



Navua Flood Warning System



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Agencies involved



- Funded by: EU as part of SOPAC *Reducing Vulnerability of Pacific ACP States* Project
- Operated by: Hydrology Section
- Warning services by: FMS
- Response by: NDMO / local DISMAC
- Contractor: NIWA – NZ's National Hydrology Service



Why Flood Warning?



- Flood losses are high - on average Fiji loses nationally every year 10 lives & Mio \$ 22
- 2004 flood in Navua mounted to F\$ 13 million
- Major Floods in Navua every 7 years based on > 100 yrs of documented floods and 35 yrs of flood records, last major floods (2004, 1993 TC Kina, 1980 TC Wally, 1972 TC Bebe)
- Flood warning can save lives and reduce flood losses → time to act
- Protect possessions, secure livestock, evacuate in time, avoid risk of injury and death, reduced stress and early recovery

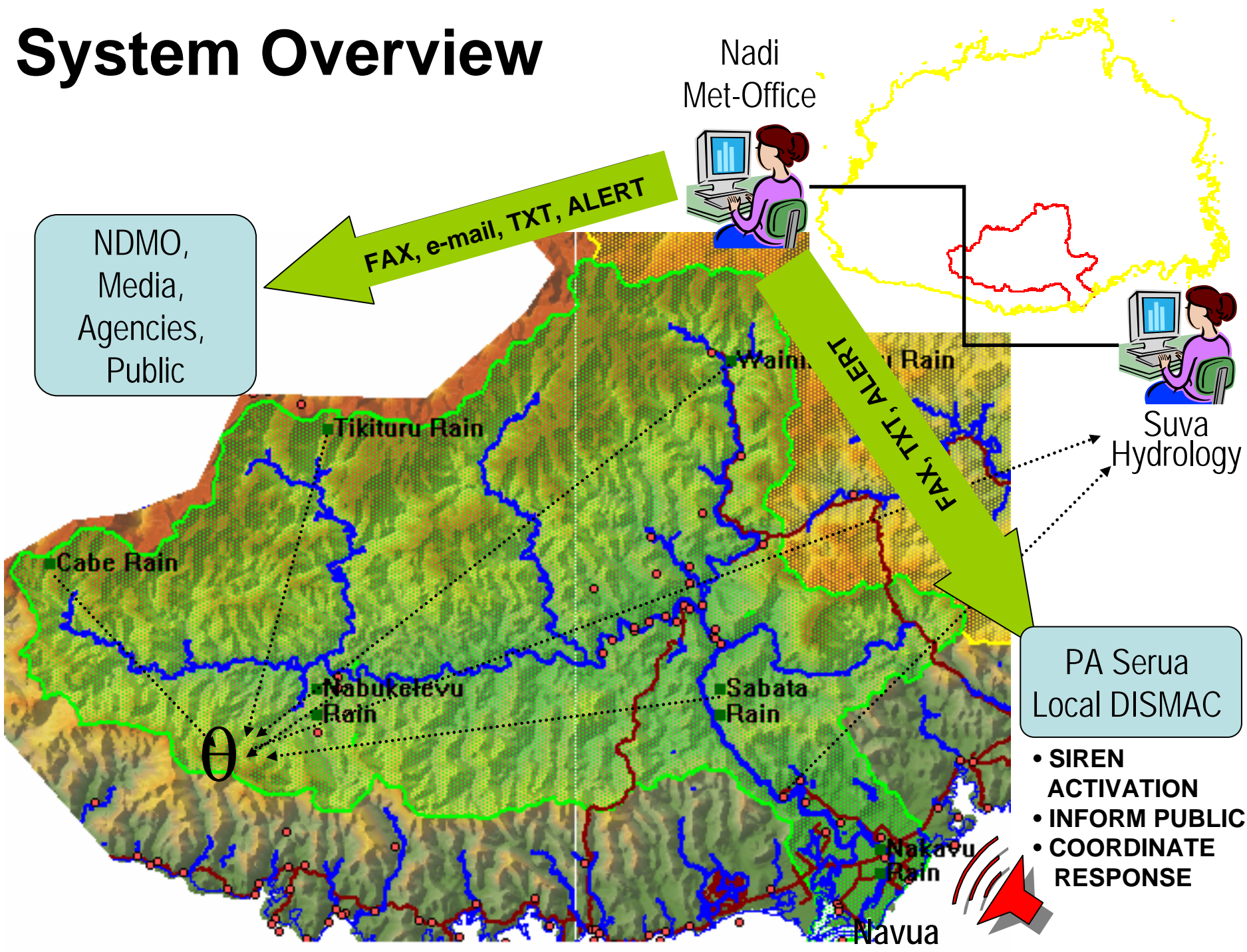


Components



1. Institutional strengthening and inter agency cooperation at national/provincial level
2. Design and technical implementation of flood detection system
3. Establishment of an effective warning dissemination system
4. Development of flood response plan
5. Testing of arrangements and system
6. Economic evaluation to ensure ongoing government commitment and sustainability
7. Public awareness and community engagement

System Overview





Navua gauge network



- 3 river-level stations (1 existing at Nakavu, 2 new at Sabata and Nabukalevu)
- 6 rainfall stations giving catchment-wide coverage





Data sent to Hydrology & Meteorology Service



- Data is sent by VHF radio to Hydrology in Wailoku/Suva and then by broadband internet connection to FMS in Nadi
- A flood forecasting model is in place but data is needed to calibrate the new stations





Robust Installation





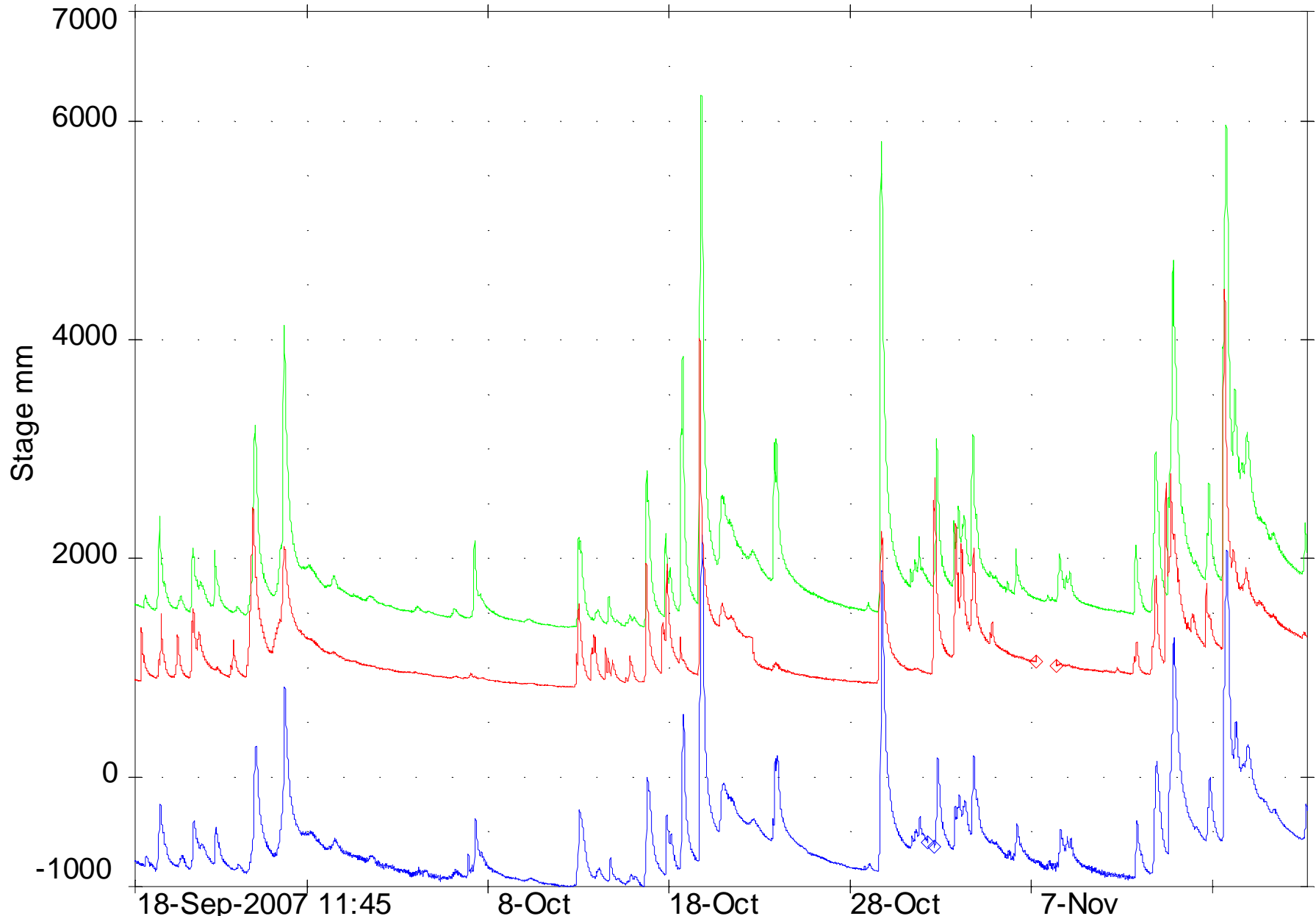


Tikituru rainfall station



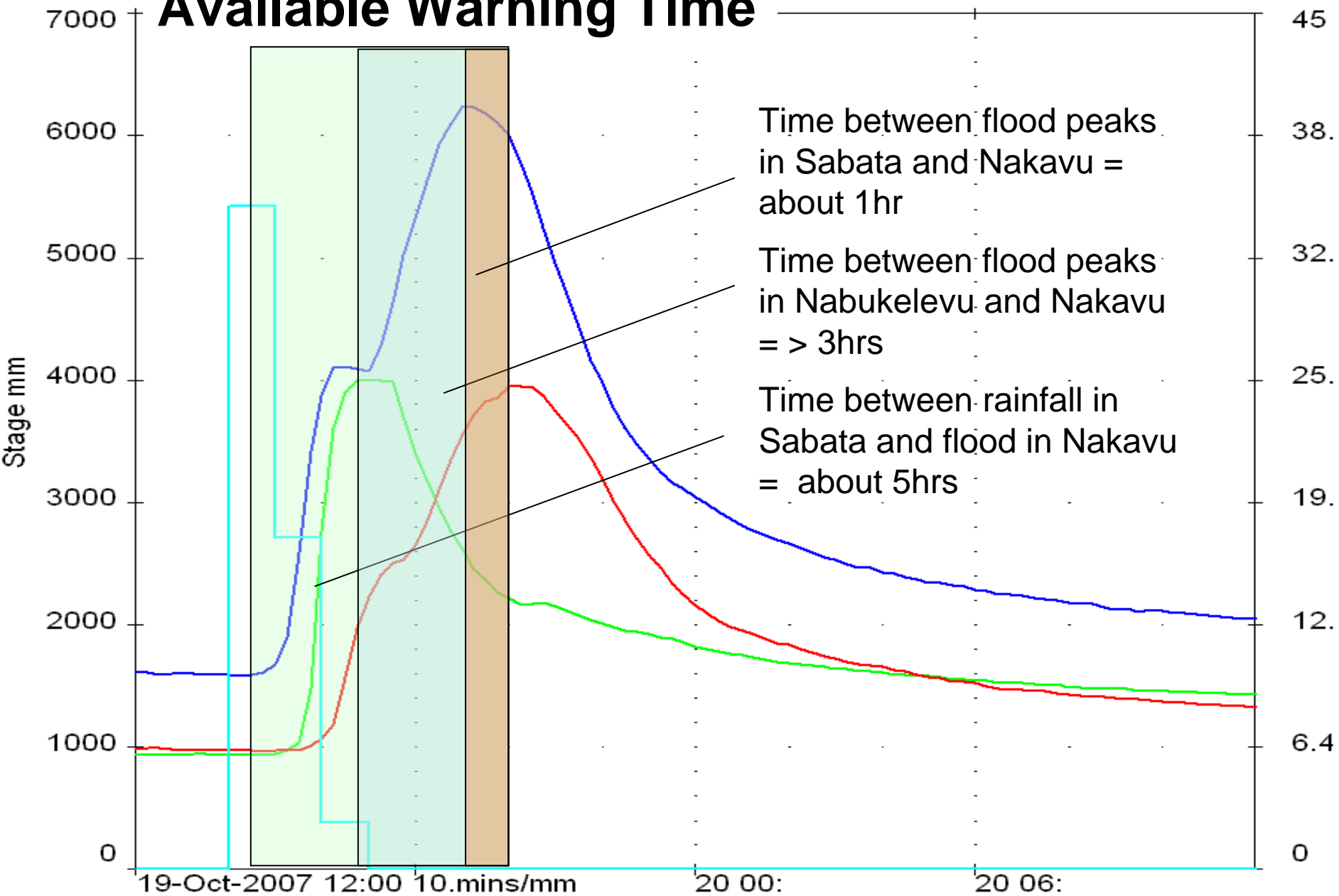
- 920 m ASL
- NW of catchment adjacent to upper Sigatoka valley
- Remote site - access
- TB3 tipping bucket – 0.5 mm tip





— site 311801 Nakavu Stage Stage mm
— site 312703 Sabata Stage Stage mm
— site 310704 Nabukelevu Stage stage mm

Available Warning Time



Time between flood peaks in Sabata and Nakavu = about 1hr

Time between flood peaks in Nabukelevu and Nakavu = > 3hrs

Time between rainfall in Sabata and flood in Nakavu = about 5hrs

- site 312703 Sabata Stage Stage mm 49.645units/mm
- site 310704 Nabukelevu Stage stage mm 49.645units/mm
- site 311801 Nakavu River Stage Stage mm 49.645units/mm



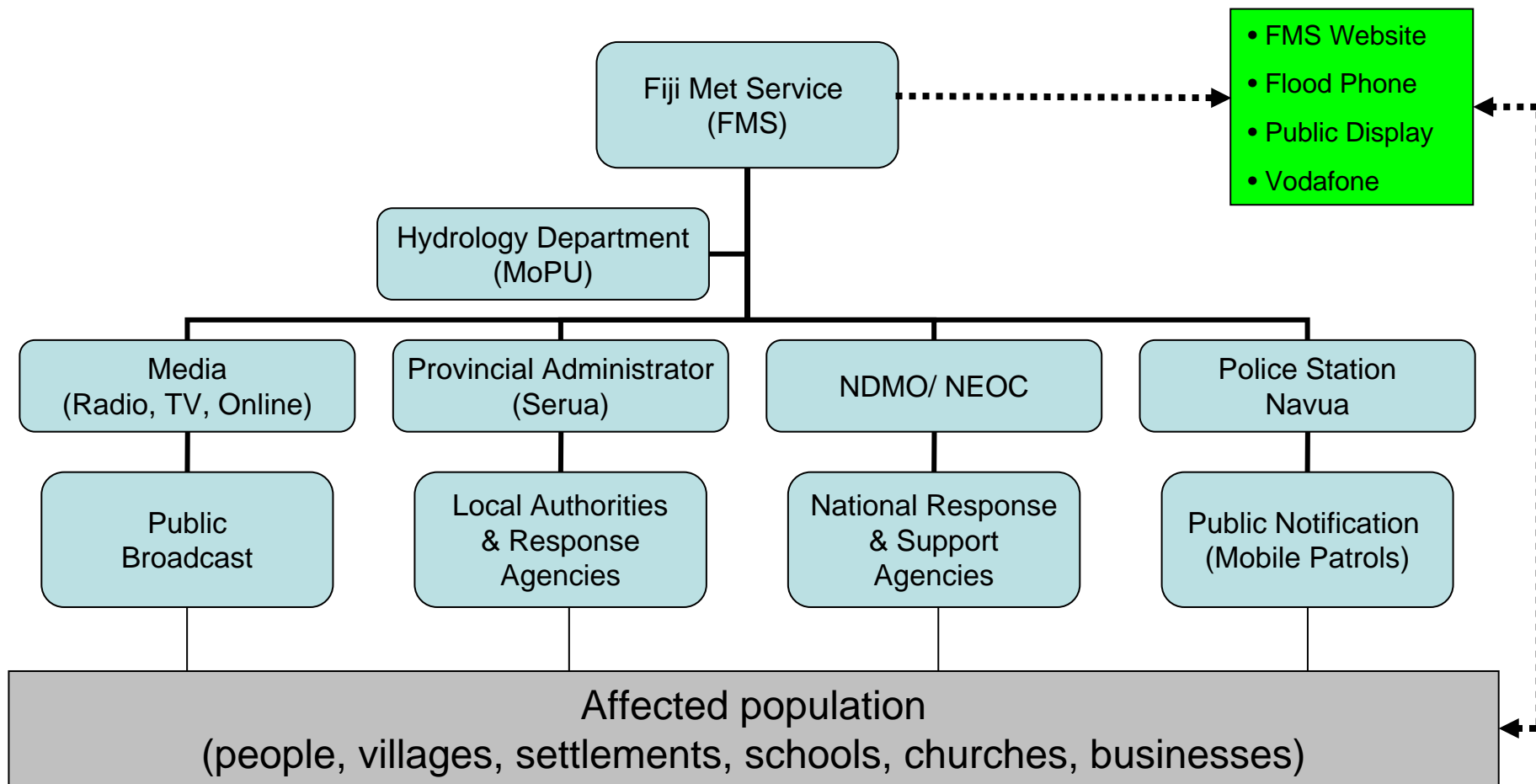
System operation



- The water-level or rainfall dataloggers will send alarm messages to the base stations, once critical levels are reached
- Operators at Suva (8/5) and FMS (24/7) will monitor river level rise
- Forecasting model will provide predictions of downstream levels once calibrated
- FMS will give warnings to national and local DISMAC, media and general public



Information Flowchart





Flood Response Plan



- Outlines Roles, Capacities & Responsibilities of Agencies
- Communication & warning dissemination Strategy
- Provides needed information (maps, zones, emergency contacts, location & capacity of EEC
- Community Outreach



Project Funded By:



A Flood Response Plan
for the Greater Navua
Area

Technical Support From:



NAVUA FLOOD ADVISORY SYSTEM

EXAMPLE

NAVUA FLOOD ADVISORY BULLETIN NUMBER **TWO** ISSUED FROM NWFC NADI AT 10 AM MONDAY 24 SEPTEMBER 2007.

A FLOOD WARNING IS NOW IN PLACE FOR GREATER NAVUA AREA THE UPSTREAM NAVUA RIVER GAUGE(S) AT NABUKALEVU AND SABATA HAVE BOTH REACHED CRITICAL FLOOD LEVEL.

THE WATER SHOULD RISE FURTHER AS HEAVY RAINFALL CONTINUES WITH THE RIVER BURSTING ITS BANK.

FLOODING IS THEREFORE EXPECTED TO OCCUR IN THE GREATER NAVUA AREA WITHIN THE NEXT 3 HRS.

PEOPLE LIVING IN THE LOW-LYING FLOOD PRONE AREAS OF NAVUA RIVER ARE NOW ADVISED TO:

- SECURE YOUR PREMISES AND LIVESTOCK AGAINST FLOODING.
- STORE YOUR POSSESSIONS ON HIGHER LEVELS INSIDE YOUR HOUSE.
- MOVE TO HIGHER GROUND OR THE NEXT EVACUATION CENTRE BEFORE ACCESS ROADS ARE CUT OFF BY FLOOD WATERS
- INFORM YOUR NEIGHBORS AND FAMILY LIVING IN FLOOD PRONE AREAS
- LISTEN TO YOUR RADIO FOR FURTHER ADVICE OR CALL ---



Benefit-Cost Analysis



- Warning system most likely to save a *minimum* of Fj\$ 1.9-3.8 m over its life
- Would save *much more* in practice but not possible to estimate value of:
- All possible floods
- All possible benefits (use of warning system for other disasters, use of data for water resource management, reduced trauma)
- Most likely returns on investment:

Stakeholder	Gross savings Fj\$	Returns on investment
Navua community	1.7-3.4 million	∞
Government of Fiji	0.4-0.8 million	1.1-2.2 to 1
Everyone	2.1-4.2 million	3.7-7.3 to 1



Are we safe of floods now?



- NO, nature will still prevail
- Better warning services available
- The Navua FWS will reduce flood losses significantly, BUT
- Navua catchment is short and steep, warning time may only ever be short
- Development planning and preparedness remains key



Malo

