

## From Mountain to Market

In the mountainous regions of Nepal physical isolation can mean that communities face an exhausting, time-consuming and often dangerous journey to get their crops to market, particularly during the rainy season. Each year at harvest time good produce goes to waste as the labour required to transport it fails to justify potential cash earnings.

In this issue of the *IFRTD Update Series* we profile a recent programme by Practical Action Nepal to demonstrate gravity ropeway technology as a viable means of goods transportation in hilly and mountainous regions. The lessons highlighted here are based upon the findings of an external evaluation carried out by the IFRTD in March 2006.

### Key Learning

Gravity ropeways provide an economical and environmentally friendly transport solution. They are non-motorised and require no external fuel or energy. The construction process does not destroy the fragile mountain eco-system through de-forestation and costs ten times less than the construction of an earthen/green road in the mountains.

Community participation is key to the sustainable financing and operation of the ropeways. The main components are sourced locally and Practical Action staff train local manufacturers to build the parts. Small user charges cover operation and maintenance costs. Gravity ropeways are easy to operate and can be managed and maintained locally with minimal training.

A holistic approach integrates the transport system with the community. Technical aspects such as construction and maintenance are addressed alongside socio-economic activities and organisations e.g. trading, marketing groups and co-operatives.

Facilitating South to South technical knowledge exchange provides an important conduit for the development of viable transport solutions.

In December 2001 Practical Action Nepal, with financial support from The International Centre for Integrated Mountain Development (ICIMOD) demonstrated two gravity ropeways in Marpha, Mustang district, using a technology that had been successfully proven in Himachal Pradesh, India. These pilot ropeways facilitated the transport of apples and other produce, reducing waste and enabling access to high value markets. The demonstrations generated attention among local communities and organisations and led to requests for Practical Action Nepal to support further ropeway projects. These requests formed the genesis of the programme highlighted in this *Update*.

**“It takes two hours to get down the mountain trail to the main road, and during the monsoon accidents are frequent. Now we have the gravity ropeway, the time saved means I can earn three times as much from selling my vegetables. With that extra money I can afford to farm animals too. But I'm not just glad for me - the whole village is prospering thanks to the ropeway.”**  
- Dharma, 55 years old, Janagaon Village.



### Project Bio:

#### Title:

Gravity Ropeways for Hill Communities in Nepal.

#### Lifetime:

April 2003 - April 2006

#### Location:

Mustang and Dhading Districts, Nepal

#### Implemented By:

Practical Action Nepal

#### Funded By:

European Community (EC)

#### For more information about this project contact:

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see page 4 for address details

## The Programme in brief

The 'Gravity Ropeways for Hill Communities in Nepal' programme, supported by a European Community (EC) block grant, established three gravity ropeways over a three year period. During the first year a gravity ropeway was installed in Kunjo, Mustang District for the benefit of 600 people in three villages (Kinjo, Chimang and Taglung). In the second year the Janagaon to Bishaltar ropeway was installed in Dhading District with a span of 1350 meters, a slope of 22°, and a vertical height drop of 505 metres from top to bottom station. The final ropeway was established in Toriswara, Ghoroka District in 2006. At a span of 1800 metres it is the longest of the Practical Action supported ropeways, crossing the Trishuli river and benefiting seven villages, each of approximately 400 households. Construction and installation of each ropeway took approximately five months.

Together the ropeways are expected to:

- Directly benefit 1000 local people through increased agricultural incomes.
- Indirectly benefit 500 local people through general strengthening of the local economy.

- Reduce time poverty through a reduction in the household transport burden.
- Improve health conditions through a reduction in heavy load carrying, particularly for women and children.
- Train local artisans to enable replication of the ropeway technology.
- Develop transferable organisational and administrative capacity within the local community.

The target beneficiaries of the programme were primarily women aged between 40 and 60 years. Many young people in the region have migrated to cities and larger towns in Nepal or to the Middle-East as labourers, leaving women to undertake both domestic and income-generating activities.

## The Ropeways in Operation

Each ropeway has an associated marketing group or cooperative also comprising members of the beneficiary households. These groups are responsible for levying the ropeway user charges and overseeing the transportation and marketing of the goods. They employ the Operators at the upper and lower stations. The lower station Operator earns a higher wage, 4000 Nepalese Rupees (NRs<sup>1</sup>) per month, compared to 2000 NRs per

month at the upper station. This is due to the added responsibility of applying the braking system that controls the speed of the ropeway. Additional helpers are employed on a daily wage basis to assist with the loading, unloading and weighing of goods at the lower station.

Charges are levied according to weight although each ropeway has developed its own system. For example at Janagaon ropeway the user is charged 5 NRs per 10-30 kg, 7 NRs per 30-50 kg and 10 NRs per load greater than 50 kg. Meanwhile at Toriswara ropeway users are charged 0.5 NRs per kg for up or downward loads.

Marketing group members obtain daily information from the market centres in order to negotiate bulk prices with the traders that come to the bottom stations to purchase the goods. At the close of business the group then reconciles individual earnings with user charges levied, makes payments to the ropeway users and records the transactions in the ropeway log book. Money earned by the ropeway is used to cover the operator and helper wages and to pay for regular maintenance of the ropeway mechanisms. Users who need money urgently or wish to purchase goods to transport back up to the village will walk down on foot to oversee their transactions.

<sup>1</sup> 65 Nepalese Rupees = 1 US \$

### Longevity

The ropeways aim to be sustainable in three key areas:

#### Technical Sustainability -

manufacturing and operational capacity has been established at local level through exchange visits and training from Practical Action Nepal staff. A body of individuals now exists that is capable of replicating all technical aspects of the programme and undertaking routine maintenance. The ongoing demand for their skills is expected to ensure their preservation, practice and further dissemination.

#### Organisational Sustainability -

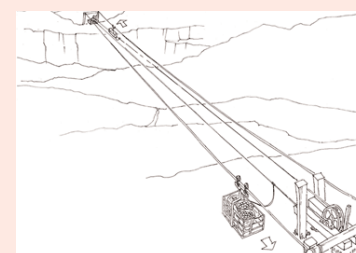
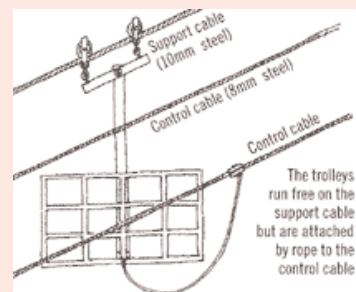
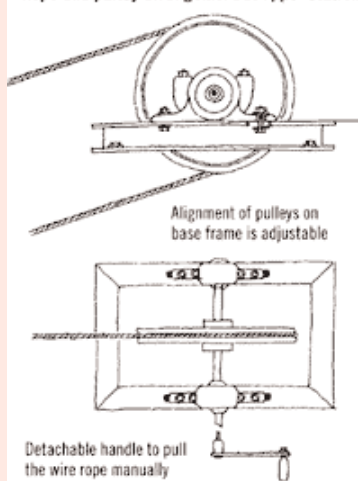
community members are developing transferable skills, for example book keeping and committee management skills that could be applied to a range of future community development activities.

**Financial Sustainability** - the user fees system ensures a revolving maintenance fund that, if appropriately managed, will underwrite the long-term financing of each installed ropeway.

### Just Gravity

Two linked trolleys on pulleys run on separate 10mm diameter steel wires that are suspended from towers. As the laden trolley comes down the mountain pulled by the weight of its load, the empty trolley (or a trolley with lesser weight) is pulled up ready for the next load. The trolleys' progress is controlled by another 8mm wire looped over a flywheel. A wooden drum brake with a bearing and bracket governs the speed of the trolleys.

Rope and pulley arrangement at upper station



## Community Participation

The community has been central to this programme from site selection, through financing, construction and installation to the operational management of the ropeways.

Sites were selected in response to community requests following the successful demonstration project in Marpha. Communities then contributed labour, land, and material (rubble, stone, logs) equating to a **40% capital investment in each ropeway**.

In Janagaon village loans were obtained from each household to purchase logs for the upper and lower stations. Revenue generated by **the ropeway has**

**repaid 85% of these loans within the first eight months of operation.** Even non-villagers have contributed to the development of the ropeways through land donations for the lower stations in both Janagaon and Toriswara villages.

The management and operation of the ropeways is carried out by a Committee that was elected from and by the local community (beneficiary households) prior to the construction phase. Practical Action recommended a minimum of 30% female representation within the Committee and members were also elected according to their proficiencies in understanding technology, leadership, and management

skills. In Janagaon the treasurer of the "Bhairebi Shankhadevi Gravity Ropeway Committee" records all transactions and oversees the collection of user charges, payment of wages and maintenance expenditures. At the time of the evaluation this committee was unregistered and the treasurer kept cash in his own custody.

The IFRTD external evaluator noted a clear sense of ownership of the ropeways by both the wider communities and the community management committees. This is thought to be due to the visible economic benefits that the ropeways have already delivered.

## Impact on Livelihoods

In Janagaon village, prior to the installation of the ropeway, goods were carried in bamboo baskets 'doko' by Porters, migrant workers from outside the village. Porters take three to four hours to reach the road-head and charge 75 NRs plus three meals per day for a load of 60kg. Now by ropeway the goods can be transported more quickly down the mountain for 10 NRs (average load 100kg) and back up again for 15 NRs (average load 50kg). Overall an 86% reduction in transport costs combined with a reduction in the

time it takes to transport goods has meant that more and fresher (higher priced) produce can be marketed. In turn this has led to more consumer goods and better quality produce making their way back up to the village.

The time saved by sending goods via the ropeway has been utilised for the cultivation of additional land and the diversification of production, for example villagers are cultivating bananas and farming poultry. Improved connectivity

and household income has also generated better availability of agricultural inputs such as fertilisers and seeds.

Increased purchasing power has led to improvements in the quality of life, for example there is more money to buy fuel for cooking and heating, to purchase better quality rice, to pay for education and healthcare, and to make home improvements. For example building materials such as new roofing sheets can now be transported up the mountain.

## Challenges and Limitations

As gravity ropeways only facilitate goods transportation and not the movement of people there are inevitable limitations in their capacity to fully address the transport burden faced by Nepal's mountain communities. Despite increased local incomes, the actual physical access to water, healthcare, secondary education and other services remains a challenge.

IFRTD's external evaluator noted that the ropeways have had a limited impact on the transport drudgery of women even though they form the target beneficiary group. For example in Janagaon village, it was observed that women still fulfil the bulk of transport activities, particularly water collection. Due to the location of the water source between the upper and lower stations and the quantity of water that must be collected - 45 pots (15 litres per pot) per day per household, the Management Committee has chosen not to use the ropeway for domestic or agricultural water collection. Women therefore continue to spend on average 4.5 hours per day transporting water.



IFRTD / Ranjith de Silva

The ropeways have also triggered improvements in communications. Messages and newspapers are tied to the goods trolleys increasing the information flow between the village, the road-head and the outside world. Increased information has further supported agricultural development and income generation through, for example, the availability of up-to-date knowledge on market prices.

**"It used to take two people over three hours to carry a 120kg load of apples 1.3 km down a steep mountain path - and that was just the first part of the gruelling journey to market. Now, with a gravity ropeway, the apples take less than five minutes to cover the same distance"**

- [www.practicalaction.org](http://www.practicalaction.org)

## Moving Forward

With the ropeways in operation Practical Action Nepal are now looking to integrate new activities that will build upon the income generation that has been triggered and/or address other aspects of the local transport burden. With the rise in local incomes the villages are slowly gaining access to grid electricity and it is anticipated that the installation of drinking water supply systems and irrigation systems to achieve maximum agricultural yields, could be next.

The external evaluation, carried out when the first ropeway was just nine months into operation, made a number of recommendations concerning the potential for programme replication, and the need for longer-term evaluation:

- **The development of site selection criteria for project replication.** The definition of a minimum number of beneficiary households alongside guidelines for location selection will help to ensure the alignment of lower stations with existing transport infrastructure and services.
- **Technical reviews with project engineers, manufacturers, operators and users.** These will help to identify opportunities to improve ropeway performance and safety. For example following feedback from the external evaluation weighing scales have been installed at upper and lower stations to ensure balanced weights that will optimise ropeway speed and performance.
- **Skills dissemination to build the capacity of more manufacturers and ropeway installers.** The project team emphasised the need to minimise a monopoly by one single manufacturer.
- **Longer-term evaluation of baseline data.** In order to determine the *actual* and *sustainable* economic gains for beneficiary communities, particularly vulnerable groups e.g. women and children.
- **Some evaluation of indirect impacts on the wider community.** For example to determine the impact of loss of employment for migrant porters.

In March 2006 Practical Action Nepal brought together policy makers and community representatives in a 'dissemination workshop' to promote the ropeway technology to key government organisations. Short informative video presentations demonstrated the ropeway technology alongside a lively discussion

and answer session. The community contribution to capital investment is a convincing argument for the allocation of funds to this type of infrastructure development in rural areas and the possibility of the inclusion of this technology in District Development Plans and the next three year national interim development plan should be explored.

### Find Out More:

Practical Action Nepal is a non-governmental organisation that specialises in helping people to use technology to provide practical answers to poverty. *Gravity Ropeways for Hill Communities in Nepal* was initiated by Practical Action Nepal's Access to Infrastructure Services Programme.

A *Ropeways Technical Brief* in English is available for free download at [www.practicalaction.org](http://www.practicalaction.org)

An *Operational Manual for Ropeway Users* in Nepali is available on request from Practical Action Nepal. The Manual is targeted at operators and the technical team within the management committee.

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