PRACTICAL ACTION

Practical Action is an international development charity that helps some of the world's poorest communities to engineer and sustain their own long-term development. Here, the organisation's Director of Policy and Programmes, Andrew Scott, explains how they go about their work, and gives examples of how simple technologies can make profound, life-changing impacts.

Practical Action was founded in 1966, as the Intermediate Technology Development Group, by the radical economist Dr EF Schumacher to prove that his philosophy of 'small is beautiful' could bring real and sustainable improvements to people's lives. He believed the best way to tackle poverty in deprived areas was not with capital-intensive aid, but to find out what people already have and to build on those assets in order to maximise their resources.

Today, Practical Action's programmes have four main themes: helping to reduce vulnerability following natural and man-made disasters; enhancing livelihoods through improved methods of production, processes and marketing; providing access to basic services such as water, sanitation, housing and energy; and showing how new science-based technologies can change people's day-to-day lives for the better.

We promote ourselves locally, and receive enquiries for help from a variety of sources, including individuals, communities or community groups, and requests arrive by e-mail, telephone or word-of-mouth. We also work in partnership with other organisations, with government departments, international NGOs or local civil society organisations.

The technologies we apply are often in remote communities in Africa, Asia and South America. We can help with housing, roads and transportation to water pumps, irrigation, agricultural equipment, animal husbandry and the provision of energy. Energy has proved time and time again to be the catalyst for change. One of the mainstays of our work has been the development of small-scale stand-alone renewable energy solutions – based on water, sun, wind or waste products.

WATER POWER IN THE ANDES

The lack of energy supplies in rural areas is a chronic problem. There are 1.5 billion people in developing countries who have no access to electricity. Rural electrification through conventional means such as grid connection or diesel generators is costly but where there are supplies of water these can be utilised for energy production then solutions can be found.

We have been in Peru for 25 years. The Andean village of Tamborapa (population 1,200) is one of a number of remote rural

Women carrying transmission wire needed to build a wind turbine in Patla Village, Phalamkhani, Nepal. The electricity generated by their turbine provides a clean alternative to kerosene. It enables children to study in the evenings and people to cook meals by electric light © Practical Action

communities where we have made a concerted effort – and are now supported by the Peruvian Government – to install and run micro-hydro schemes, harnessing the power of water from fast-flowing mountain rivers. More than 50 schemes have been installed, providing electricity to over 10,000 families. Our intention is to double the number of schemes in the next decade.

Micro-hydro power is the small-scale harnessing of energy from falling water, such as steep mountain rivers. Using this renewable, indigenous, non-polluting resource, micro-hydro plants can generate power for homes, hospitals, schools and workshops. Practical Action promotes small-scale hydro schemes that generate up to 500 kilowatts of power.

Where such schemes have developed, Practical Action has used a small business approach to help communities manage their micro-hydro schemes. Schemes have a manager and operator who are trained to run and maintain the plant, collect agreed tariffs, repay capital loans and report to a village committee.

Electricity has made a huge difference in Tamborapa, reducing the cost of lighting fourfold, halting the exodus of villagers going to seek work, and helping small businesses start up and flourish. Mechanisation has relieved labour-intensive tasks such as grain-milling; vaccines can be kept cold in the fridges of health centres; and the internet is helping students study and access information from the wider world. The communities installing and utilising micro-hydro schemes in the high Andes have now created cottage industries and are contributing to the economic development of the entire region.

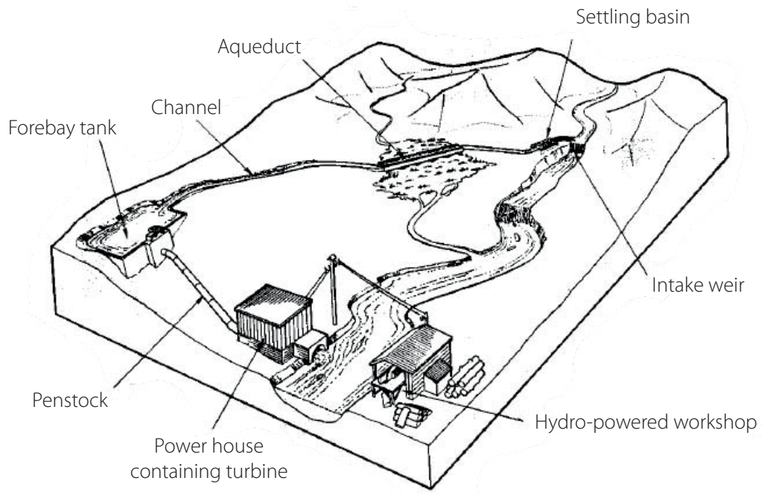


Figure 1. For most micro-hydro schemes, water is collected from a main watercourse via a simple intake, settling basin and channel to a forebay tank that sifts out sand and small pebbles before directing it via a penstock pipe leading steeply down to a powerhouse. There, a turbine can turn the potential energy of the water to kinetic energy, which the generator converts into electricity. Power is produced 24-hours a day, but the flow can be manually or electronically regulated according to demand.

INCREASING FOOD RESOURCES

Practical Action has a base in Bangladesh where one fifth of the country is flooded every year, affecting millions of people. The charity helps build up the technical skills of communities there in order to protect them from the worst effects of annual flooding.

The floating garden is just one approach that can be used to improve the food production of people living and working in Bangladesh. Other approaches include small-scale fish farming, pigeon rearing, and duck rearing. Farming methods have to be suitable for small-scale farmers without the need for large financial investment.

During the monsoon season, much of the land in the Gaibandha district of Bangladesh is covered by water, making it impossible to grow crops. Local people have been introduced to a new cultivation technique, using a raft made from water hyacinth called a floating garden. This enables poor people to grow vegetables to feed their families during the floods.

Water hyacinth is a common weed in the river and can be collected and knotted together by hand to build a simple raft eight metres long and one metre wide, which is then covered with soil and cow dung, and sowed with vegetable seed. Summer and winter vegetables such as gourd, okra and leafy vegetables are grown on the raft as it floats on the flooded river. A new raft needs to be built every year but the old one can be used as fertiliser during the dry season.

The floating gardens provide food for people even during the annual 'monga' (period of food shortages) and they can also provide a source of income through sale of any surplus in the market. They are suitable for farmers who need to diversify from traditional land use, and, as the rafts can be moved from place to place, they are also useful for those who have temporarily or permanently lost their homes and land.

The lessons learned and successes from our projects are communicated to global decision makers as well as fellow development practitioners.

BIOGAS PRODUCTION

In Sri Lanka, three quarters of the population have access to electricity – though firewood and kerosene are the main energy sources for the majority of the country's rural communities (85%). With fuel wood becoming increasingly expensive and also scarce in some parts of Sri Lanka, there is a need to look for alternative cooking fuel. Cow manure and biogas technology provide a free, sustainable source of energy all year round and a better income for farmers. On-farm biogas plants collect cow dung from specially adapted cattle sheds, mix the result with water and channel it into fermentation pits. The gas (of which 65% is methane) produced as a by-product of this fermentation and is collected in a simple storage tank from where it is piped directly into the farmer's home to provide energy for cooking, laundry and lighting.

Practical Action has trained local builders to construct biogas digesters, leading to the introduction of over 60 new biogas schemes meeting 75% of household cooking needs. Incomes have risen in these areas as women and girls are freed from an average of two and a half hours a day of domestic labour (fuel collection, cleaning smoke-blackened utensils and disposing of animal waste), using

There is little food in the markets during the monsoon season, as few people can grow crops, so vegetables are in great demand. By cultivating seedlings in the floating gardens people are able to plant them earlier in the year and get a better harvest. After the end of the monsoon season, the old rafts can be used as compost to grow crops in the dry season

An upper station of a gravity ropeway installed in Janagaon, Nepal. Janagaon is one of six communities which have benefitted from this goods-transportation ropeway. The proven technique can now be copied elsewhere from a free technical brief available online.

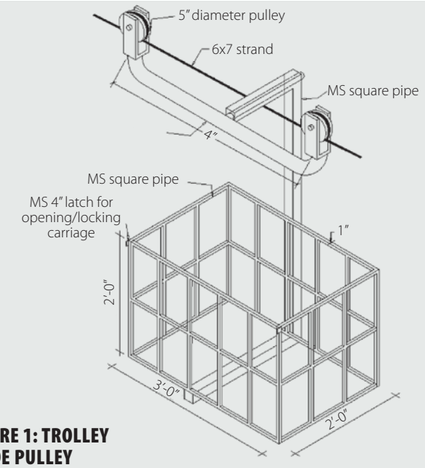


FIGURE 1: TROLLEY GUIDE PULLEY

PRACTICAL ANSWERS

Last year, the Practical Answers section of the charity's website responded to 6,292 technical enquiries from 92 countries. This service is able to call on the expertise of several hundred professionals in technical, economic and sociological disciplines worldwide to help formulate the answers to enquiries. The written materials on the website are much in demand with 285,754 downloads of technical materials from 172 countries.

'Gravity ropeways' is one of 400 such technical briefs available free online. In Nepal, getting crops to market can be exhausting and dangerous – generally mules, women and children carry these heavy loads on their backs down treacherous dirt tracks. When it rains, or after a landslide, this becomes impossible.

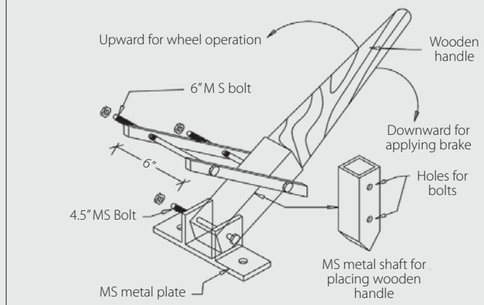
The gravity ropeway is an inexpensive and simple means of transportation. It operates by gravitational force without the use of external power. The gravity ropeway consists of two trolleys rolling over support tracks attached to a control cable in the middle which moves in a traditional flywheel system. When the loaded trolley at the up-station is pulled downward by the force of gravity, the other trolley at the bottom-station is pulled up automatically by means of the control cable.

The goods coming downward from the top-station need to be three times as heavy as the load going up from the down station. The sliding down of the trolley and its speed depends on the angle of elevation made by the cables installed with the horizontal ground.

A flywheel with bearing and bracket is used as a brake to control the landing speed of the trolley at the bottom-station. Communication between top and bottom stations is done by tapping the wire rope. The operator at the down-station when alerted then applies the handbrake to control the flywheel.

Six communities in Nepal, together with Practical Action, have found a surprisingly simple answer that is transforming their lives. It used to take two people over three hours to carry a 120 kg load of apples 1.3 km down a steep mountain path, just the first part of the gruelling journey to market. Now, with a gravity ropeway, the crop takes less than five minutes to cover the same distance.

FIGURE 2: BRAKE SYSTEM



Figures 2 and 3: Diagrams from a technical brief showing how to construct a trolley guide pulley and a braking system for gravity ropeways. The system uses two linked trolleys, on pulleys, run on separate 10 mm diameter steel wires suspended from towers. The trolleys' progress is controlled by another, 8mm wire, looped over a flywheel. A wooden drum brake, with bearing and bracket, governs their speed.

The braking system reflects the diagram in figure 3. When the lever on the right is pulled back it will pivot on the 6" bolt and cause the wooden block above the wheel to drop down, thus applying pressure and slowing the wheel speed.

An input tank of a biogas digester being installed in Sri Lanka. The resultant biogas provides a clean cooking and lighting fuel that can be produced on a scale varying from a small household system to a large commercial plant of several thousand cubic metres.

the time instead for new income-generating activities. Work on setting standards for biogas systems in Sri Lanka is now underway in partnership with the Lanka Biogas Association.

DISPENSING TECHNICAL KNOWLEDGE

During 2009, we were running 111 projects in 13 countries, with a total budget of about £22 million. Together with our technical briefs and manuals, used by engineers abroad and local communities, we estimate that we helped more than 500,000 people last year by empowering them to deploy technologies that gave them greater control over their lives and livelihoods (see Practical Answers box).

Practical Action employs around 700 people worldwide with many of our projects based in Bangladesh, Kenya, Peru, Nepal, Sri Lanka, Sudan and Zimbabwe. Each overseas office contains a mix of engineers, technicians, social scientists and community mobilisers – any or all of whom may play a role, according to the individual requirements of each project.

In all the countries where we work the project costs are often met in part at least, by the local community. Our own funding comes from donations by the British public and a variety of organisations, including the Department for International Development and the European Union. We can facilitate innovative financial mechanisms to ensure low-interest loans, and at the same time provide whatever education and training are needed to create an infrastructure that can fix problems, manufacture spare parts and, importantly, boost production and market products.

The lessons learned and successes from our projects are communicated to global decision makers as well as fellow development practitioners. By adapting existing technologies, we help ensure that success in one country can form a template for success in another. Practical Action uses its credibility to inform, influence and encourage project partners to enter into a dialogue for change, which helps give local people a voice at national level. As a result, local concerns on such daily issues as good urban planning, proper shelter and fair taxation can be heard and acted upon.

The tools and solutions we provide access to may be simple but they can provide long-term, appropriate and practical help when placed in the hands of local people. These skilled people can then shape technology and control it for themselves.

For more information:
www.practicalaction.org.uk

BIOGRAPHY – Andrew Scott

Andrew Scott has worked for Practical Action for more than twenty-five years. His own work and writing has focused on concepts relating to science and technology and development, small enterprises and the environment, adaptation to climate change, and the development impacts of modern new technologies. He has worked in Botswana, Kenya, Zimbabwe, Malawi, Sri Lanka, India, Nepal and Peru.

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