Integrating Climate Change Risks into Water and Flood Management by Vulnerable Mountainous Communities in the Greater Caucasus Region

Deliverable 1 (2016): Community-based implementation plan

REPORT TITLE - Deliverable 1 (2016): Community-based implementation plan

PROJECT - Integrating Climate Change Risks into Water and Flood Management by Vulnerable Mountainous Communities in the Greater Caucasus Region

Deliverable 1 (2016): Community-based implementation plan			Date
Prepared by	Juan Fernandez	Signature	30/04/2016
Checked by	David Milton	Signature	08/06/16
Approved by		Signature	

1. Introduction

The aim of this document is to present the implementation plan for the Community-Based Flood Early Warning System (CBFEWS) in the communities in the study area of the project Integrating Climate Change Risks into Water and Flood Management by Vulnerable Mountainous Communities in the Greater Caucasus Region.

2. Background

The Project document states the need to set up a CBFEWS in order to reduce the flooding risk in the project study area. The design and approach for the community-based flood forecasting early warning system has been described in numerous and previous deliverables by this consultant. A brief description of CBFEWS can be found below, enumerating the main advantages of such a system.

2.1 Community based Flood Early Warning System

A community based flood early warning system (CBFFEWS) is a locally based operational flood forecasting and warning activities of a community that aids them in mitigating the effects of flooding in their area. This is usually a relatively cheap, easy to sustain system enhanced by the direct and active participation of the community and its leaders. The ultimate goal of the system is to protect life and property by achieving and maintaining a high-level of community preparedness through timely flood information and warnings. This system is more important and efficient in areas prone to floods.

The most important characteristic of a CBFFEWS is community participation and empowerment. It empowers the people of the community to protect, prepare themselves and make them resilient against the disastrous effects of floods. The community is in the best position to undertake preparedness measures against floods.

The presence of a full flood forecasting (operational) framework for an early warning system alone sometimes is not enough to effectively minimise or prevent the damages from flooding. Early warning systems are sometimes neglected by the people, especially if they are not involved or fully aware of all the implications. One of the main challenges in early warning systems is implementing and sustaining it. The idea of incorporating the active involvement of

the people in the community with an early warning system aims to increase the effectiveness of such systems. Learning by actual participation and taking a part in the system enable people to understand more the value of these systems not only for themselves but for the whole community that will be affected, and make them become more responsible in performing their tasks in implementing and sustaining the system.

The following basic elements and features of a CBFEWS are:

- People's participation - community members are the main actors and propellers; they also directly share in the benefits of disaster risk reduction and development.
- priority for the most vulnerable groups, families, and people in the community
- risk reduction measures are community-specific and are identified after an analysis of the community's disaster risk
- existing capacities and coping mechanisms are recognized
- the aim is to reduce vulnerabilities by strengthening capacities; the goal is building disaster resilient communities
- links disaster risk reduction with development
- outsiders have supporting and facilitating role

There are some key factors that should influence the decision to implement a CBFEWS:

- Frequency of flooding
- Community's interest and awareness
- Possible lead time
- Cost-benefit of the implementation versus flood damages

If a community is not interested in a CBFEWS, the success of the scheme may be compromised. Maintenance and sustainability aspects have to be considered, and therefore a community has to be fully involved in the implementation of a CBFEWS in order to ensure its success. This interest can be related to the number of flood events this particular community has suffered in recent years. Therefore, a successful CBFEWS is characterised by a:

- watershed approach
- community participation
- community counterpart
- sense of ownership

Early warning systems have four different components, namely:

1. Risk Knowledge: risk assessment exercise provide essential information in order to set priorities for mitigation and prevention strategies and designing early warning systems.
2. Monitoring and forecasting: systems with monitoring and forecasting capabilities provide timely estimates of the potential risk faced by communities.
3. Dissemination: communication systems are needed for delivering warning messages to the potentially affected locations. Messages need to be reliable, synthetic and simple to be understood by authorities and the public.
4. Response: coordination, good governance and appropriate action plans are key points in effective early warning. Likewise, public awareness and education are critical aspects of disaster mitigation.

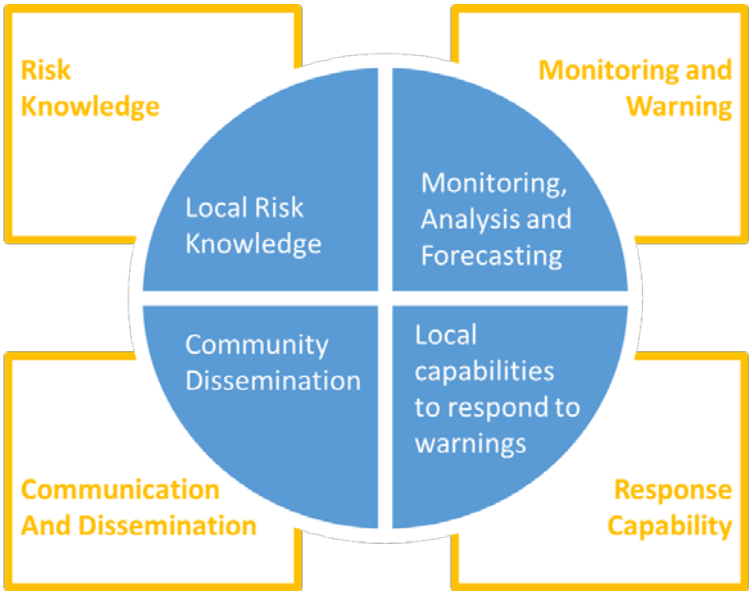

Figure 1 - EWS components

2.2 Local Situation

The local situation of the communities regarding floods and flash-floods was thoroughly described in the ToR for a Flood Forecasting EWS (deliverable 5 – 2013). The main output from the assessment of the local situation was that due to the short lead-time available for any community in the study area, all the flood events to occur in the area could be considered as

flash-floods (a lead time less than 6 hours). This fact compromises the community involvement for the monitoring, warning and forecasting component.

2.3 Communities

There is no up-to-date formal flood catalogue, and therefore it is challenging to define the communities that should benefit from this scheme. Local experts have gathered information from local authorities regarding which communities would benefit further from the implementation of a CBFEWS.

3. Full Flood Forecasting Early Warning System

As it has been detailed in previous deliverables, the short lead time characteristic of the flood events in the study area justify the implementation of a centralised full flood forecasting early warning system (FFEWS). The flood forecasting framework can be observed in Figure 1.

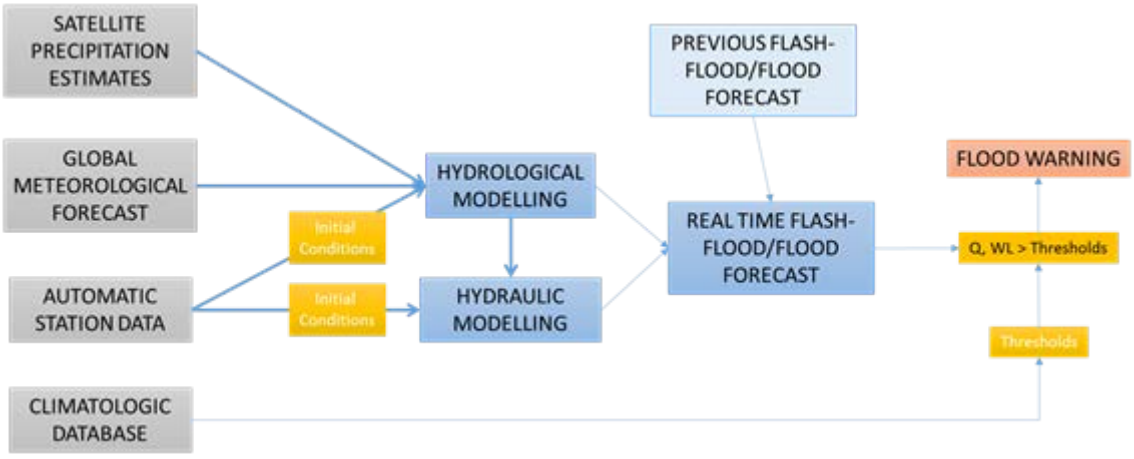

Figure 2 – FFEWS Structure

The structure of this platform will be described below in detail.

3.1 FFEWS components

The different components of the FFEWS are briefly outlined below.

3.1.1 Meteorological Inputs

Several meteorological inputs are considered in the FFEWS.

3.1.1.1 Automatic Stations

Information from weather and hydrological automatic stations and posts is being imported into the system.

3.1.1.2 Meteorological Forecasting (GFS and ACCESS)

At this stage global forecasting models are being used. The Global Forecasting System by NOAA (National Oceanic and Atmospheric Administration of the USA) is the main forecasting input. Also, the global Australian Community Climate and Earth-System Simulator (ACCESS) weather model is also being imported into the platform.

3.1.1.3 Satellite Precipitation Estimates

Satellite precipitation estimates (TRMM/GPM) are available. At this stage TRMM estimates are being imported automatically into the FFEWS.

3.1.2 Hydrological Modelling

A hydrological model (HEC-HMS) has been implemented for the FFEWS. This hydrological model is using the precipitation and temperature information from the meteorological inputs in order to calculate flow at pre-specified locations.

3.1.3 Hydraulic Modelling

A hydraulic model (HEC-RAS) has been implemented for the FFEWS. This hydraulic model is routing the flows generated by the hydrological model and providing discharge and water level information.

3.1.4 Forecasting Platform

A forecasting platform (Delft-Fews) has been deployed in order to collect all the data, analyse all the data and provide the necessary means for model launching.

3.2 FFEWS Implementation

The implementation of such a system is a very complicated task due to all the different data sources and models required. It should be noted, however, that the basic implementation of the system has already being undertaken and that once all the different data sources are available (especially automatic station data) the system will be fully operational.

3.3 FFEWS Operational Procedures

There are several operational procedures within the FFEWS relevant to the implementation of the CBEWS. In the first place, the system will be run every 12 hours, providing a 3 days forecast into the future and using 2 days of historical data (a total of 5 days simulation). As previously noted, the forecast will make use of different sources of precipitation data, automatic weather stations, satellite precipitation estimates and meteorological forecasting. This is critical in order to be able to provide sufficient lead time to the relevant communities.

There are different warnings associated with the different forecasting times, as previously described in several deliverables (Figure 3).

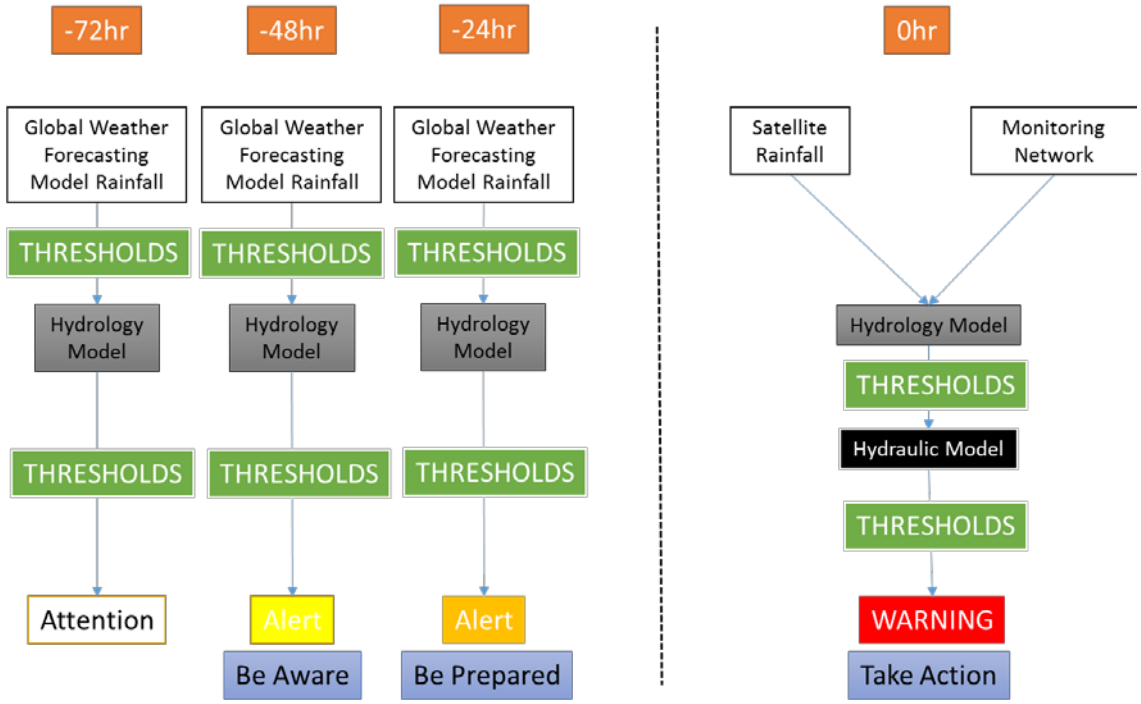

Figure 3 – FEWS Structure – Warning levels

Also, these different levels of warning should have associated different actions from communities and community members. This will be detailed in following sections.

4. Community Flood Emergency Plan

In order to ensure that the Community-based Flood Forecasting Early Warning System is fully embedded into the community practices during disaster events, the implementation of a Community Flood Emergency Plan (CFEP) is recommended.

A Community Flood Emergency Plan outlines the roles and responsibilities of all parties to be involved, actions to be taken, coordination arrangements and communication channels to be used prior to, during and after a flood event. The purpose of planning for flood emergencies is to reduce the risk to health and life and the damage caused by flooding.

Building community resilience is something that many people and communities already do without realising it, however having a flood emergency plan may form an important part of how a particular community might best respond to a flood situation. By building on existing local relationships and networks, using local knowledge and preparing for risks, a community is in a better position to cope during and after a flood event. A flood resilient community will not only be better prepared to respond at the time of a flood, but will be better able to cope in the

long-term. The community flood plan will assist the community in reducing the negative effects of a flood regardless of its source.

Formalising of the flood response in the form of a CFEP will help to inform all who need to be involved as to the overall response effort, and illustrate what tasks are being carried out by other parties. This has the advantage of ensuring that duplication of tasks will not occur and gaps in response are avoided.

The knowledge and experience of flood response procedures gained by local authority and emergency services staff can be lost when they are absent, move to other posts or retire. Having a flood emergency plan ensures that the experience and lessons learned by current responsible people in the community can be preserved and drawn upon by being incorporated and recorded in a written format for use by all relevant people in the future.

It should be noted that no two communities are the same as each one may have different needs. Thus, there is a need gather local flood information, which can then be used to create the community flood plan. The flood emergency plan should be maintained and practiced regularly.

There are some key steps required during the implementation of the CFEP:

1. Establishment of Community Group: a community group in each community should be established, with relevant householders, business and community leaders. Working together as a community or group to complete a plan will help in responding quickly when flooding happens and what practical actions to take before and during a flood, helping reduce the damage flooding can cause.

2. Raise awareness of the flood risks in the community: Prior to a flood, the flood community group should promote awareness to householders within the community of the actions and responsibilities they have in regard to preparing, responding to and recovering from a flood. Householders should be encouraged to have their own property flood protection equipment and household flood plan.

3. Identify the flood risks in the community: local knowledge on how every community has been flooded in the past or how is likely to flood in the future should be gathered. All the properties within the community at risk of flooding should be listed, including property other than homes damaged by flooding (e.g. where gardens or cars were damaged by floodwater). These lists will help to form a flood plan and enable the group to target resources to specific areas.

4. Identify vulnerable people that are at risk of flooding: Some members of the community may be at greater risk from a flood than others due to their age, disability, or illness (both short term and long term). Vulnerable people should be identified prior to a flood so that providing assistance to them is included in the flood plan. People in the community should be encouraged to contact the flood plan group if they feel they might need assistance, even if it is only during a short period of time.

5. Identify community resources: the community should be aware of the flood protection products available. Within the framework of this project the communities have been handed flood protection equipment (sirens, generators, projectors, extension cables, power saws, various type of ropes, metal cutting scissors, gloves, water pumps, shooter hoses, suction hoses, lamps, megaphones, shovels, boots, buckets, crowbars, hand saws, axes and raincoats).

   Also, evacuation routes and centres should be identified and properly disseminated throughout the community. This identification should be carried out considering both historical flooding and information from the flood hazard maps produced within the framework of this project. Some of the above-mentioned equipment should be located in the designated evacuation centre in order to facilitate its use.

6. Decide on a Communication Plan: the communication plan should cover all different possibilities. The deployment of sirens within the community should be undertaken considering that all the different households are covered and that household members understand the meaning of the sirens and the associated actions. Also, a detailed list with all the different contact number should be compiled. Floods can occur when people are working or are away and may need to be contacted, and also when they are sleeping, and this should be taken into account. Designate people should keep the list updated and keep the list with the flood emergency plan. It should be decided in advance how a flood alert is to be communicated.

7. Decide on an Action Plan: once the flood risk, the vulnerable people and the community resources are identified, safe actions to be taken by residents to protect against those risks should be decided and disseminated throughout the community. The proposed actions should be realistic and safe. Also actions regarding the the vulnerable people in every community should be agreed. Actions could be: moving valuable possessions, furniture and paperwork upstairs; switching off water, electricity and gas supplies if needed and switching them back on when it is safe to do so;

gathering together prescribed medication and repeat prescriptions if it is likely that they may need to be evacuated from their home.

8. Test the flood plan: a dry-run of the community emergency flood plan should be undertaken with as many as possible community members participating.

The following sections should be present in a CFEP.

4.1 Introduction

The Introduction of the Flood Emergency Plan will ensure a better understanding of what the plan is about and how its aims are to be achieved through the document. The suggested content of this section could be:

- Purpose
- Intended usage
- Background
- Structure of the plan

4.2 Area of operation and flood history – risk assessment

4.2.1 Flood History

This section describes the geographical areas that area covered by the plan. It is intended to give the reader an understanding of the expected areas that will be affected by any possible flooding. The suggested content of this section could be:

- Name of area and community(ies) in which it lies;
- Maps;
- Subject Area (in km2);
- Population and estimate of the population affected by flooding;
- Rivers passing through the area and those which cause flooding;
- Details of roads;
- Locations of important buildings, including operations centre for flood response.

4.2.2 Flood Risk

This section describes the history of flood events in the area. It is intended to give the reader an understanding of the expected extents and severity of any possible flooding based on an explanation of past events. The suggested content of this section could be:

- Explain how regularly flooding occurs in the area;
- Describe the worst event in recent times;
- How quickly do the flood waters rise and recede;
- What are the most commonly affected areas and frequency of flooding in those areas;
- What roads are closed off during flooding;
- What depths have been recorded at referenced locations;
- Refer to historical and predictive flood maps.

4.3 Roles and responsibilities

This section will be used as a quick reference guide for each organisation outlining their roles and responsibilities. The suggested content of this section could be:

- The roles and responsibilities shall be defined by reference to the protocol document;
- Organisations involved;
- Roles of the local co-ordination group;
- Roles of Ministry of Emergency Situations;
- Roles of Voluntary agencies;
- Roles of other organisations involved.

4.4 Flood warning stages and action-plan

4.4.1 Flood Warning System

This section introduces the different discrete stages of flooding as per the flood warning system. It explains that there will be a graduated flood response effort based on the different flood levels expected. It will also give a brief overview of the main features of the flood warning system. The suggested content of this section could be:

- Brief description of the flood warning mechanism available to the local authority, its location who operates it and on what gauges/methods it is based.

4.4.2 Action Plan

This section utilises the division of the response effort into different discrete stages of flooding to describe the actions to be carried out by all of the responding agencies. It gives the corresponding response actions of each agency for each level of flooding, and is effectively a quick reference guide. The suggested content of this section could be:

- Required actions;
- Insert the agreed trigger levels for each stage of the response;
- Describe the areas that will be affected for that trigger level;
- Describe the actions for each level and who will perform that action.

4.5 Information management and the media

This section will detail how the information on the flood emergency is to be disseminated to operational units, members of the public and media representatives, what specific information is to be passed on, detour routes, when the flood is expected etc. The suggested content of this section could be:

- Describe the methods of communication – sirens, mobile phone, land line telephone, UHF two-way radio, email, websites, news reports etc
- Define who will be the person responsible for contacts (a single point of contact should be used) ;
- Describe the communication arrangements;
- Describe the types of information to be disseminated;
- Give details of where the public may obtain the relevant information;
- Detail how door to door information may be disseminated.

4.6 Additional information

Additional information within the Community Flood Emergency Plan could be:

- List of Contacts

- Maps
- Field Equipment, Facility Resource List, and Main Buildings
- Sandbag/Flood-proofing Policy and Procedures
- Evacuation & Vulnerability Registers
- Incident Report Form & Flood Records
- Traffic Management
- Recovery& Clean-up Operations
- Flood Forecasting & Warning - System Details
- Safety, Health and Welfare considerations
- Training and Testing of the Flood Plan
- Flood Emergency Plan Distribution List
- List of Definitions
- Public Information
- Details of Instructions for Temporary Flood Defences

5. Implementation Plan

In the sections above, the consultant has described the different actions required for the implementation of the community-based flood early warning system. The implementation of such as system will be carried out once all these different stages have been accomplished. In the Figure 4 below a tentative implementation plan is described.

Actions	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16
Implementation of Flood Forecasting System								
Community Workshop - Flood Protection Equipment Delivered								
Community Flood Emergency Plan Implemented								
Community Group								
Risk Assessment								
Communication Plan (including siren deployment)								
Community Action Plan (including evacuation routes and centres)								
Community Drill								
Community-Based FEWS finalised								

Figure 4 – Implementation Plan

5.1 Implementation of Flood Forecasting System

The implementation of the Flood Forecasting System is almost completed. This work is being undertaken by the International Flood Forecasting Early Warning in collaboration with the Flood Forecasting Unit within the Ministry of Emergency Situations. The final implementation of the system it is scheduled for the end of July 2016.

5.2 Community Workshop – Flood Protection Equipment

A Community Workshop was held in Gabala on the 27th of May 2016. Within this workshop the implemented system and the Community Flood Emergency Plan was presented to the different communities attending the workshop. Also, the flood protection equipment acquired within the framework of this project was shown to the different communities and it will be delivered in the near future.

5.3 Community Flood Emergency Plan Implemented

The implementation of the Flood Emergency Plan would require several stages. However, the main issue within this implementation will be the collaboration of the relevant communities. This is evident from the response of the communities in the above-mentioned workshop. It is important to highlight the benefits of such a system and plan to the different communities. At this point, most communities do not understand the benefit of a flood early warning system

due to the lack of preparedness activities at this stage. It is advised that the implementation of the Community Flood Emergency Plan it is undertaken in close collaboration between the Ministry of Emergency Situations, the international Flood Forecasting and Early Warning Expert, the National Institutional Expert and the relevant communities. The initiation of the required activities for the implementation will start in September with a visit to the communities, and will be finalised in December 2016.

5.4 Community Drill

One key stage of the whole implementation process is a community drill. This will help to raise awareness about the system and to identify flaws. It is advised that this drill is undertaken at the end of the year (November or December) when the system implementation is more advanced. The Ministry of Emergency Situations (Regional Centre) should be in charge of these community drills.