



CRIDF 

Designing, financing and delivering climate resilient infrastructure that contributes to socio-economic investment and poverty reduction in Africa

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1.1 Introduction

The Climate Resilient Infrastructure Development Facility (CRIDF) is an official SADC Programme funded by the Department for International Development (UKAid) working to provide long-term solutions to water issues that affect the lives of the poor in Southern Africa. It undertakes its programme in shared river basins improving the resilience of communities and taking into consideration issues of gender and social equity. CRIDF supports the Southern Africa Development Community's (SADC) developmental agenda. The programme therefore, aims to provide climate resilient infrastructure to guarantee access to safe and sustainable water supply, while also promoting synchronised development across the borders and fostering regional cooperation.

This paper presents two case studies from CRIDF's portfolio (SADC Border Posts Water Supply Programme and the Livelihoods and River Protection suite of projects in Zimbabwe). These case studies highlight the general principles CRIDF is learning in financing and delivering transboundary infrastructure covering water resources management, livelihoods, water supply, sanitation and hygiene (WASH) in the SADC region that could assist Consulting Engineers to align and contribute to Africa's infrastructure and development vision.

General Principles

It is CRIDF's and the author's experience that there is a huge demand for infrastructure projects in the SADC region – indeed infrastructure is a huge bottleneck to regional integration. There is an equally high number of potential funders for such projects. A lot of these projects, however, exist more as project ideas as opposed to bankable project documents. With climate change impacts becoming more pronounced, the design for climate resilient infrastructure has become fundamental for sustainability. The design of such infrastructure in predominantly rural settings has its own challenges. The following principles and approaches have been found essential in promoting bankable and sustainable infrastructure provision:

1. Climate proofing water supplies: whether the science of climate change is as yet fully understood or not, one certainty seems to be that extremes have become more prevalent. Droughts and floods are more frequent and more severe. In most parts of rural southern Africa, rainfed agriculture is failing every 3 to 5 years. In most of these cases crop failure is due to in-season dry spells, including seasons where the total precipitation is considered normal. In the design of water supplies, water resource assessments are no longer optional. Most of these rural areas are ungauged. Modelling techniques have to be employed to estimate the adequacy of such water sources, especially during low flow seasons. Besides this, resistance to damage by extreme floods is now a critical factor to be included in the analysis.
2. Financial and Economic Assessments: Small projects require as thorough financial and economic assessments as large ones. Too often there has been a tendency to not treat small projects with the same approach. This has led to prevalent failures of

such projects, especially after the 'donor' has left. The feasibility of most small projects is generally enhanced when the Capex is a grant, but their recurrent Opex must be fully covered by revenue streams. It is crucial that regardless of whether the project is in some deep rural area or urban, whether for the poor or for the not so poor, a maintenance regime, fully funded from revenue streams, is built in at handover. Using economic factors to justify the importance of the project, for example time saving, is important, but these factors need to be used to improve the financial growth of the community to ensure sustainability.

3. Power supply: Solar power costs have significantly dropped over the last few years. Most national grid systems are either unstable, unreliable and / or are generally expensive. While solar may have high capex, it almost always works out cheaper on a whole life basis. Projects targeting poverty alleviation must be such that they minimise opex requirements, especially where a capex grant is available.

1.2 The Cross-Border Water Programme

SADC has prioritised various transport corridors shown in figure 1 below, due to the current logistical transport challenges within the SADC region (large distances, land locked countries, non-integrated rail infrastructure, delays at border posts, complicated and differing administrative procedures). These challenges impact negatively on intraregional trade and industrialisation.



Figure 1:

Map of Southern Africa indicating the major transport corridors

A particular focus along these transport corridors is the efficient operation of the border posts, including construction of One-Stop Border Posts (OSBP) with harmonised standards and procedures. The SADC border post strategies have been described in the SADC Regional Infrastructure Development Master Plan (RIDMP, 2012). However, the strategies have been focussed on the transportation aspect of the projects and have not specifically looked at water supply and sanitation aspects.

Border posts throughout the region have experienced a marked increase in population, as people are attracted by the economic opportunities around the border town. If it is considered that, the improvement of transportation infrastructure will increase trade and travel between countries, it can be accepted that the number of entrepreneurial traders at

border posts and other stopping areas along the transport corridors will increase. The pressure on water and sanitation infrastructure, which has already been enormous, exacerbated by economic challenges, reduced institutional capacity and climate change, will only increase. The deteriorating water and sanitation infrastructure situation at the border posts will lead to increased hygiene and waterborne disease risk. Therefore, to ensure the success of transport corridor improvement strategies, it is critical to consider water supply and sanitation rehabilitation and expansion at these border posts. A similar approach must be taken in the provision of holistic infrastructure planning in the development corridors.

CRIDF's Cross-Border Water Programme is aimed at complementing transportation infrastructure projects that have been identified and prioritised in the SADC Regional Infrastructure Development Master Plan with water and sanitation infrastructure. Insufficient infrastructure is likely to lead to increased risk of waterborne diseases, which unfortunately know no political boundaries and carry heavy social and economic burdens. It is therefore imperative that transportation improvement strategies include water supply and sanitation rehabilitation and expansion, together with other key infrastructure.

Through the CRIDF cross-border water programme, 20 key border posts that are within the prioritised SADC transport corridors have been identified in liaison with SADC and the Transport Corridor Secretariats. The CRIDF programme involves screening of SADC prioritised border posts for eligibility against the criteria of addressing poverty issues, climate resilience and taking into consideration regional integration issues. The prioritisation is done through a multi-criteria process taking into account SADC

prioritisation of the corridors. It is pertinent to note that the North-South Corridor and Beira Corridors have been prioritised for development. Eligible projects are taken forward for scoping (pre-feasibility) after which prioritisation will take place and the top priority border posts will be prepared for bankability on the basis of need. CRIDF will consider funding construction of a small number of sample projects from those reaching bankability and these projects will proceed to Financial Closure and Implementation. The rest of the projects will then be packaged into a suite that can be attractive to a DFI for funding. Packaging together a number of small projects across several border posts into a programme provides economies of scale and creates a sizeable work programme that is more attractive to funders. CRIDF has provisionally prioritised twelve (12) border posts projects for potential construction. CRIDF has invested in four border town WASH projects as a 'proof of concept' in joint planning and construction. The Mwami – Mchinji (Zambia – Malawi) border posts WASH infrastructure was jointly constructed by one contractor, contracted through a Zambian utility with full delegation from Malawian authorities. The joint use of one contractor resulted in significant value for money savings for both countries.

Lessons learnt

The following lessons and principles have been learnt from the work that CRIDF has supported:

1. Engineering, and hence Consulting Engineer's, is an important part of promoting synchronised and equitable development across borders and throughout Africa,
2. While the improved water and sanitation for these border towns is a principal aim of the programme, the cross-border nature of delivering the work offers substantial opportunities to foster collaboration, exchange technical knowledge and skills, and

develop best practices for implementation and management across countries. In addition, cross-border construction using one contractor, although with its own challenges, can provide cost and time efficiencies, while engraining collaboration and equitable infrastructure delivery.

3. Working groups that bring together key stakeholders are crucial for success. In the case of the cross-border water programme key stakeholders are from both sides of the border, which can serve as platforms for future cooperation in WASH activities between the countries. In addition, by ensuring that infrastructure development is equitable on both sides of the border, the risk of transboundary transmission of waterborne diseases is reduced, along with any associated political tensions. This also avoids the risk of border disruptions or closure due to outbreak of waterborne diseases.
4. The success of the project will enhance wider cooperation between SADC Member States. The cross-border nature of the projects will initiate dialogue and cooperation of the countries involved and provide a platform for future cooperation in WASH and other critical sectors' activities.
5. Regional integration through trade facilitation is the highest priority of SADC and supporting infrastructure development in transport corridors aligns to achieving the Africa free trade area vision.
6. The identified border towns are key emergency relief routes and hence their access to adequate water and sanitation facilities is important in the implementation of the emergency relief plans.
7. Border posts serve as an important hub for a significant number of informal traders and entrepreneurs who seek to improve their economic fortunes. The provision of

water and sanitation facilities will benefit this group, particularly women who constitute the bulk of cross-border traders.

1.3 Enhancing livelihoods and River Protection in Zimbabwe

In 2013, the Zimbabwe – Mozambique Save River Basin Joint Integrated Water Resources Management Strategy, was launched. One of the components of the Strategy was implementation of Community Based water Management Projects (CBMPs) whose aim was to fight poverty through investment in community water projects. High population densities, coupled with erratic harvests from failed rain-fed agriculture, have forced most rural populations into streambank cultivation. This practice has exacerbated erosion that has silted most water bodies. Provision of an alternative to stream bank cultivation would concomitantly result in protection and sustainable management of water resources.

CRIDF prioritised investment in projects that demonstrated proof of concept in small-scale water infrastructure that provided relief to stream bank cultivation while providing alternative sustainable livelihoods.. Three projects were identified and implemented:

1. The 28 ha Kufandada Irrigation and River Protection Scheme in rural Bikita District. The scheme is set up to directly benefit a rural Hospital serving 40 in-patients, 80 maternity deliveries a month, up to 15,000 out-patients per year, and three villages with 120 households, with potential secondary beneficiaries through employment of non-resident people. The hospital's is one of four main health centres in the district of almost 200,000 people.
2. The 34 ha Bindangombe Climate Resilience and Irrigation Scheme in Chivi District. Chivi is among Zimbabwe's driest and climate vulnerable districts in the country. The scheme is for the benefit of ten villages with 300 households and two schools, with potential secondary beneficiaries through employment of non-resident people.

3. The Ntalale Rural Service Centre Water Supply Project in Gwanda District, which is in one of the most arid regions in Zimbabwe. This project was an opportunity to rehabilitate and adapt an existing system which had collapsed as a result of Cyclone Eline in 2000. It involved installation of boreholes in the Thuli River bed which had fully silted; submersible pumps powered by a solar power station; the cleaning of an existing reservoir; and the rehabilitation of a distribution network. The rehabilitation has benefitted the community including the local clinic, small business centre and the Zimbabwe National Water Authority.

The key infrastructure components of these schemes comprised:

1. Hydrological assessments of ungauged small rivers. This resulted in the construction of a weir on the river at Bikita while river bed boreholes provided relatively better quality water at Gwanda. The choice of location and engineering designs incorporated factors of safety against flood damage as had frequently happened in the past. A number of hand augur investigations indicated the high yield well locations.
2. To avoid the risk of further siltation and loss of water resources, catchment protection was built into the design and implementation of the schemes.
3. In the irrigation schemes, water application efficiency as well ease of use and maintenance directed water application technology.

The schemes further required that the communities committed to sustainable environmental management practices; chief among them is giving up their stream bank gardens. In addition, the schemes will assist in the restoration of riverine ecosystem services that will serve to restore habitats for the Save River Basin environmental reclamation initiative.

Lessons learnt

The following lessons and principles have been learnt from the work that CRIDF has supported:

1. Sustainable engineering design techniques are critical to successful project implementation. Project life cycle costing, which includes the operational costs, should be used to determine the preferred solution.
2. In the case of community based infrastructure schemes, having a Constitution managed by an elected Irrigation Management Committee was important. This must provide a platform and mechanism for dispute resolution.
3. Sustainability is key for water infrastructure. In the communities described above, the communities will own the infrastructure and they will be responsible for its operation and maintenance. An “Operation and Maintenance Fund” has been created (as stipulated in their Constitution) by the communities, which will fund all running costs and other incidentals associated with maintenance of the infrastructure.
4. Climate change will affect the most vulnerable and poor members of the population. Providing climate resilient water infrastructure will therefore have the largest impact on the poor.
5. Renewable energy plays a critical role in rural settings, particularly where communities are far from the national grid, and where there is unreliable and inadequate power supply. Solar energy makes the scheme more resilient by removing the risks of grid power shortages, which mainly come from the climate change threatened hydro power and fossil fuelled plants.
6. In each of the irrigation schemes, it is advisable to keep the smallest plot at no less than 0.2 ha per household, with 0.3 – 0.4 ha being ideal. These schemes must be

linked to markets or agribusiness that ensures uptake of the produce and hence revenues for the households. Aiming only for subsistence food security is no longer adequate and sustainable, and by providing surplus for markets can reduce poverty, provide savings to deal with climate change challenges and eliminate the environmental degradation cycle.

7. In Zimbabwe, the projects have been acclaimed as 'proof of concept' that has now influenced SADC and the Zimbabwean authorities to package 50 similar sized projects for application for co-funding to the Green Climate Fund. This is meant to be a transformational program of basin-wide projects that seek to restore the poverty ravaged Save Basin while improving livelihoods. CRIDF's projects were thus designed as a small action with global impact.

1.4 Conclusion

In conclusion, the projects highlighted above promote equitable and sustainable utilisation of water for social and environmental justice, regional integration and economic benefit for present and future generations. The projects also demonstrate that when trying to look for solutions, proof of concept and up-scaling is important for greater impact on the continent. Within CRIDF, packaging projects into programmes in an effort to attract finance is key, as increasingly investors are looking to finance scalable solutions. The role of the Consulting Engineer is no longer reactive. In order to rise to the infrastructure challenges within the region, Consulting Engineers need to identify opportunities and drive the implementation of targeted appropriate solutions in a holistic sustainable manner.

