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Towards Safer River Crossings: Trail Bridge Capacity Building Project in Ethiopia

Gerebhidar Trail Bridge, Suspension Type, 73 meters span, Atsbi-Wonberta Woreda, Tigray Region, March 2010

A strong correlation exists between poverty incidence and access: remote, inaccessible areas are generally much poorer. The provision of trail bridges and hence access is one of the most effective ways to improve the livelihood of poor people in remote areas. The bridges help thousands to cross rivers safely saving thousands of walking hours, allowing children to go to school, providing entire village's access to medical centres and farmer's access to their fields and to markets.

Addis Ababa, Ethiopia, October 2010

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1 Background

Helvetas, Swiss Association for International Cooperation, is an international NGO established in 1955 and based in Zurich, Switzerland. Helvetas is operating in fifteen countries across Africa, Asia, and Latin America. Working areas of Helvetas are Sustainable Management of Natural Resources, Civil Society and State (Woreda Governance Support Project) and Infrastructure in Rural Areas (trail bridge project).

Cognizant of the fact that improved rural access will contribute to enhancement of socio-economic livelihoods of the rural communities, Helvetas Ethiopia had piloted a trail bridge project in Ethiopia in the period 2003-2007, which led to the construction of 13 trail bridges. Lessons learnt from the pilot implementation have resulted in the realization of nationwide trail bridge programme in Ethiopia since May 2008. With the view to roll out the trail bridge technology as nationwide programme, a MoU was signed between Helvetas Ethiopia and the Ethiopian Roads Authority (ERA) in May 2008. Subsequently, implementation agreements were agreed between Helvetas Ethiopia and the Rural Roads authorities of Tigray, Amhara and SNNPR in June 2009, which led to the construction of 9 trail bridges.

2 Mission of Helvetas

The mission of Helvetas Ethiopia is to guide and support innovative development processes that lead to positive changes to the livelihoods of disadvantaged communities.

3 The Local Context

Ethiopia being a country where 70% of the population lacks access to road network, Helvetas Ethiopia works to the improvement of rural connectivity. Drawing on Helvetas's ample experience in the promotion of trail bridges in the Himalayas and the recent experience in Ethiopia, Helvetas Ethiopia set up a Trail Bridge Promotion and Capacity Building Project. The project aims at breaking the isolation of rural communities through the construction of pedestrian bridges in cooperation with local authorities, communities and the private sector. In addition, the project will contribute to the institutional anchorage of the technology into national standards as well as improvement of the technical and organizational capacities of the Rural Roads Authorities in trail bridge building and maintenance.

4 Project Rationale

Most of the population of Ethiopia lives away from motorable roads, travelling by foot on narrow trails, which often involve crossing rivers-small and large. Such risky crossings pose a high threat and result in loss of human life and livestock, particularly 3-4 months per year during high flood times. Unavailability of better crossing facilities together with limited involvement of other actors in the sector worsens the crossing problem in rural areas. Lack of crossing structures means longer travel time and lack of access to socio-economic service centres. Many rural dwellers are left isolated with little or no social relationship, and hence cannot easily communicate with their relatives and friends, living across the rivers. Foot bridges can dramatically reduce travel times, and hence building them can play a major role in improving rural connectivity. Trail networks with safe crossings will ensure all year access to farmlands, schools, health and market centers, employment centers, cultural and religious locations, neighbors and kin. Walking along foot trails can be the main safer mode of transport for most of rural areas any time of the day. And for all rural communities, safe river crossings are an acute need not just for growth and development but for their very existence and survival. Enhanced mobility is the bottom line not just for sustaining livelihoods but also for infusion of new knowledge into the remote communities and access to modern amenities and facilities that foster growth and development.

Pedestrian trail bridges can serve as a means to facilitate mobility and access to stimulate socio-economic activity and efficiency that help reduce poverty. They also serve as an excellent entry points for democracy and good governance because they facilitate participation in political processes and reduce the marginalization caused by rural isolation. Assuring safe and all year access to rural settlements is similar to empowering the people with the gift and power of

mobility. These facts have been practically demonstrated through the construction of 22 trail bridges of which 13 were constructed during the first pilot project in 2003-07 and 9 from November 2009 to April 2010. Hence, the achievement and experience gained so far, and the severity of crossing problems which triggers high demand for trail bridges, necessitates a further continuation of the collaboration between Helvetas Ethiopia on one hand and Ethiopian Roads Authority (ERA) and Rural Roads Authorities (RRAs) on the other in the areas of trail bridge technology.

5 Trail Bridge Technology: An Innovative Response to the Problem of Crossing

Trail bridges are usually built off the main trail in isolated or remote areas where there is no road in near vicinity, or the probability of a road being built in the near future is low. Such trail bridges are built to serve both pedestrians and packed animals. A potential trail bridge site is selected considering a number of factors among which the major ones are: number of people directly benefiting from the prospective bridges; distance gained in hours by having a bridge; number of months the river cannot be crossed without a bridge; and a risk factor that is the estimated percentage of the benefiting population that succumbed over the last five years.

In terms of bridge span, there are two types of trail bridges. The Short Span Trail Bridges (SSTBs) are applied up to 120m span and LSTB there beyond. In terms of bridge types, there are three types of bridges. These are steel truss, suspended (D-type) and suspension (N-type) as described hereunder:

Steel Truss Bridge: suitable for small span crossings from 8 up to 32 meters. It is made of firm profiled steel. It is found to be suitable for the Ethiopian topography. Example of this bridge is shown below.

Zemda Steel Truss Bridge, 24 meters span, Yem Special Woreda, SNNPR, April 2010

Suspended Type Bridge (D-type): suitable for river crossings with steep hill slope banks or deep gorges. It is selected where the bridge foundations can be placed at a sufficiently high position giving the required free board from the highest flood level. Technically, the D-type bridge is explained by its downward sagging walkway. Its cables are anchored into the main anchorage foundation at both banks. It is also more economic, simple to design and construct than other bridge types. An example of a D-type bridge is shown below.

Bale Trail Bridge, Suspended type, 84 meters span, Bale Zone, Oromia Region, 2007

Suspension Type Bridge (N-type): suitable for flat river banks. This type of bridge is selected only when the Suspended type bridge is not feasible due to insufficient free board. It has an upward cambering walkway. Its cables are anchored into the main anchorage foundation at both banks. This bridge is more expensive (50-75% than Suspended) and more complex in survey, design and construction than the D-type bridge. Example of N-type bridge is shown below.

Endamayno Suspension Bridge, Tigray Region, April 2010

5.1 The Helvetas Experience

5.1.1 Helvetas Nepal-Trail Bridge Support Unit

In Nepal, bridge building is fully decentralized to Local Governments in conformity with a national policy referred to as the “Trail Bridge Strategy” within the Local Infrastructure Development

Policy (TBS/LIDP). All norms, standards, technologies, management procedures (including procurement) are laid down in manuals that form the core of the TBS/LIDP. “Good Governance” is a major principle of the TBS/LIDP, implying that Local Governments are facilitators and they must delegate the work to communities for Short Span Trail Bridges (SSTBs) and to the private sector for Long Span Trail Bridges (LSTBs). Furthermore, in the event of SSTBs, Local Governments are to contract a capacitated local NGO to assist the Communities. The TBS/LIDP and its 16 Manuals represent 40 years of Helvetas’ trail bridge experience in Nepal. Over 3,380 trail bridges have been built to date of which 2,475 tail bridges have been constructed through support of Helvetas Nepal. Currently over 200 community trail bridges are built annually. The trail bridges serve approximately 10 million people, which is nearly one-third of the 29 million population of Nepal. Currently, multilaterals too fund the construction of trail bridges through Local Governments. Helvetas Nepal provides the know-how (“Capacity Building”) to the Local Governments through 34 Educational Institutes (EIs) comprising 4 Universities, 5 Colleges, and 24 Vocational Schools. Furthermore, Helvetas Nepal coaches the lesser experienced Local Governments and provides Technical Assistance on request.

5.1.2. South-South Collaboration (Nepal-Ethiopia)

Helvetas, as part of knowledge management and dissemination strategy among its country programmes, launched South-South collaboration between Helvetas Nepal and Helvetas Ethiopia. The collaboration is founded on the transfer of trail bridge technology know-how from Nepal to Ethiopia. With this collaboration, trail bridge experts of Helvetas Nepal have provided valuable support to Helvetas Ethiopia personnel in the form of technical assistance (coaching, mentoring, advising, guidance, etc). Such support has been given by visiting Ethiopia or working on specific issues for Helvetas Ethiopia in Nepal. The collaboration has contributed to the construction of trail bridges and the training of Ethiopian personnel on trail bridge project cycle management. Learning from lessons and further practice are ongoing to achieve excellence. The collaboration between Helvetas Nepal and Helvetas Ethiopia continues to remain the cornerstone of trail bridge project implementation in Ethiopia. The outcome of the collaboration in Ethiopia is outlined below.

5.1.3. Helvetas Ethiopia

Pilot Trail Bridge Project Implementation (2003-2007): Based on the most contemporary support model implemented in Nepal, a successful modest kick start was launched in Ethiopia in 2003 which has led to the completion of 13 foot-bridges (from 2003-2007). Apart from the construction of 13 trail bridges, local capacity building in the form of on-the-job training has been given for two engineers, twelve technicians, one foreman and one social worker. The lessons learnt from the pilot trail bridge project implementation in Ethiopia led to the launch of a national trail bridge programme.

National Trail Bridge Programme (2008 to date): The successful achievement of the 2003-2007 pilot project on one hand, and the severity of crossing problems in rural areas on the other, trigged high demand for scaling up of the trail bridge programme at regional/national level. To this effect, a three-year Memorandum of Understanding (MoU) was signed in May 2008 between Helvetas Ethiopia and the Ethiopian Roads Authority for the construction of pedestrian bridges and building of local capacity in Ethiopia through South-South collaboration (Ethiopia-Nepal). The subsequent Phase I of the Trail Bridge Project resulted in the construction of 9 pedestrian trail bridges within the Ethiopian Rural Travel and Transport Programme (ERTTP) pilot Woredas of Tigray, Amhara and SNNPR (October 2009 to April 2010). The construction of 4 pedestrian bridges in Gambella Regional States will kick start in November 2010. In total, Helvetas Ethiopia has constructed 22 pedestrian trail bridges under two major projects.

Achievements:

- Better visibility and recognition of the importance of trail bridges by Federal, Regional and local governments and communities

- Co-financing of trail bridge projects by regional/local governments using donor allocated funds
- Building on existing decentralized structures: Regions, Zones, Woredas, communities (partnership established) e.g. ERTTP
- Integration of trail bridge specifications, manuals & drawings into National Standards
- Successful South – South transfer of trail bridge technology from Nepal to Ethiopia
- Knowledge, skills & experience gained by Helvetas Ethiopia trail bridge team through facilitating technology transfer and adaptation to local context
- Capacity building through learning by doing
- Significant improvement of livelihoods of rural communities.

Lessons Learnt (2003 to date):

The lessons learnt from the trail bridge project implementations in Ethiopia are summarized below.

- Though the technology was new to the communities and local authorities, the bridges constructed are highly welcomed by the users enabling them to get access to social and economic service centres, triggering increased demand
- Continuous, more systematic and coordinated capacity building support efforts are needed to improve the technical know-how and ensure a champion at national and regional levels
- The importance of meaningful community participation for full ownership of communal assets has been clearly observed during construction and ultimately at post construction. However, participatory planning, monitoring, and evaluation should be reinforced through a bottom up approach.
- It is imperative that local governments pay for the construction of trail bridges using national or donor allocated funds
- Considering the very low level of road infrastructure development in Ethiopia and the very high construction price of roads and bridges for motorized vehicle in such areas with very rugged terrain, the suspended trail bridge technology could be an important complement to the country's endeavours in providing basic access infrastructure to rural communities
- The use of a decentralized framework of government structures for construction and building institutional capacity of RRAs and Woredas will yield better results but needs clear and systematic support
- Active collaboration with other actors in the sector and creating synergies is fundamental for successful trail bridge project implementation
- As a means to ensure long term sustainability, clear maintenance handling systems, transfer of know-how and building the capacity of local institutions and private sector operators is essential.

6 Project Framework

6.1 Goal

The goal of the trail bridge project is to contribute to the improvement of livelihoods of rural communities through enhanced access to socio-economic service centers.

6.2 Objectives

The objectives of the trail bridge capacity building project are to:

a) enhance rural mobility through construction of pedestrian trail bridges

b) build capacity of local personnel on trail bridge technology so as to plan, construct and manage trail bridge projects.

6.3 Outcomes

The major outcomes of the project are two-fold:

Outcome 1: Rural communities have improved access to socio-economic service centers

Outcome 2: Capacity of local institutions to plan, construct and manage trail bridge technology developed and utilized.

6.4 Outputs and Major Activities

Output 1: Construction of pedestrian trail bridges

Major activities related to this output include: reconnaissance, detail survey, and design of bridges; organize cables and bulldog grips; fabrication of steel parts, User Committee (UC) formation, and training; conduct social auditing of the entire process and provide regular feedback to UCs, Woredas, RRA and ERA; collection of local materials (stones and sand), and portering of "non-local" [1] materials" to the sites and undertake construction works.

Output 2: Construction technicians are trained on trail bridge technology

Major activities related to this output include training of personnel on trail bridge technology including Engineers, Technicians and Bridgecraftspersons on theoretical and on-the –job training including site identification, survey, design, costing, holding community meetings, conduct baseline studies, coach and monitor fabricators.

Output 3: Increased social inclusion and empowerment of communities

Major activities related to this output include formation and strengthening of an inclusive Users Committee (UC) and Bridge Maintenance Committee (BMC); providing executive posts to women within UCs and BMCs; conduct social auditing of the entire process, etc.

7 Approaches

a) **Trail Bridge Technology Transfer (through South-South collaboration):** the trail bridge technology know-how accumulated in Nepal will be systematically transferred to Ethiopia, to enable bridges to be built by the Trail Bridge Project of Helvetas Ethiopia initially and finally by Rural Roads Authorities and Woredas who will gradually take over. The Trail Bridge Project Office of Helvetas Ethiopia will facilitate the transfer of know-how from Nepal to Ethiopia. The Helvetas Nepal trail bridge technology experts will provide backstopping services dased on demand and prior human resource requirements.

b) **Social Engineering:** creating local initiatives and commitment requires rigorous efforts through social mobilization. Ownership is built through a bridge request coming from the community itself and to a certain extent through contribution of labor. Participation of communities and social inclusiveness will be observed as essential prerequisites to ensure equity, wider participation and ownership of the bridge, which can also lead to diffusion of conflict situations.

c) **Learning by doing:** construction of trail bridges in tandem with capacity development through on-the-job training

d) **Demand creation/Demand driven support:** project implementation will be based on collectively identified needs of RRAs, Woredas and communities. The programme will work in response to commonly agreed needs. At times of pressing demand for pedestrian trail bridges, with no knowledge of trail bridge technology as a solution for rural crossings, a supply driven (demand creation) approach shall be used through promoting the technology with the users.

e) **Types of bridges to be constructed:** considering the short construction time, cost and impact, Short Span Trail Bridges (SSTB with span less than 120 meters) and Suspended (D-type) bridges.

[1] "Non-local" materials refer to materials not available in the vicinity of the site. Cables, bulldog grips, steel parts and cement usually fall in this category.

f) **Mainstreaming of good governance principles while building pedestrian bridges:**

- **Participation:** active, free, effective and voluntary participation in decision-making; decision ought to be taken in a transparent way.
- **Equity and Inclusiveness:** inclusion of all groups of the community, especially the most vulnerable as well as equal sharing of benefits and burdens. Bridges, as a public good, do not exclude anyone from using them.
- **Transparency:** all project operations and processes will be recorded in a structured "Project Book" enhancing transparency from technical, social, materials-handling, financial, and administrative perspectives. In addition, Public Hearings, Public Reviews and Audits will be conducted to ensure accountability and enhance transparency.
- **Efficiency and Effectiveness:** the trail bridge projects produce results that meet the needs of the community while making the best use of the resources at their disposal.
- **Accountability:** accountability will be ensured in two directions: (i) to the financers of the project at higher level and (ii) to the beneficiaries of the bridge
- **Incorporation of other cross-cutting issues:** mainstreaming gender, occupational safety and creation of awareness on HIV/AIDS, do-no-harm, etc during the bridge planning and construction process.

8 Project Partners

Recent trends in rural development thinking emphasize decentralization, devolution of power and a participatory approach to development project implementation. The result of such trends is that greater responsibility has been placed on local authorities, local organizations, and communities themselves. Improving access in rural areas is a multi-stakeholder issue, which has to be addressed effectively through the coordination and integration of the effort and resources of various stakeholders at various levels.

Effective multi-stakeholder programme implementation requires identification of partners and clarifying their respective roles and responsibilities. The direct partners of the trail bridge programme are ERA, DFID Ethiopia, Rural Roads Authorities of Tigray, SNNPR, Gambella and Amhara, Woredas and user communities of prospective bridges. In addition, the private sector will be involved in steel component fabrication and provision of logistical services. Indirect partners include sectoral ministries and Regional Bureaus that will contribute to the smooth running of the programme. The major roles and responsibilities of the different partners shall be specifically elaborated and outlined during preparation of the project document and/or project agreement. Major roles of partners are described below.

Ethiopian Roads Authority (ERA): Facilitates the integration of trail bridge technology in the federal and/or regional rural travel and transport sector policies and national standards.

Rural Roads Authorities (RRAs): Inform and update their Board on major trail bridge project planning and implementation progresses; provide support to Woredas in the prioritization of bridge sites; incorporate/update trail bridges in the Regional Master Plans or Woreda Integrated Development Plans; take part in joint project planning, review reports, and monitor progress.

Woreda Administration Offices: The Woreda Administration Offices are the highest decision making bodies regarding the endorsement of the specific trail bridge locations in respective Woredas. However, the Administration Offices may delegate tasks and responsibilities to the other relevant sector office in the Woreda as appropriate. The Woreda Administration Offices shall make decisions on issues related to right-of-way of the specific site assigned for bridge construction and decide on ownership of a bridge linking two or more linking Woredas. The Woreda Administration Offices will settle disputes between Woredas/communities if the subject of ownership of trail bridges arises and will facilitate inter-sectoral administrative and logistical support.

Users Committees (UCs): Communities are the end users of trail bridges. Hence, they will be actively involved right from the planning to implementation stages. In order to handle community matters, User's and Bridge Maintenance Committees shall be formed. Depending on the context, communities may contribute local materials in kind. In-kind contribution can be in the form of labour, collection of sand, gravel, etc. from nearby locations.

9 Organization of the Project

Helvetas Ethiopia, as a lead implementing agent, has solid management and coordination competencies. The field level operational works shall be handled by Regional Trail Bridge Project Teams. The Regional Teams will be steered by Helvetas Ethiopia core management team which is based in Addis Ababa. The Regional Team comprises qualified and experienced Ethiopian professionals including a Regional Team Leader (Engineer) and a Trail Bridge Construction Foreman to be stationed at each site. A Logistic Officer will provide the required social, logistical and other administrative support.

The overall Trail Bridge Project team will be strengthened and backstopped by expertise knowledge and skills of Nepali trail bridge experts. The Nepalese experts will come to Ethiopia at different times to provide backstopping inputs. All of their performance and travel costs have been taken into account and will be covered by the project.

The respective Woreda Road Desks and User Committees will collaborate and will be involved in the planning, scheduling and implementation of the project. Such a project organization is expected to achieve a high level quality standard of project implementation.

Our leading strategy, as a means ensuring the sustainability of the project, is to build local human resource capacity through recruitment and retention of competent Ethiopian professionals and laying down effective systems for the transfer of knowledge and skills from Nepal. The Trail Bridge Project Main Office shall be hosted in the Helvetas Ethiopia Addis Office and will provide all necessary support to the Trail Bridge Project Regional Teams.

10 Project Monitoring & Evaluation

Regular monitoring and supervisory field visits will be undertaken by the Project Management staffs and these will be used to improve the quality of trail bridge construction work and other project activities. It will help to ensure that any problems are identified and dealt with at an early stage before they can affect project implementation. In addition, the following meetings, workshops and activities shall be held at the indicated frequencies: (a) Project monitoring meetings with RRA (frequently) (b) Internal assessment workshop (at final stage of construction) (c) External review and financial audit (annually).

As part of documenting lessons learnt from project activities, the following documents shall be prepared by Helvetas Ethiopia: (a) Operational Plan (b) Progress Review Report (c) Internal Evaluation Report (d) Final Completion Report (e) Post-bridge Building Assessment.

11 Overview of Estimated Project Cost

The financial resources required to implement the project shall be made available from financial contributions of project donors, development partners and Helvetas Ethiopia. The cost estimation for major construction inputs is done based on market prices prevailing at the time of preparation of detailed bill of quantities and cost estimation. Hence, in the event of major price escalations (>15% of the estimated budget), the project budget will be revised accordingly.

Major cost centres of a typical trail bridge are the following:

a) **Direct trail bridge construction inputs:** includes feasibility studies, technical survey, design & cost estimate preparation; direct cost of construction materials & road transportation as well as direct labour for construction.
b) **Trail bridge technology transfer (Nepal to Ethiopia):** performance , travel, subsistence and accommodation cost of backstopping mission by Nepali trail bridge experts.

c) **Project management and supervision:** vehicle running cost, communication, supervision and coordination.

Bridge Type	Suspended (D-type)	Suspension (N-type)
Span (meters)	85	85
Cost Description	Cost (US$)	Cost (US$)
1. Preparatory work: feasibility study, survey, design / cost estimate	4,000	5,000
2. Construction, materials: cables, bulldog grips, steel parts, cement, tools, transportation	40,000	50,000
3. Construction, labour: skilled, unskilled, foremen, driver, running cost	9,000	18,000
4. Capacity Building: south–south collaboration, social organization support, trainings etc	18,000	23,000
5. Management: coordination, supervision, monitoring (main office Addis Ababa)	18,000	25,000
Total Cost (US$)	**89,000**	**121,000**
Cost per meter (US$)	**1,047**	**1,424**

12 Project Time and Implementation

The construction of a typical suspended type bridge shall take a maximum of 4 months including all necessary preparatory activities. Major milestones of a typical trail bridge are categorized into three stages namely:

a) Planning Stage: Identification of Crossings; Survey, Design & Cost Estimate; Sand, Stone, Gravel etc. Mobilization; Procurement of Construction Tools & Equipment; Fabrication & Delivery of Steel Parts.

b) Construction Stage: Public Hearing (Community Meeting); Trail Bridge Construction; Public Review; On-the-Job-Training; Public Audit (Technical & Social Auditing); Final Inspection, Bridge & Document Handover; Formation of Bridge Maintenance Committee.

c) Monitoring, Supervision and Documentation: Project Monitoring & Evaluation (ongoing); Internal Evaluation Workshop; Documentation, Final Reporting, Planning for Next Project.

13 Challenges

- Cables & bulldog grips of the required quality are not available in local market
- Galvanisation of steel parts is either too expensive or there are very few companies that render the service in Ethiopia
- Top-down approach and unfeasible site selection
- Geographically scattered bridge sites resulting in logistical inconvenience and increased costs for coordination and monitoring
- Right-of-way (land disputes)
- Limited support from partners
- Lack of availability of local materials as per required quantity & quality
- High staff turn over within the Helvetas Ethiopia project team
- Limited financial base and funds availability for programme extension.

14 Elements Contributing to Sustainability of the Project

The critical factor required for sustainability of the project and its benefits is continued government commitment at the highest level with support to the project and to sector policy and institutional reforms. The following actions will contribute towards the sustainability of the project:

a) **Enhancing Local Capacity:** Strengthening the institutional and organizational capacity of Woredas and road agencies is essential for ownership and sustainable implementation of the trail bridge project.

b) **Institutionalizing the Trail Bridge Technology:** In subsequent phases, the trail bridge technology will be anchored within the training centres of ERA for training many trail bridge experts who can mange such projects and provide services on a fee basis.

c) **Private Sector Involvement:** Involvement of private sector (SMEs, metal workshops, educational institutes and bridge part fabricators, etc.) for the implementation and management of trail bridge projects contributes to continued and diversified quality service delivery.

d) **Integration into Sector Policies/Strategies:** Trail bridge project implementation is aimed at solving rural crossing problems and is designed to fit into the decentralized structures of local authorities both at Federal and Regional levels. The integration of the technology in the rural development sub-sector policies can ensure ownership by the local government bodies and management of trail bridges as part of their daily routines.

e) **Increased Demand:** As trail bridge technology is appropriate and meets local needs and conditions, the demand will increase and more partners take part in this intervention.

f) **Maintenance:** Subject to periodic assessment of bridge conditions, Routine and Major Maintenance will be carried out by the Bridge Maintenance Committees and local authorities, respectively. Routine Maintenance includes cleaning of bridge parts from debris, tightening of nuts and bolts, cleaning the debris and re-fixing the dry stones. Major Maintenance includes changing the walkway deck, the crossbeams, and the wire net and the maintenance of the foundation walls. Major Maintenance will be less necessary and could be postponed if routine maintenance is done properly and regularly, thus saving a lot of money. Hence, incorporation of maintenance issues in the project implementation will contribute to the safety and long-term usability of the bridges.

g) **Environmental Safety:** The project will have a positive contribution towards environmental protection through minimizing cutting of scarce forests for temporary crossing purposes.

15 The Outlook

In the next 5-10 years, the trail bridge capacity building project plans to achieve the following:

- Continue to be a national programme with a regional approach focusing on trail bridge construction and capacity building components
- The Nepal versions of the trail bridge technology manuals, drawings and specifications will be adapted to the context of Ethiopia and integrated into national standards, sector policies and programmes
- There will be a trail bridge technology centre of excellence in Ethiopia which will provide services to other African countries using its qualified local trail bridge personnel who are capable of managing the trail bridge project cycle in Ethiopia and Africa
- The capacity of Small and Medium Enterprises (SMEs) will be strengthened and will fabricate steel parts at an acceptable level of quality
- Trail bridge technology will be integrated into Educational Institutions such as Technical, Vocational, Education and Training (TVET) colleges
- Establish a solid community-based and demand driven trail bridge programme with support from private contractors and consultants.