bridge building part of public-private partnership, national capacity has grown, now enabling Nepal to build 350 new bridges each year. The new trail bridge strategy (2006) is now mainstreaming the construction experiences on a national level stating the roles and contribution of local people, authorities, private sectors, NGOs and INGOs. The performance, construction and maintenance of trail bridges are now much improved by promoting the use of appropriate technologies and the involvement of local contractors.



Hanging Bridge of Ghasa, Mustang, Nepal

On the other hand suspension bridges of length greater than 200 meters are increasingly demanded in Nepal. Though suspended bridges have a typical span

smaller than 200 meters, but spans up to 359m exist. For example the 359 meters long Kushma-Mudhikuwa Bridge completed in 2073 BS (2016). These days the trend towards the construction of lightweight footbridges is also increasing. Despite the recent improvements in the trail bridge technology, much of rural Nepal remains inaccessible to bridges; rural people thus travel by foot. The construction of trail bridges should not be seen purely in terms of provision of a safe and easy means of crossing rivers, it should impact positively on other aspects like improved livelihoods and progressive social change. In Nepal construction of trail bridges has contributed significantly towards poverty alleviation.

## 2 NEPAL TRAIL BRIDGE RECORD

### 2.1 Oldest bridges (as of March 2017)

Rank	Bridge	Location	River	District	Span(m)	Completion Date
1	Sanghutar	Raniban-Sanghutar	Likhu	Okhaldhunga	39.6	1907/08
2	Betrawati	Betrawati-Lahrepouwa	Betrawati	Rasuwa	41.7	1910/11
3	Pachali	Pachali-Pachali	Bagmati	Lalitpur	121	1917/18
4	Butwal-I	Butwal-Butwal	Tinau	Rupandehi	160	1927/28
5	Mulghat	Budhimorang-Belhara	Tamor	Dhankuta	146.5	1930
6	Sundari	Lalitpur-Kirtipur	Bagmati	Lalitpur	85	1931/32
7	Koteswor Manohra	Lalitpur-Koteswor	Manohara	Lalitpur	60	1934/35

### 2.2 Longest bridges (as of March 2017)

Rank	Bridge	Location	District	Span(m)
1	Mudhikuwa	Mudhikuwa-Kushma	Parbat	359
2	Triveni Garas	Kyaneshwar-4	Sindhuli	350
3	Kushma Balewa	Kushma- Balewa	Parbat/Baglung	347
4	Gyadi	Kushma-Gyadi	Parbat	344
5	Leguwa Ghat	Leguwaghat-Jarayotar	Bhojpur	310
6	Shibalay	Purtimekanda Rukhum-Shibalay Jajarkot	Rukhum/Jajarkot	283
7	Seti Madi Dobhan	Byas	Tanahun	278
8	Ghasa Hanging Bridge	Ghasa	Mustang	170

### 3 MOST COMMON TYPES OF NEPALESE TRAIL BRIDGES

In terms of span:

#### 3.1 Short span trail bridges (SSTB) – span up to 120m.

Such bridges use simple technology and are implemented through community approach.

#### 3.2 Long span trail bridges (LSTB) – span more than 120m.

Such bridges use modern tools and technologies.



Nepal's longest suspended bridge in Parbat district of Western Nepal

In term of type

#### 3.3 Suspended bridge (D- Type)

It is suspended between two hill slopes. Downward sagging walkway, cables attached in the main anchorage foundation at both banks. Hangers attached to main anchorage cable. Such bridges are suitable in hilly areas and are easier to construct. They are very economic.



### 3.4 Suspension bridge (N-Type)

They have two towers in each side with upward cambering walkway. They are more expensive than D-Type and constructed in flatter areas. Such bridges are only selected when D-Type Bridge is not possible to construct.



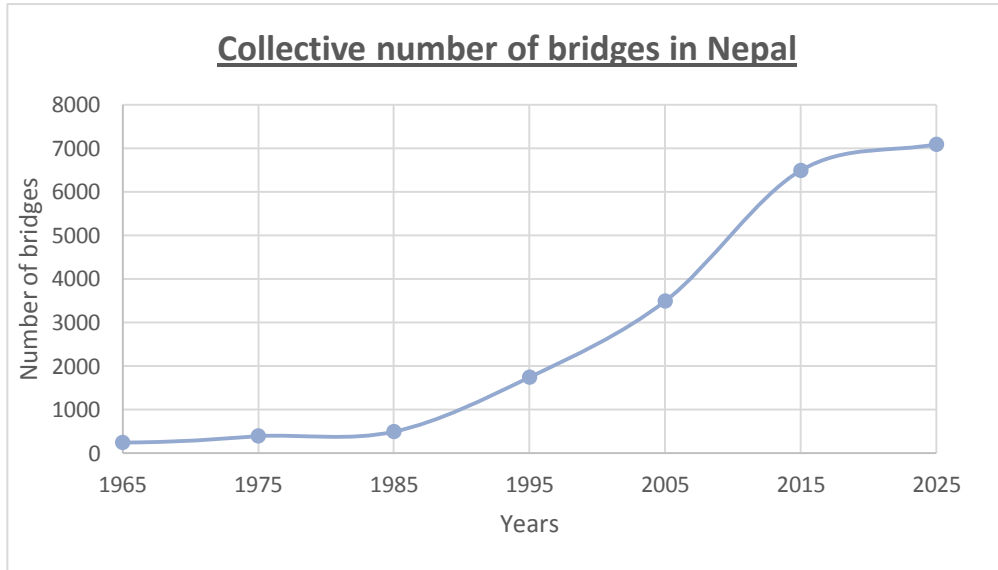
### 3.5 Truss bridge

Span is less than or equal to 32m. They are made by steel structure which is assembled at the site of construction. Such bridges are suitable for small spans. They are very less used in Nepal.

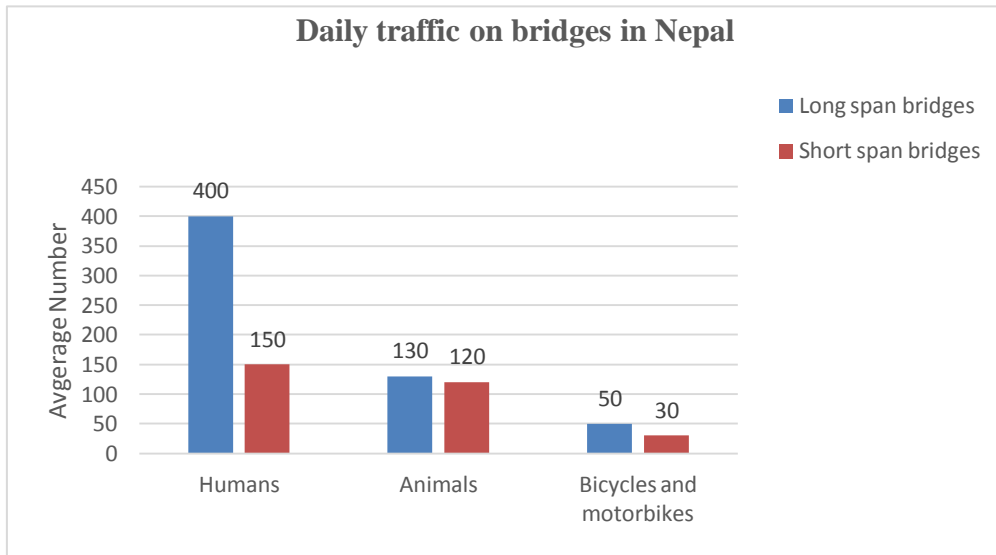


## 4 STATISTICS OF TRAIL BRIDGES IN NEPAL

Initiation of planned and systematic trail bridges started in 1990s. The idea was to develop as many bridges possible and to develop a bridge technology on various local trails to ease traffic congestion caused by local animal herds and people. In 1990s short span trail bridges were in practice but these days demand of long span trail bridge technology has grown. The number has grown from few to 6500 by 2015. There are almost 7000 bridges in Nepal currently. It is estimated that the trail bridges serve some 7.8 million users which is about one third of Nepal's population.



The average daily traffic for people, animals and others like motorcycle and bicycle are indicated in following chart:



## **5 CONCLUSIONS**

Stretching high above river valleys, Trail bridges are built for a very practical reason. The trail bridge technology has a tremendous potential to promote and improve access for local people of remote and scattered areas and contributing towards poverty alleviation. Our history is littered with the successes and failures that make up the trail bridge story today. The technology is flourishing in Nepal despite of slow paced economic growth. There are immense challenges to such infrastructures but the improved education and health levels, reduced poverty and development of such rural infrastructure with an enormous rate makes our progress ideal. So will this practice improves the huge involvement of communities and ensure good governance? Following recommendations can be made to improve practice of trail bridge technology in Nepal.

### **5.1 Transparency**

The programme should have a remarkable track record on transparency with many people feeling that corruption is nonexistent. People meeting and public auditing should be regularly made. The explanation of how money has been spent should be given to public.

### **5.2 Maintenance**

Progress can never be achieved without a proper maintenance of existing bridges. Though provisions and capacities are there, it is not carried out satisfactorily. So awareness programme are important for routine maintenance.

### **5.3 Quality and sustainability**

The total investment for trail bridge programme in Nepal being 100 million CHF over many years, quality must be taken into consideration so that structure won't fall or damage. Sustainability is also increasingly important goal for us. Our structure should defy brutal natural calamities like landslide, flood and earthquakes. So care must be taken during construction.

### **5.4 Development of private sector**

Private sectors play a key role in scaling up of trail bridge programme. Development of skills, capacities and products in the private sector is very essential.

### **5.5 Institutionalizing**

Trail bridge building follows specific engineering norms and design parameters. So it must be made as a part of standard courses in civil engineering and governmental engineers have to be trained well.



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