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Forecast-based approach for flood in Mali: a prototype of a climate service

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The rainfall regime in the Sahel region in West Africa shows a rise in the extreme rainfall occurrence. During the 2020 rainy season, floods and inundations of unprecedented magnitude have struck almost all the Sahelian countries. Despite this new trend, the local disaster management community still reacts on a response mode, based on an annually updated flood contingency plan. In this work we present the process followed to set-up an Early Action Protocol for riverine flood. Novelty and specificity of this climate service and its co-production process lies in the fact that it's not led by the climate national information providers (meteorological and hydrological agencies), but rather proposed by a user, namely Mali Red Cross Society, with the support of its partners across The Red Cross movement. Working groups (WGs) were established to co-produce the following: participatory mapping of past flood extent linked to historical river flows and vulnerability and exposure analysis for different areas, around the 2 major rivers Niger and Senegal and their tributaries; an impact-based trigger model, taking into account, on a 5 year return period basis, the available river flow monitoring historical analysis of river peaks at the main hydrological stations, the expected impact level, the derived exposure map and vulnerability index; coordination and selection of early actions and intervention map, based on priority impacts, people targeting and feasibility of actions was led by MRCS and its Red Cross partners. After reviewing available tools and capacities, the decision was made to prioritize riverine floods around the two main river basins of Niger and Senegal. In absence of suitable hydrological forecasting models, the agreement was to use the weekly monitoring of river flows and levels by the department of hydrology, combined with rainfall forecast from the Met agency. Water levels corresponding to the 5 years return periods were selected with a lead-time for action of 4 days. The civil protection directorate provided historical flood impacts. In addition, for the city of Bamako, the following actions were undertaken: geomorphometric analysis from radar and satellite imagery; participatory mapping of flooded areas and analysis of the drainage network collectors, with a focus on the state of gutter blockage; analysis of the duration of the rising water after the start of the rain and the duration of water stagnation. The work undertaken by the WGs led to critical data production needed to develop the trigger mechanism for extreme stream flows, and associated impacts, for the noted rivers, inter alia: identification of areas and households exposed to risk; determination of the thresholds required per village/commune to trigger the emergency alert; identification of upstream mitigation activities at the household level, identification of potential partners in coverage areas where cooperation and/or complementarity

is needed; enhanced monitoring of the announced flood through the scientific tools available on a weekly and daily basis. The output of this work is intended to inform discussions in the region and in other regions related to sustainable and appropriate locally led co-development of anticipatory action mechanisms.