AERIAL ROPEWAYS OF NEPAL

PRACTICAL ACTION
Technology challenging poverty

technical brief

Introduction

Nepal

Nepal offers extreme geographical conditions to test different transport systems. It has ranges of high mountains occupying much of the country and flat land areas known as *terai*.

Rural access is a major problem in Nepal. Settlements are scattered with few densely populated areas, which combined with the harsh terrain and unfavourable weather conditions, makes linking homes to established roads very difficult.

Figure 1: Rural Nepal ©Practical Action

Ropeway transport has been in use in Nepal for many years. In their most basic form, they consist of a single span made with fibre rope simply anchored at each end. The first major ropeway in Nepal installed in the 1920s followed by an improved and extended system in 1964. Although there has been some stagnation in the development of large-scale ropeways, small-scale systems are economically feasible in Nepal.

The Nepal transport programme

The transport programme started in 1988 by the Intermediate Technology Development Group – ITDG, now known as Practical Action, and is working on developing river crossing ropeway bridges known as tuins, ropeway transport for mountainous regions and in the flat regions of the country there is an emphasis is on bicycle technologies. ITDG was also instrumental in setting up a National Forum for Rural Transport and Development, under the International Forum for Rural Transport and Development (IFRTD) umbrella.

Tuin

Figure 2: Tuin is the main means of river crossing for the people of Kalleri Village, Dhading
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Wire Bridges (Tuin) are an indigenous technology and one of the most common structures for river crossing in the hilly region of rural Nepal. There are more than 6000 rivers in Nepal and most of the rivers have no means of crossing. Because of that, many people have lost their life during monsoon (attempting to cross). There are more than 15 tuin in operation along the Trisuli River, on average nearly 50 households are using each tuin which amounts to more than 300 people using each tuin.

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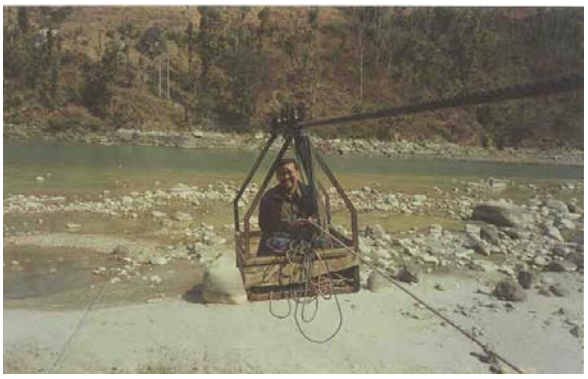

Figure 3: The traditional design of Tuin
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The new design of tuin

ITDG Nepal conducted a study looking to improve the existing technology. Ideas for improving the design came form the local community during discussions with ITDG technical experts. The community expressed concerns about the safety of traditional *tuins*. Many people have lost fingers while operating *tuins* and there is a danger of falling out of a trolley while crossing a river. ITDG technical personnel brainstormed to come up with low-cost improvements that addressed the users concerns.

Figure 4: A modified tuin
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One of the first changes was to develop a safe trolley to prevent people falling out. Seats were added and sidebars were installed. ITDG Nepal then went on to develop a new pulley system that makes pulling the trolley easier and eliminates the risk of trapping fingers in the mechanism. The pulley and bearing system also reduces friction and lessens the effort required to cross the river. The efficiency has been doubled.

The improved *tuin* was developed and tested at the village of Mahestar about 60 km west of Kathmandu. Based on the experience gained at Mahester, the design was further developed into a double-cable design which, although it costs more, provides better balance and can carry a greater load. Double-cable prototypes were then built in the villages of Kalleri, Pimaltar and Balkhu in the Dhading district of Nepal.

Figure 5: Demonstration of the new tuin ©Practical Action

The costs involved in the construction of an improved *tuin* are:

- labour
- manufacturing
- *tuin* support system (pillar construction)
- wire cable
- *tuin* trolley
- pulley system
- anchor block and other accessories
- installation
- equipment transportation

The improved *tuin* is intended for those areas where other forms of river crossing are inappropriate or too expensive.

Ropeways

Ropeways are a relatively new technology to Nepal that people in hilly areas use in the absence of conventional transport infrastructure.

Figure 6: Hydro-powered ropeway transport system ©Practical Action

Some initial studies on ropeways were carried out by the Department of Engineering at the University of Lancaster. An evaluation of the Micro hydro Powered Ropeway in Nepal was carried out by Imperial College of Science, Technology and Medicine at the University of London. ITDG was involved in a number of trial projects relating to this technology and building on the experience in micro-hydro

Practical Action and the Northern Gorkha Development Group have been co-ordinating the construction of a ropeway that spans 2.5km over a 1,00m climb. The winch is powered by a micro-hydro scheme, which produces 35kw that powers the ropeway during the day and provides electricity to the village at night. Before the ropeway was built, the journey could take six hours.

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