

Limpopo Basin Data Sharing and Early Warning Flood Forecast System (EWFFS)

Stakeholders in Mozambique Workshop 1st March 2017





Agenda

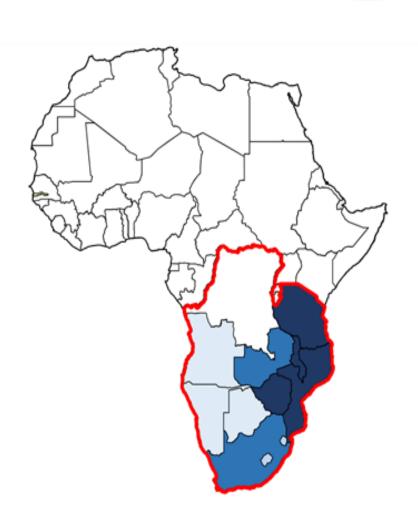
Introductions	08:00
Update on CRIDF Programme and CRIDF2	08:15
Recap on the project Progress to Date Project Implementation Plan (PIP) Economic Analysis of the EWFFS	08:45
presentation on how the EWFFS works	09:15
TEA BREAK	10:00
Agreement how to make the system operational (agricultural companies with government organisations)	10:15
Dates for training	11:15
Any other business	11:30





Update on CRIDF

- Climate Resilience Infrastructure Development Facility;
- ◆ DFID's water infrastructure support programme in Southern Africa, taking lead from SADC's vision commenced in May 2013. Programme finishes in March 2017. CRIDF2 due to commence from April 2017
- ◆ Delivering water related infrastructure in SADC Countries, building climate resilience for the poorer communities, needs to be sustainable
- Peaceful and climate resilient management of shared water resources in SADC for the benefit of the lower income communities: projects within the major river basins
- Approach is commencing with pilot projects expanding to a transboundary approach.





Tanzania Dar es Salaam **CRIDF** projects Some CRIDF Projects Bindagombe Irrigation 🎎 Kufundada Irrigation Ruhuhu Irrigation Scheme in Chibabava WASH and Flood protection Angola Zambia Kazungula Water Supply & Sanitation Malawi Chipata Water Supply & Chirundu Water supply & sanitation Cubango – Okavango River. Chipata Water Supply & Sanitation Chirundu Water supply Mozambique Mashili Small Dam Kazungula Water Supply. Metuchira Dam Zimbabwe Gorongosa dam Technical Assistance t... Bindagombe Irrigation Ruhuhu Irrigation Scheme Namibia Botswana Eastern Limpopo Small Ntalale Water and Sanitation Rehabilitati... Lastern Limpopo Small Dams Rehoboth Effluent Re-use Gaboro Regional (SADC) : Nontoria Maseru Water Demand Management Lower Incomati Flood R. Johannesburg Swaziland Nondvo Dam Project Rehoboth Effluent Re-use Limpopo Flood Monitoring (Botswana, M... 🌲 Mayana Community Climate Vulnerabilit... Durban www.cridf.com Maseru Water Demand Ma. | A & CCAP Sioma/Malombe Irrigation South Africa 🎎 CCAP Chikowa Irrigation **See About page** ? Google My Maps

Map data @2016 AfriGIS (Pty) Ltd, Google, ORION-ME Terms 200 km L

Makonde Water Supply Scheme



Project Objective

Establish a system to transmit **near real-time data** from critical flood flow monitoring points in the upper Limpopo and its tributaries in each LIMCOM Member State to a **central server**, and to establish a flood routing model to determine the **likely extent and timing of floods** at critical points downstream, especially in Mozambique.





Project Phases

- Phase I: Determine flow gauges, transmit flow data from rainfall runoff data / water level gauging stations in all four countries, predict likely extent and timing of downstream flooding
- Phase II: Secure financing for improved flow gauging stations, water infrastructure implementation (civil works rehabilitation of weirs)
- Phase III: Heightened awareness system, increase warning times for flooding to more than one / two weeks

The project is currently at the end of Phase I



Description of the Project Area: Site Selection & Model





Limpopo Basin 402,000 km²

Branch Name	Length (kms)
Limpopo	1509
Shashe	65
Bubi	148
Mwenzi	325
Luvuvhu	118
Oliphants 1	220
Oliphants 2	85
Total	2470

Pilot project

Mike Customise: EWFFS model

One node every 10 kms

River cross sections from 90m

resolution DEM

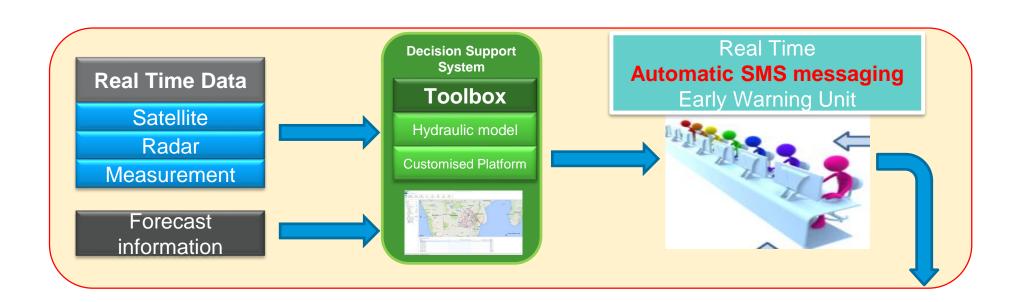
Model built

Flooding thresholds to be decided



Success Phase 1A: Early Warning Flood Forecasting System (EWFFS)

- The aim is when a water level threshold is reached in the EWFFS, text messages/ whatsapp message can be sent to key stakeholders
- ♠ Real time water level data loggers available in South Africa and Mozambique to use on the project
- EWFFS is ready for use operationally



Potentially maximum 10 days for flood warning



Completion: Phase IA

Foundation for CRIDF 2





CRIDF

LIMCOM FTT

DWA Botswana

ARA-Sul Mozambique DWS South Africa

ZINWA Zimbabwe

D01, D02

- Justification for the identification of Gauging Sites
- Options for ensuring sustainability and financing options

D03, D04

- Appropriate tele-transmission system
- Demonstration Workshop an flood warning system

D05, D06,

- Project Implementation Plan (PIP)
- Recommendation for LIMCOM FTT
- Final Activity Report

Strengthened relationships
RESILIM, GWP, LIMCOM,
Dutch International Cooperating Partners

SADC WD & LIMCOM FTT workshop

Procurement and Logger installation

LIMCOM FTT Workshop agree PIP



Socio-economic and financial analysis

Private Sector & Water Users Engagement

Software installation

Link PIP to SADC Water Division

- SADC Climate Service Centre (CSC)
- SADC HYCOS
- SADC Disaster Risk Reduction (DRR)
 Information Management System (IMS)
- data logger installation in Botswana and Zimbabwe (donated) to ZINWA
- Human Capacity Development (HCD)
- LIMCOM FTT Champion, team structure
- Parallel approach for data loggers to transmit to EWEFS and databases
- Quality assurance, Training on system
- Cost implications
- Hosting/server and website
- CBA analysis with GESI type data
- Outline of Business Case
- Public Private Participation
- Training of EWFFS
- Training on data logger system



Phase 1A: Project Implementation Plan (PIP)

◆ LIMCOM Flood Task Team (FTT) requested a PIP during the CRIDF EWFFS Demonstration workshop.

The PIP is a concise 11 page document circulated to the LIMCOM FTT and contains the following:

- Explanation of how the system works
- Summary of the system sustainability :
- robust and inexpensive. O & M costs low, no additional resources needed
- Implementation Issues and Implications
 - Technical and compatibility (water level data loggers linked to existing databases, data releases)
 - Institutional and human resources (Champion from FTT, Member States departments)
 - Role of the SADC sector
 - Gauging Station Quality Assurance
 - EWFFS installation and training
 - Procurement, ownership and asset management



• Cost summary Initial costs and estimated O. 8. M. costs



Phase 1B: Engagement with Agricultural Companies

- Cesar Mulana (CM): Director of Operations, Hidráulica de Chókwè (HICEP)
- Armando Ussivane (AU): Chairman of the Board of Directors, Regadio do Baixo Limpopo (RBL)
- Sami Saran (Chief Operating Office) : African Food Company (AFC) :
- ♦ Gary Thirkettle Agri –Sul : General Manager





Benefits & Costs of the Project

Investment Case for the Private Sector

- Companies exposed to flood risk and damage – large costs from flood damage
- EWFFS can provide lead time to respond, therefore reducing loss of life, injury, damage to moveable property
- Impact on insurance premiums?

Costs

Capital

0&M

Benefits

Lower loss of life & injury

Lower evacuations required

Reduced relief costs

Reduced reconstruction, replacement





Technical Options & Flood Scenarios

Technical Options

Flood Scenarios

BaselineDo nothing

Option 1

Pilot project with technology transfer & O&M

Option 2

Option 1 + model upgrade

Mild Flood

Flood occurrence = 1:10 years

- Directly impacted population that are located within the area of inundation in 2040
- 182,938 people
- Located in 60 villages

Moderate Flood

Flood occurrence = 1:25 years

- Directly impacted population that are located within the area of inundation in 2040
- 519,137 people
- Located in **75 villages**

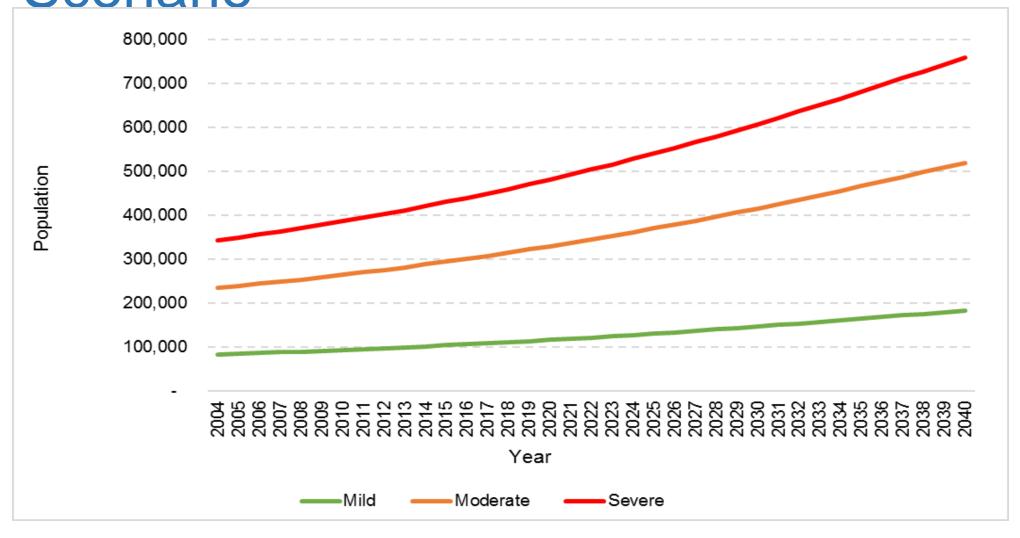
Severe Flood

Flood occurrence = 1:100 years

- Directly impacted population that are located within the area of inundation in 2040
- <u>758,744 people</u>
- Located in 100 villages



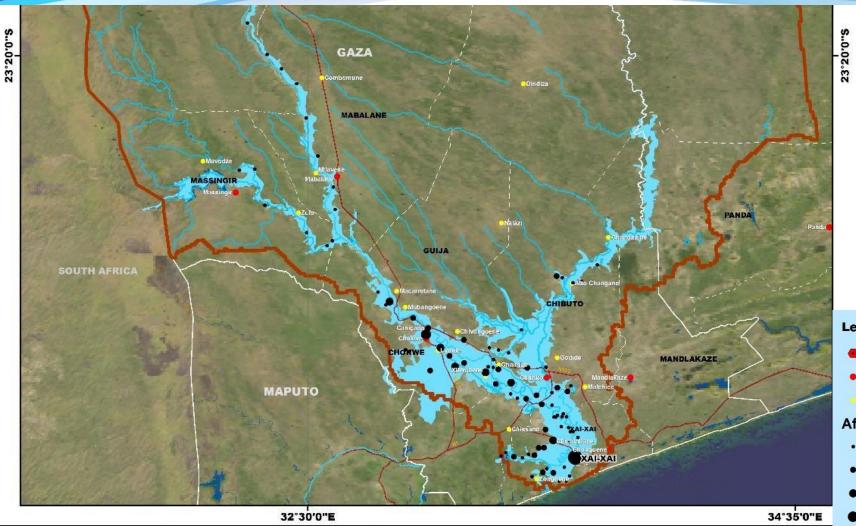
Forecasts Direct Beneficiaries by Flood Scenario





Phase 1B: Cost Benefit Analysis Results





- 1 in 100 year flood event
- Mozambique Flood Risk **Analysis Project (SMEC 2004)**
- GIS analysis added for population affected by flooding

Legend

- Provincial Capital
- District headquarter
- Admin. Post Headquarter

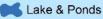
Province Boundary

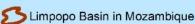
- **District Boundary**
- Existent Roads

Affected Villages Population

- 0 2.194
- 2.195 5.276
- 5.277 14.265
- 14.266 49.730
- 49.731 99.442

Rivers Severe Flood





Version: 1.0 Prepared by: Approved by: Data: 06.12.2016

Map Base: DINAGECA (National Directorate

Geographic Projection

Datum: WGS 1984

FTT/LIMCOM Geography and Cadastre) 1998

Company: CRIDF

Client:

Title:

Severe Flood (1:100 years) Project:

CRIDF-FP13-006-Limpopo Data Sharing and Early Warning Flood Forecasting System





Project Costs

CRIDF Investment
GBP 468,800

Capital Costs
GBP 59,800

O&M (annual) 24,300

Option to upgrade system = additional GBP 200,000





Project Benefits

Summary of Costs Avoided Due to the EWFFS for Flood Scenarios, 2017 - 2020

Costs Avoided Due to	Flood Scenario						
EWFFS	Mild			Moderate	Severe		
Relief Costs	£	104,659	£	261,648	£	392,472	
Direct Costs	£	220,543	£	551,359	£	827,038	
Indirect Costs	£	346,926	£	867,315	£	1,300,972	
Reconstruction Costs	£	172,696	£	431,739	£	647,609	
Total	£	844,824	£	2,112,061	£	3,168,091	





Cost Benefit Analysis Results

Tachnical Ontions	Indicators	Discount Rates	Flood Scenario					
Technical Options	Indicators	Discount Rates		Mild		Moderate		Severe
Baseline	NPV	3,5%	-£	61 791	-£	81 980	-£	98 804
		10,0%	-£	33 032	-£	43 836	-£	52 838
Option 1	NPV	3,5%	£	243 160	£	1 244 678	£	2 079 275
		10,0%	£	106 665	£	642 565	£	1 089 149
	BCR	3,5%		1,57		3,93		5,90
		10,0%		1,43		3,56		5,35
	IRR	both		33%		144%		237%
Option 2	NPV	3,5%	£	49 924	£	1 051 441	£	1 886 039
		10,0%	-£	75 153	£	460 747	£	907 331
	BCR	3,5%		1,08		2,70		4,05
		10,0%		0,83		2,07		3,10
	IRR	both		5%		33%		55%





Thank You

