



Reducing Flood Risk – From Science to Policy: The Samoa Process

Prepared by

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Presented by: Michael Bonte-Grapentin (technical aspects)
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INTRODUCTION

River flooding, especially flash floods, are a serious and frequent problem in Samoa and in particular Apia where steep catchments with rapid flood onsets are subject to frequent heavy rainfall events. The April 2001 flood event inundated large parts of Apia urban area within a negligible time lag from the beginning of the intense rainfall. The surrounding watersheds responded to the flash floods with combined overbank/overland flow. Approximately 5,000 local residents were directly affected by the flood and resulting damages were estimated in excess of WST\$ 11 million. Such events are not rare for Samoa.

The Vaisigano catchment was selected for the study due to its impacts on Apia during flood events. It is also the best-monitored watershed in Samoa with discharge records available between 1973 and 1990 and precipitation records from several locations on Upolu with two records dating back some 100 years.

In addressing flood risk management, previous studies have concluded that technical mitigation measures such as channel or detention basins are only be of local and thus limited effect. As the development described above is mainly caused by urban extension activity only considerate flood plain management strategies and urban development planning strategies adapted to flood drainage are sustainable and therefore of high importance for the future protection of Apia, the principal centre of population, administration and commercial activity in Samoa.

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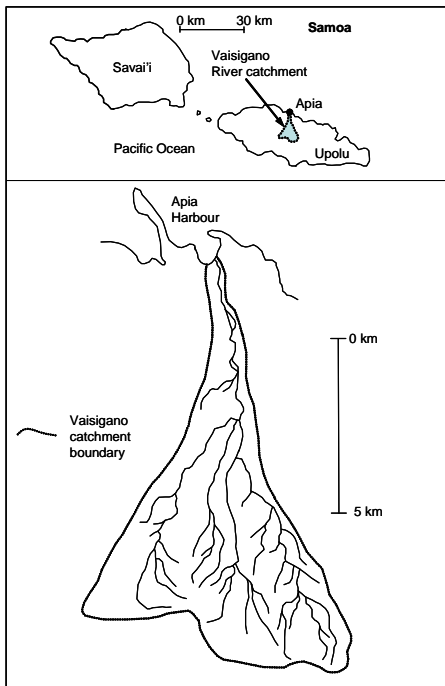


Figure 1. Location of Vaisigano River in Apia, Samoa.

GOAL

The overall goal of the study is to reduce flood risks for urban Apia by enhancing flood risk management capacity within Samoa.

PROCESS

To address the goal the Project first focussed on the capacity needs of the Meteorological Division Water Resources Division and the Planning and Urban Management Agency (PUMA) in understanding flood hazards of Apia urban area by identifying areas prone to flooding and quantification of flood hazard, extent and intensity. The training and ensuing modelling and mapping served as guides for improved urban planning and floodplain management.

The process taken by the Project is depicted below (Figure 2).

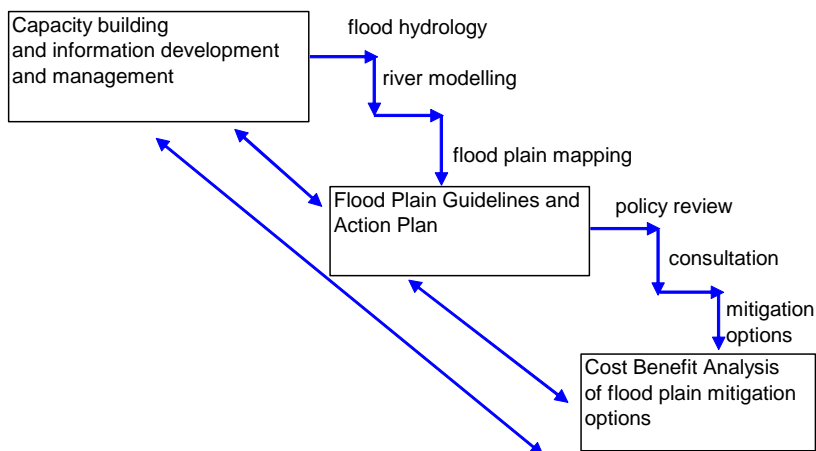


Figure 2. Steps undertaken by Project to address Flood Risk in Samoa.

CAPACITY BUILDING IN FLOOD RISK ASSESSMENT AND MANAGEMENT

In a combination of formal lectures and hands on training lead government agencies had been guided through the process of flood risk assessment, from data capture to the production of flood hazard maps for certain design events. These formed the basis of the development and evaluation of flood risk reduction options and policy documents, such as the flood management guidelines and action plan. The following aspects had been covered:

- Training in flood hydrology, river modelling, floodplain mapping and flood mitigation
- Introduction into flood modelling using license free software packages from the US Corps of Engineers
- Development of a hydrological model and a flood inundation model of the Vaisigano River catchment
- Production of flood hazard maps
- Estimation of flood risks
- Technical evaluation of flood risk reduction measures

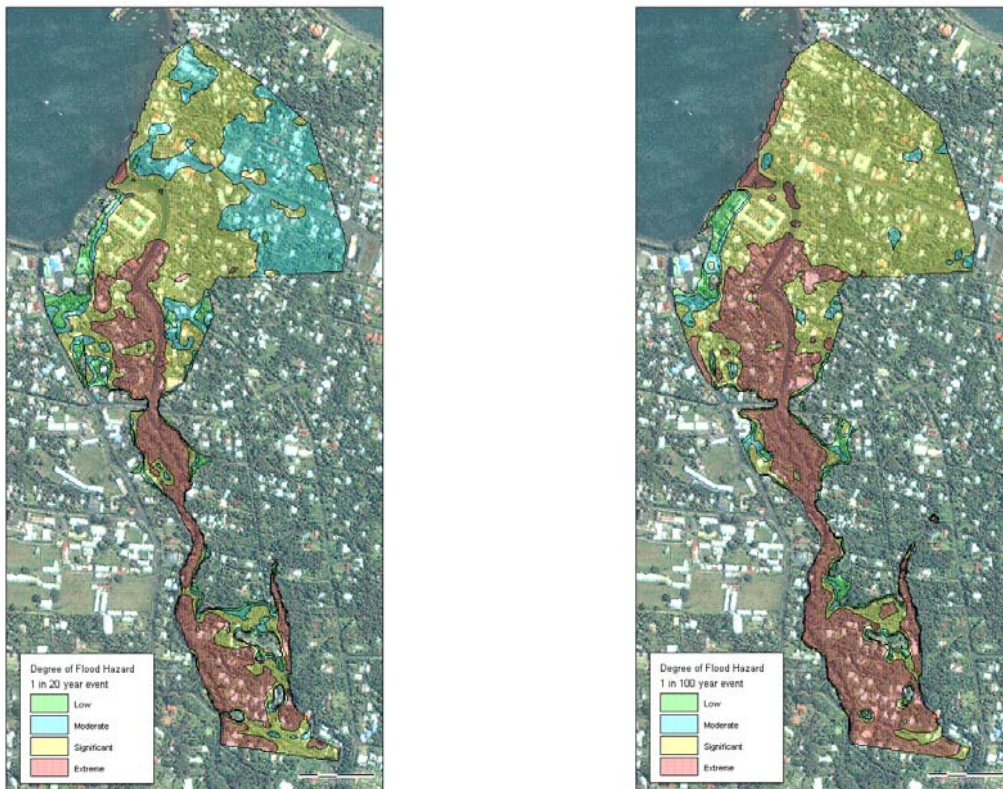


Figure 3. Flood hazard maps for a 20 and 100 year return period event.

FLOODPLAIN MANAGEMENT GUIDELINES

The Guidelines were defined in consultation with Samoan stakeholders to determine acceptable design events based on potential damage categories and severity with respect to local vulnerability (social and financial), land-use, infrastructure and available disaster relief action.

The objectives of the Guidelines are to:

- Assist the (PUMA) in its planning and development assessment as prescribed by the *2004 Planning and Urban Management Act* Part III, Section 8 and Part IV.
- Promote awareness and provide information for developers on the requirements of the development consents process for development proposed for floodplains.
- Provide useful resource and advisory to responsible authority (PUMA) as provided for under Section 46 of the *2004 PUM Act* and, authorities enforcing building codes, building and maintenance of public infrastructures, utilities, drainage systems and emergency agencies to coordinate their relevant and 'connected' activities in various aspects of the floodplain to reduce flood risks and associated flood costs.

FLOOD RISK MANAGEMENT PLAN

The Action Plan includes proposed flood mitigation strategies and measures (structural/non-structural) based on the flood hazard mapping carried out. The framework was developed in partnership with Samoan stakeholders outlining future activities, priorities and institutional requirements for effective flood risk management

The overall goal of the Action Plan is to reduce social, economic and environmental impacts of floods on the people of Apia thereby facilitating the achievement of national development goals.

The objectives of the Plan are to:

- Identify and map the flood hazard within the lower Vaisigano River catchment
- Identify flood risk management options and indicate how these may be assessed in more detail
- Strengthen a nationally coordinated flood forecasting and warning systems
- Support public outreach and educations activities to improve awareness of flood risk and hazard and promote recommended preparedness actions communities can take to reduce risks to themselves and to others
- Manage activities in floodplains in a manner compatible with multiple and competing uses, including existing and proposed urban development within Apia.
- Strengthen capacity of the Ministry of Natural Resources and Environment, in particular Water Resources Division, PUMA, Meteorology Division and DMO and other relevant agencies to provide consistency in flood risk management
- Incorporate flood risk management in the national planning and budgetary processes
- Update the Action Plan regularly and employ adaptive management strategies in order to take full advantage of scientific and technological advances, and to use the best available floodplain management practices, principles and information

Economic analysis of flood risk reduction measures for the lower Vaisigano catchment area

The economic study assessed the priority structural and non-structural measures identified by stakeholders during a consultation meeting held with SOPAC in March 2007. These include the construction of floodwalls, the construction on a by-pass channel, improvement of the current flood forecasting system and strengthened development control by requiring houses built in the floodplain to have raised floors.

The study concludes that significant future savings can be achieved by investing in flood management measures. Savings, in terms of avoided flood damages, can be realized through an improved flood forecasting system accompanied by an improved flood warning system. The most effective measure, in terms of reducing flood damages, according to the study is building new homes located in the floodplain with raised flood heights. The study also considered the costs and benefits of investing in large-scale flood management projects such as floodwalls along the banks of the lower Vaisigano and the construction of a by-pass channel. However these measures were found not to be economically feasible due to the high construction and maintenance costs involved.