CRIDF

Case study:
Incomati Basin

MARCH 2018

INVESTING IN FLOOD RISK MANAGEMENT REDUCES FLOOD VULNERABILITY AND BUILDS CLIMATE RESILIENCE

The role of public-private partnerships in managing flood risk in the Lower Incomati Basin

The Climate Resilient Infrastructure Development Facility (CRIDF) catalysed a public–private partnership to manage floods in the Lower Incomati Basin. The aim is to deliver economic benefits to all Basin inhabitants and to reduce the vulnerability of poor communities. The approach taken was to encourage a switch from flood avoidance to flood risk management. Given the capacity and budget constraints in the public sector, flood risk management promises to be more sustainable than flood avoidance. Presenting infrastructure options for managing floods developed by hydraulic modelling enabled CRIDF to facilitate a basin management committee including large sugar estates and, with the cooperation of Mozambique, Swaziland and South Africa, to pilot an early warning flood forecasting system for the entire Basin which can benefit over 250,000 people in Mozambique.

The Incomati Basin spans 49,000 km^2 across South Africa, Swaziland and Mozambique. In recent decades, the Lower Incomati Basin, covering 14,900 km^2 in Mozambique, has been flooded more frequently than would have been expected from historical records. For instance, the floods that occurred in the three consecutive years of 2012, 2013 and 2014, attributed to climate change, would not have been expected more than once in five years. Sugar estates have incurred substantial losses, and smallholder outgrowers, subsistence farmers and local communities have suffered considerable hardship. Engaging both the public and private sector has steered the approach to floods away from avoidance towards risk management.

This shift will significantly improve the resilience of everyone in the Basin to the more frequent flooding predicted.

THE CHALLENGE

The main economic activities in the Lower Incomati Basin are commercial sugar farming and sugar production. The main estates, Tongaat Hulett at Xinavane and Illovo Sugar at Maragra, have responded to more frequent floods by protecting and isolating flood-prone areas on their estates – building dykes and flood embankments, excavating channels and diverting water courses. In contrast, outgrowers supplying the sugar companies from their smallholdings, as well as local communities, are often very exposed to floods.

Until 2014, the measures put in place by sugar companies to prevent cane fields being flooded were largely uncoordinated and reactive, and were undertaken without considering or understanding the overall hydrodynamics of the floodplain. As a result, these measures may have exacerbated the risk of flooding in some areas, may have adversely affected the wetland system and may have lengthened inundation periods, thus transferring the negative impacts of floods to vulnerable households.

ADDRESSING THE CHALLENGE

CRIDF, responding to a request from Illovo Sugar for help to lessen the vulnerability of outgrowers to flooding, championed a collaborative approach – engaging and convening business, government and civil society – to manage flood risks in a holistic way. CRIDF:

- modelled flood events in the Lower Incomati Basin using detailed topographic and light detection and ranging (LIDAR) data and determined flood risk management infrastructure options;
- analysed socio-economic data and information from interviews with demographic groups;
- analysed the costs and benefits of infrastructure options;

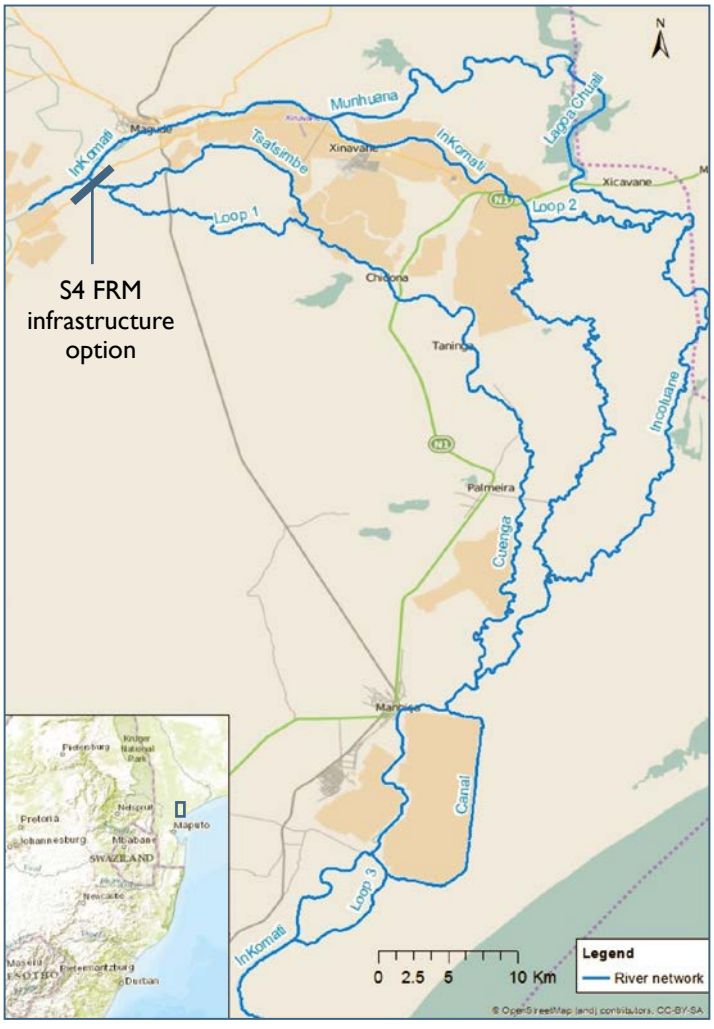

Figure 1a: Lower Incomati showing water courses and the proposed flood risk management infrastructure (flood embankment with sluice gates to control flood and environmental flows)

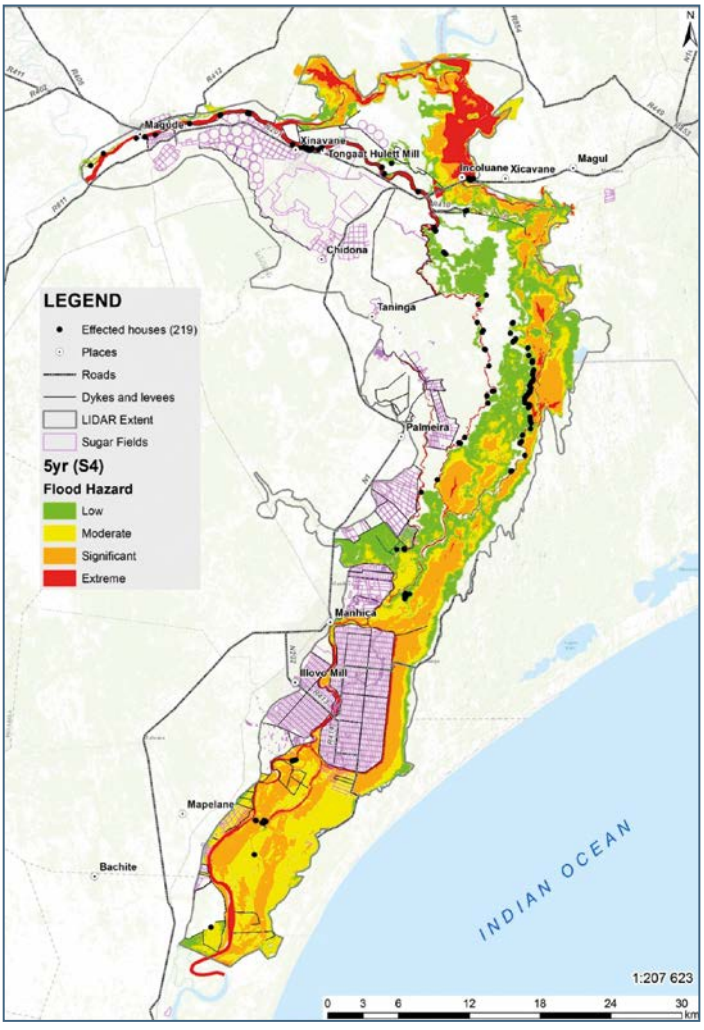

Figure 1b: Lower Incomati River Basin flood hazard map for a 1-in-5-year flood event with the proposed flood risk management infrastructure

- established and facilitated a Memorandum of Understanding for a Lower Incomati flood risk management steering group (involving the private and public sectors);
- secured financial and technical support from the private sector; and
- developed an Incomati Basin real-time flood forecasting system involving the riparian member states Mozambique, Swaziland and South Africa.

Modelling flood risk for practical purposes

CRIDF used flood risk modelling data and scenarios to stimulate collaboration and catalyse a shift to collective flood risk management. This involved improving existing information with detailed topographic and LIDAR data and developing detailed flood risk models geared to practical planning. The models were used to illustrate different flood scenarios; sharing the results among stakeholders improved communication and enabled them to identify infrastructure options to manage flood risk.

Moving towards collective flood risk management

To manage and discuss the results of the modelling, CRIDF, as an independent party, encouraged the establishment of a steering committee. Chaired by the government body managing river operations, the Mozambique Regional Administration of Waters in the South (ARA-Sul), and with the participation of the Illovo and Tongaat sugar estates, the steering group has gained momentum. Over three years the committee has grown to include the National Road Administration (ANE), the Manhiça Local District Planning and Infrastructure Division and Electricity of Mozambique (EDM). The steering committee is now effectively a flood management committee for the Lower Incomati Basin – providing a notable example of how to grow a valuable water resources management institution. The steering committee asked CRIDF for technical assistance and to conduct several studies. One of these studies, a socio-economic analysis, helped clarify impacts on different groups in the Basin and led to a more collaborative, basin-wide approach to flood risk.

Developing an early warning and flood forecasting system

Building on the flood management approach, CRIDF developed a near real-time flood forecasting system that provides accurate and timely information for planning responses to floods. The system is publicly available at www.incomati-ewffs.org.

Analysing the costs and benefits of infrastructure

The CRIDF analysis of the costs and benefits of infrastructure options showed that investing in hydraulic infrastructure at the Tsatsimbe River fork would deliver significant benefits in the event of both 1-in-5-year flood events (floods that are expected to happen once in five years) and 1-in-10-year floods. Benefits for 1-in-5-year floods would be around US$5.5 million, while for 1-in-10-year floods they would be around US$12.1 million (net present values at 10% discount). This option would direct water into a natural lake in the eastern Incomati Basin, thus reducing flooding in the western part. The beneficiaries would not only be the large sugar estates and outgrowers, but also subsistence farmers, villagers and the Mozambican national roads authority ANE.

RESULTS OF THE INCOMATI FLOOD RISK MANAGEMENT PROJECT

Flood risk management became more collaborative

A major outcome of this project arose from *how* CRIDF carried out the work; taking time to consult with all affected groups catalysed collaboration and shifted stakeholders towards a collective view of flood risk management. This collective view was essential to stimulating shared responsibility and collaborative action.

Identified operational changes to reduce flood risks

Analysis of real-time flows showed that changes to the operation of the Corumana Dam and the proposed Moamba Major Dam could reduce the risk of floods in the Lower Incomati. The analysis indicated that there are several management options that could substantially lower flood peaks. Combining changes to the way dams are operated and better flood forecasting could significantly lessen flood damage in the Lower Incomati.

Shifted resources towards resilience

The flood modelling prompted Tongaat and Illovo to divert both their own resources and European Union funding away from building hard defences towards managing risk and strengthening resilience.

Improved early warning of floods

The analysis of the costs and benefits of an early warning flood forecasting system is important for garnering support from stakeholders, identifying potential owners and pitching a business case to potential funders. The pilot, near real-time, transboundary early warning flood forecasting system for the entire Incomati Basin indicated annualised costs of approximately **£700,000** in benefits for an annual operations and maintenance cost of £20,000.

Influenced change in private-sector flood management

The project showed that building relationships with the private sector can bring change: in this case to improve the resilience of smallholder sugar outgrowers to flood risks. Working with agribusinesses can influence their sustainability strategies towards an equitable distribution of risks and benefits.

Recognised opportunities to reduce vulnerability

The tool for assessing climate vulnerability developed during the project deepened understanding of vulnerability in the Lower Incomati. Site-specific and catchment-specific vulnerability assessments established that the vulnerabilities experienced by outgrowers are characteristic of vulnerabilities experienced by communities in the area. The opportunities for lessening vulnerabilities and building resilience include:

- diversifying cropping among smallholders;
- developing irrigation infrastructure;
- improving irrigation efficiency; and
- changing institutional or managerial arrangements among sugar companies.

ANE intends to use a model developed during the project to understand the impacts of flooding on roads, and to design roads and bridges to reduce annual maintenance and repair costs.

INVESTMENT OPPORTUNITIES

The project has opened investment spaces to improve flood risk management in Southern Africa. Smallholder farmer associations linked to sugar companies in the Southern African Development Community have thousands of members. Supporting sugar companies that are sensitive to flood risks offers significant opportunities to benefit smallholder households. Constructing and managing infrastructure in the Lower Incomati will also help to alleviate flooding, benefiting significant numbers of outgrowers, subsistence farmers and poorer flood plain inhabitants.

Institutional investments include:

- developing outgrower strategies for each area.

Technical investments include:

- developing recommendations for sugar companies to deal with climate risks affecting outgrowers, develop outgrower strategies and integrate outgrowers in corporate risk assessments.

Financial systems investments would involve:

- developing business plans for specific projects in each area.

The tri-sector approach to flooding – aligning objectives and sharing risks and benefits among sugar companies, public authorities and outgrowers – can leverage private-sector investment in water management. The project provided evidence that sugar estates should shift from flood avoidance to flood risk management. Focussing on managing risks associated with flood events that have more than a 1-in-10 chance of occurring in any given year will ensure that poorer communities are protected and will deliver significant economic benefits for all parties, particularly as a changing climate brings escalating risks.

250,000 people
in the Lower Incomati Basin will benefit from improved **flood resilience**

£4.7 million mobilised from **sugar companies** and **EU** to improve flood resilience in the Lower Incomati Basin

£20,000 a year **invested** delivers **£700,000** in **benefits**

Contact us

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