



# BICYCLES

## Introduction

Isolation is one of the key elements of poverty; isolated communities have little or no access to goods and services, and few opportunities to travel beyond their immediate surroundings. This restricts agricultural productivity, reduces health and educational and limits opportunities for employment and political opportunity.

Limited financial resource prevents investment in transport maintaining the position of poverty and isolation. Consequently, there is a need to develop alternative, more affordable means of transport

Developing such systems requires consideration of four key elements:

- the improvement of village level infrastructure such as paths, tracks, and footbridges
- the provision of adequate and affordable rural transport services
- the siting of services closer to the communities, thereby removing or reducing the need for lengthy travel the promotion and use of intermediate means of transport including; pack animals, sledges, animal carts, cycle based transport and some low cost motorised devices. One of the more common types of intermediate transport is the bicycle.



Figure 1: Cyclist carrying mattresses, Puttalam District. An example of ordinary bicycle used to transport difficult loads. Photo: Practical Action.

## Bicycles

Bicycles are a low cost means of transport that can improve access to water, health facilities and, for example, address stove marketing problems faced by woman producer groups in Kenya

The bicycle is still expensive for poorer families in Africa and can cost between 20 to over 100 per cent of a rural household's annual income. Therefore, transport needs to be supported by an affordable system of manufacture, supply, and repair.

Affordability is related to the availability of spare parts and repair services, which are sometime lacking in rural areas. Several projects have attempted to boost local economics by encouraging artisanal production of suitable transport and improve the local capabilities of metal workers to maintain and repair bicycles and other types of transport.

### Panniers

The carrying capacity of the bicycle can be greatly increased by attaching panniers either side of the wheel. However, the loads in the panniers must be reasonably well balanced. Panniers are particularly suited to carrying containers such as used for carrying water.

Panniers may simply be sacks or woven baskets hung from lengths of wood or bamboo fixed across the carrier or may be frames manufactured from wood or steel. They need to be as light as possible.

The design shown is a steel frame, which may be either welded or pinned together so that it can be folded up when it is not in use.

The base and sides may be filled in with wire mesh (weldmesh), wooden slats or canvas type material. The ends can be filled in on fixed panniers but not on fold-up designs.

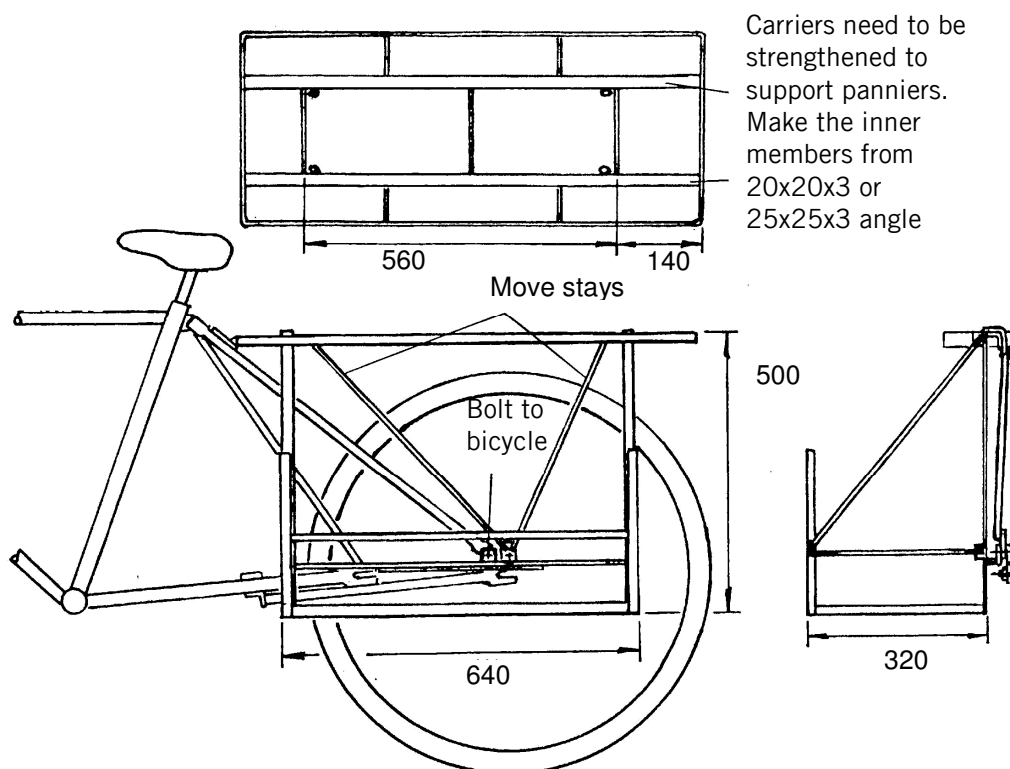


Figure 2: Construction of panniers

### Bicycle extensions

These low cost adaptations of standard bicycles enable larger and more bulky loads to be carried on an extended rear carrier.

The load that can be carried is limited by the strength of the rear wheel and tyre. A strengthened wheel can be used so that the limiting factor is the load capacity of the tyre.



Extended cycle user, W Aloysius Fernando, cultivator of mainly plantains & peanuts, sells peanuts in nearby towns. With the extended cycle, he can now transport enough to meet demand (1200 packets as oppose to 400 packets on his original bicycle). With increased business earnings he began to cultivate a larger area of land and could hire a peanut shelling machine.

Figure 3: Extended bicycle  
Photo: Practical Action

This particular bicycle adaptation requires; the chain to be lengthened, the brackets for the rear break to be moved, and the brake rods to be lengthened. The frame does not have to be cut or modified in any way.

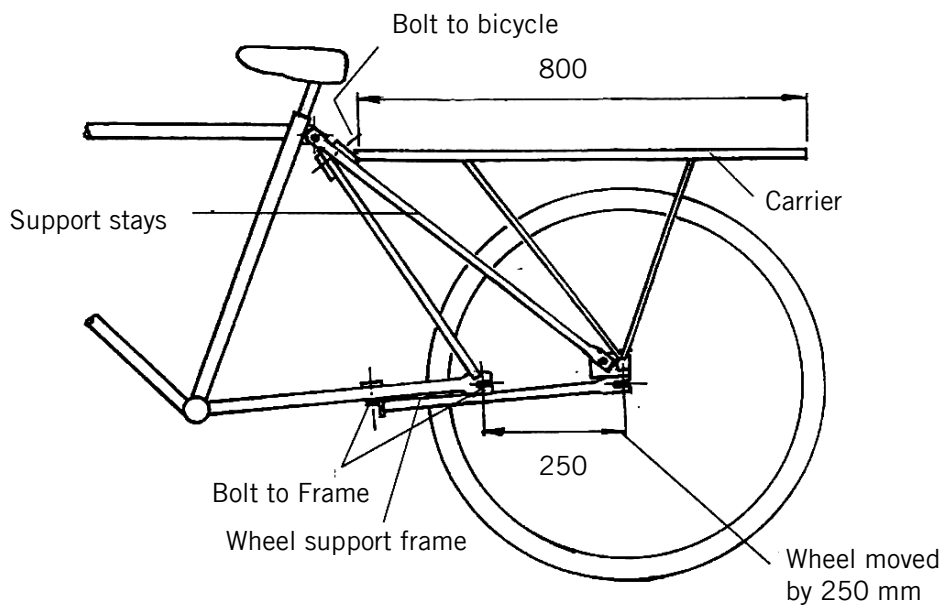
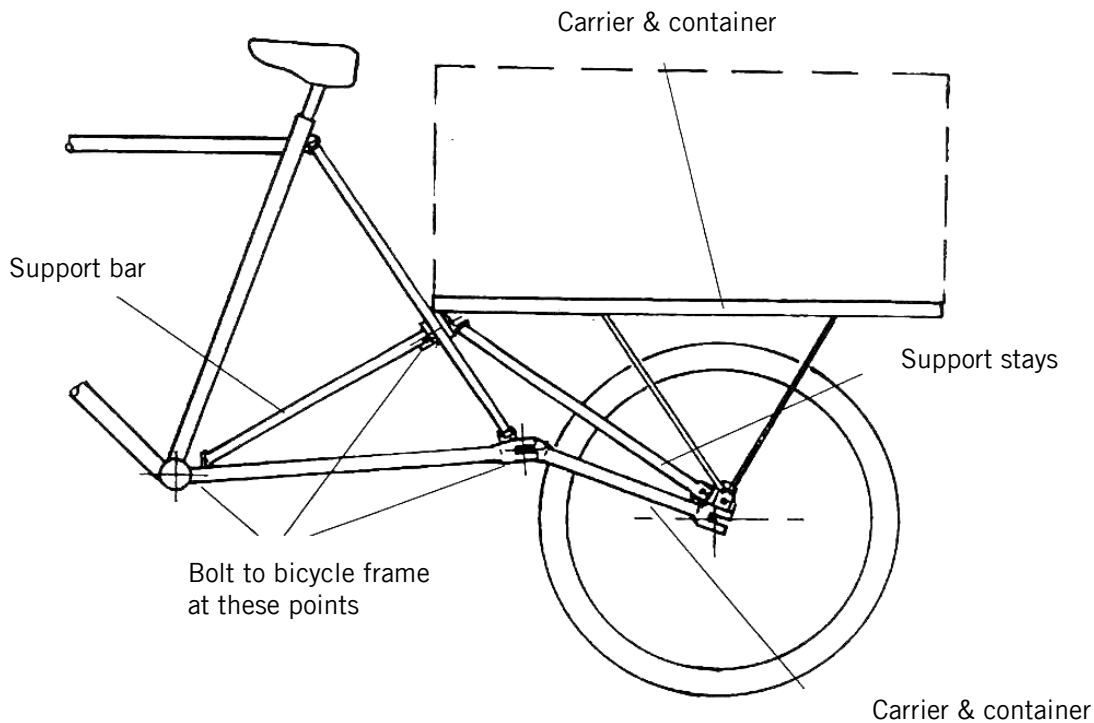


Figure 4: Construction of extension for a standard bicycle

### Construction of extension with small (20") rear wheel

The advantages of a small rear wheel are; there is more space for the load, the load is lower and easier to balance, the wheel is stronger, and the bicycle is easier to pedal. The main disadvantage is that the smaller wheel does not ride as easily over pumps and potholes.

Figure 5: Construction of extension with small (20") rear wheel



### Bicycle taxis

The Bicycle taxi or boda boda has become popular in Uganda and Kenya, they operate for hire from stands in towns, bus stops and market centres. The name boda boda is said to come from the time when the East African Community existed and there was free movement across the boarder between Uganda and Kenya. Travellers were offered transport to the boarder by bicycle-riders shouting 'Border Border' to attract passengers.

Converting a bicycle to a taxi requires reinforced forks, stronger brakes, a passenger seat and footrests, and cushions. New seat designs enable woman to ride side-addle should help to improve access.

Although the work is hard, the operators can earn a living despite a lack of formal education. The community transport organisation in Ndhiwa and The Kibos Cycle Taxi Association of Kisumu, Western Kenya worked in conjunction with Practical Action East Africa to:

- enhance the safety of bicycle taxis
- provide a cycle lane along the Kibos road
- set up a mini-medical insurance scheme for passengers and operators
- provide a credit scheme and repair fund for the members

## References and further reading

- [Bicycle Trailers](#) Practical Action Technical Brief
- [Bicycle Ambulances](#) Practical Action Technical Brief
- [The Design of Bicycle Trailers](#) Ayre, Michael, Practical Action Publishing 1986
- [Rural Transport in Developing Countries](#) Ian Barwell with G. A. Edmonds et al, Practical Action Publishing 1985
- [Low-cost Vehicles: Options for moving people and goods](#) Gordon Hathway, Practical Action Publishing 1985
- [Low-cost Load-carrying Devices: The Design & Manufacture of Some Basic Means of Transport](#) Ron Dennis and Alan Smith Practical Action Publishing 1995
- [Puncture Prevention Techniques for Low Cost Vehicles](#) Michael Ayre & Alan Smith, Practical Action Publishing 1987
- [The Impact of Road Condition on Operating Costs of Bicycles](#), IT Transport, 2004, DFID.
- [Forum News, IFRTD](#)  
A quarterly newsletter looking at the issues of transport with animal power, bridges, bicycles, gender and transport, financing, engineering, sustainable rural livelihoods, and community planning. *Forum News* is produced four times a year in English, French and Spanish.

## Useful contacts and addresses

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[www.mobilityandhealth.org](http://www.mobilityandhealth.org)

[www.ruralwaterways.org](http://www.ruralwaterways.org)

The International Forum for Rural Transport and Development is a global network of individuals and representatives from government, academia, multilateral and bilateral donor agencies, consultancies and technical institutions, national and international NGOs and groups of community organisations in Africa, Asia, Europe and North and South America.

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Consultants in transport for rural development

## Useful contacts and addresses

International Bicycle Fund  
4887 Columbia Dr S  
Seattle WA 98108-1919  
USA

Website: <http://www.ibike.org/index.htm>

A non-governmental, non-profit, advocacy organisation, promoting sustainable transport and international understanding. Major areas of activity are non-motorised urban planning, economic development, bike safety education, responsible travel and cycle tourism, and cross-cultural, educational programmes.

Pan Africa Bicycle Information Network (PABIN)

Website: <http://www.ibike.org/pabin/index.htm>

Working to improve opportunities for bicycle transport and low-cost mobility to improve productivity, the quality of life and the environment in Africa.

Re~Cycle

Unit A Global Park  
Moorside  
Colchester  
Essex, CO1 2TW  
United Kingdom

Tel: 0845 4580 852 or 01206 863111

Email: [mailbox@afribike.org](mailto:mailbox@afribike.org)

Website: [www.re-cycle.org](http://www.re-cycle.org)

Re-cycle is a charity whose mission is to collect and ship second hand bicycles and parts to less developed countries. Re-cycle helps to teach local people the skills of how to repair and maintain bicycles, to improve their lives in a sustainable manner.

First African Bicycle

Information Office

PO Box 1537

Jinja

Uganda

Tel: 00256-77-620312

E-mail: [africa.bike@jessas.de](mailto:africa.bike@jessas.de)

<http://jessas.de/partners.html>

FABIO (First African Bicycle Information Office) is providing literature and videos on bicycles as sustainable means of transport and is organising national and international seminars on bicycle-awareness. There is a bicycle-workshop and training-centre for youths in assembling and maintenance of bicycles.

Cycling out of Poverty

[info@cyclingoutofpoverty.com](mailto:info@cyclingoutofpoverty.com)

<http://cyclingoutofpoverty.com/>

Cycling out of Poverty is a Dutch organisation engaged in raising funds for bicycle micro credit projects in Africa. Cycling out of Poverty is running 3 projects: in Uganda, Burkina Faso and Ghana.

Jacana Real World Development

1321-B North Carolina Avenue NE

Washington, D.C. 20002, USA

Website: <http://fleetproject.org/>

Jacana has been working on the Build A Better Bicycle (BABB) project. The objective of the BABB project is to commercialise a bicycle designed specifically for use in demanding

African conditions. They have an office in Mozambique. Jacana is a member of bicycles for Humanity.

Bicycle Empowerment Network - BEN Namibia

PO Box 23150

Windhoek

Namibia

Tel: +264 61 250 200 / Fax: +264 61 225 006

E-mail: [michael@benbikes.org.za](mailto:michael@benbikes.org.za)

Website: [www.benbikes.org.za/namibia](http://www.benbikes.org.za/namibia)

BEN import donated new and secondhand bikes from partner organisations and refurbish them by employing and training local people. They distribute bicycles to community-based organisations (CBOs) whose staff in their work. BEN is a member of Bicycles for Humanity.

Bicycles for Humanity

E-mail: [info@bicycles-for-humanity.org](mailto:info@bicycles-for-humanity.org)

Website: <http://www.bicycles-for-humanity.org/>

Bicycles for Humanity began in 2005 with the aim of enabling others to raise funds and collect unwanted bicycles to send to reliable partners in developing countries.

## Wikis

Appropedia <http://www.appropedia.org/BICYCLE>

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Practical Action is a development charity with a difference. We know the simplest ideas can have the most profound, life-changing effect on poor people across the world. For over 40 years, we have been working closely with some of the world's poorest people - using simple technology to fight poverty and transform their lives for the better. We currently work in 15 countries in Africa, South Asia and Latin America.

# technical brief