



# Flood Forecast-based Action

## Development of Matrix and Triggers



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## What is FBA Matrix?

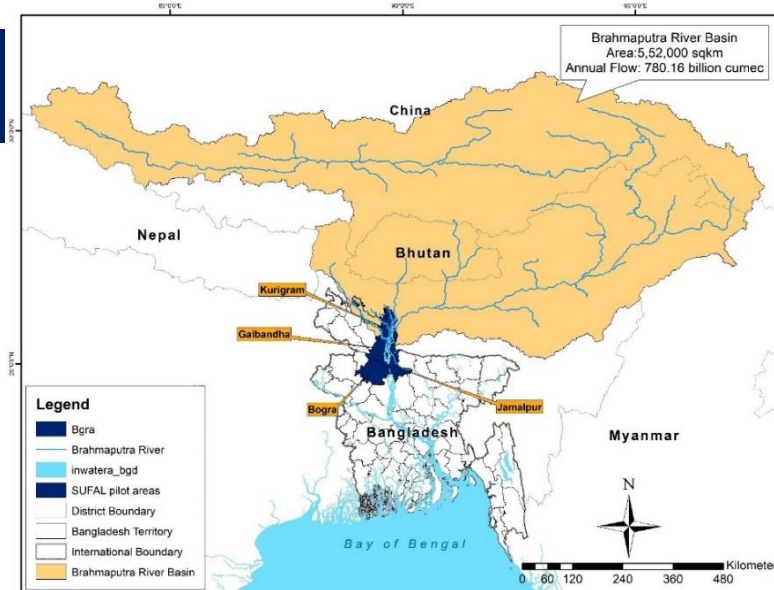
Forecast Based Action or FbA mechanisms are designed to initiate early actions when pre-established thresholds are met. Key to this is a predefined process for either directly initiating specific activities, or developing action plans in real time after the forecast has been issued. Throughout this process, effective coordination and urgency are crucial in order not to miss the opportunity for early action before an impending crisis.

Forecast Based Action (FbA) Matrix relates actions with different forecast parameters. It enables ex-ante actions at different forecast scenarios. It is usually an essential ingredient of a Standard Operating Procedure (SOP) for activating end-to-end forecast-based actions and decision-making from the institutions towards the communities. The different scenarios in the FbA matrix are triggers for different actions.

## Flood Forecast-based Action Development of Matrix and Triggers

### FbA Matrix for SUFAL

The project, Scaling-up Flood Forecast-based Action and Learning in Bangladesh (SUFAL-II) is funded by European Civil Protection and Humanitarian Aid Operations (ECHO), and is being implemented through a consortium led by CARE Bangladesh, with Concern Worldwide, and technical support from Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES). After successful completion of piloting, the project expanded its areas in Kurigram, Gaibandha, Jamalpur, and Bogra district of the Brahmaputra-Jamuna basin area. SUFAL-II is focusing on building capacity of institutions and communities to implement FbA to reduce the loss and damages from impacts of monsoon floods. It is also focusing on developing a harmonized early action protocol where the financing mechanism would be emphasized. SUFAL project aims at scaling up a flood forecast-based action mechanism involving Flood Forecasting and Warning Center (FFWC) of Bangladesh Water Development Board, Department of Disaster Management (DDM), District and Upazila administration and local government institutions.



## FbA Matrix for SUFAL

In case of Forecast Based Financing (FbF) and rapid onset disasters, deterministic triggers are usually used to activate early actions. For example, multi-purpose cash grant will be distributed if the wind gust is expected to be more than 150km/hour during cyclone landfall. However, in case of FbA and slow-onset disasters where the overall dynamics are complex, deterministic triggers might be complemented by multiple scenarios while the decision-making is assisted by a human layer. For example, in the case of floods, a range of parameters needs to be considered, including but not limited to magnitude, timing, trend, duration available lead time, probability of exceedance, etc. Human judgment might be required to determine the evolving nature of this complex hazard and decision-making on the ground. This will create room for situational awareness and adaptive decision-making.

## Different types of Early Action



## FbA Matrix for Floods: Institutional Level

This matrix is based on **Flood Danger Level** (nearest river gauge and or that UDMC/administration agreed upon) and forecast trend of water level/discharge in the river. Actions are mapped using this matrix against different scenarios (combination of parameters), which are the triggers for respective actions. For example, some actions might be triggered if the forecast shows that the water level is at danger level and the flood forecast trend is increasing. Similarly, actions might be triggered for other combinations of danger level and forecast trend. The other factor considered in the matrix is **exceedance probability**. It defines the chance of water level or discharge crossing a certain threshold (danger level or recorded highest water level) or not.

The combination of different parameters will formulate scenarios for taking actions. Therefore, a total of 10 likely scenarios (Table 1) were initially determined for institutional level decision making or early action. For instance, if the water is within 1m below danger level and the forecast trend is increasing, the probability of danger level exceedance gives two scenarios - more or less than 75% chance of exceeding the danger level. In this case, institutions should take specific actions for each scenario.

**Lead-time** determines how much time might be available before the occurrence of an impending flood after the early warning has been issued. The forecast will determine the lead-time, and it is often a considering factor for taking action. **Duration or expected duration** of flood also plays a vital role in decision-making or taking actions. From the flood forecast, at some stage, it might be predicted how many days the flood will stay above danger level, which is called expected duration. For example, the hydro-graph below shows the forecast for Jamuna River at Aricha point. According to this graph, the water level might cross the danger level around 1st October, peak around 5th October, and gradually decrease and fall below danger level after 8th October 2019 which indicates an expected duration of 7 days.

Within this period, surrounding areas will be flooded. This time period is called the expected duration of a flood. It should be noted that the expected duration cannot be determined at an early stage of flood detection. **Forecast Consistency** is also a very important consideration, especially for the forecasters. The first forecast generated that gives a hint of 75% chance of danger level exceedance within 15 days is not the one to be considered. Rather, the forecaster should observe the next couple of forecasts to evaluate forecast consistency before issuing an early warning. Forecast consistency is checked to reduce uncertainty in forecasts. **Time to peak** and **rate of increase** of water level or discharge are also sometimes considered in decision making. The decision-makers will need to look at the probable impact of floods to determine where to take the actions and prioritize the actions listed in Table 1.

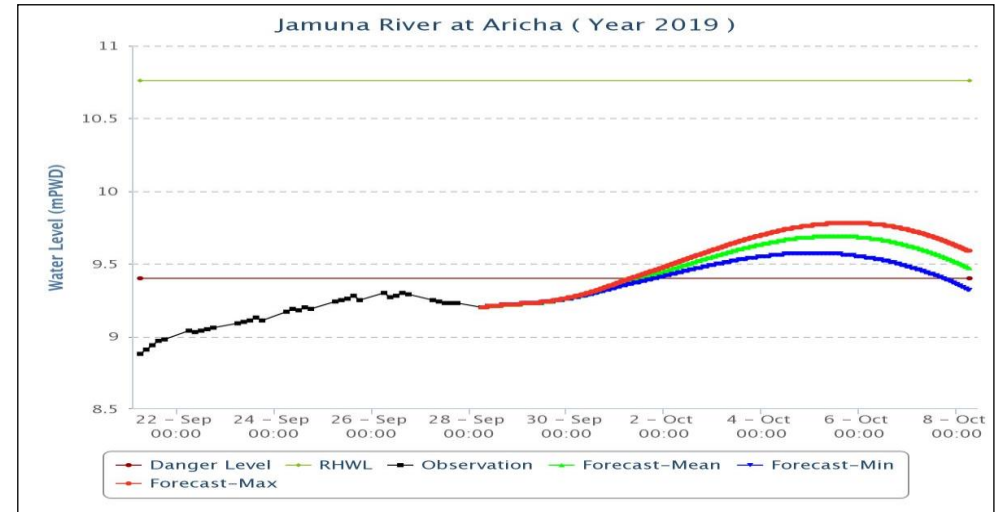
# FbA Matrix for Floods: Institutional Level

Table 1: Proposed FbA Matrix - Institutional Level

Forecast Trend → Danger Level ↓	Decreasing		Increasing	
	More than 1m above Danger Level		>75% Probability of Exceeding Recorded Highest	
At danger level and up to 1m above Danger Level				
Within 1m below Danger Level		>75% Probability of Danger Level Exceedance		<75% Probability of Danger Level Exceedance
More than 1m below Danger Level				

It is recommended that the forecasters and technical experts determine the prevailing scenario at any instance based on different forecast products. The scenarios shown in Table 1 can also be color coded. When the forecasters/technical experts forecast a particular scenario, the disaster managers can decide on the actions from the predetermined list against that scenario considering anticipated impacts and recommendations from the technical experts.

## Example Actions based on a scenario



10-day waterlevel forecast hydrograph of Jamuna River at Aricha (2019)

Table 2: Example Actions based on a scenario

Forecast Trend → Danger Level ↓	Decreasing		Increasing	
	Within 1m below Danger Level	<p><b>&gt;75% Probability of Danger Level Exceedance</b> Coordination meeting, EW dissemination, carryout/ expedite minor embankment repair, check shelter status and preparation, etc.</p> <p><b>75% &lt; Probability of Danger Level Exceedance</b> Coordination meeting, EW dissemination, carryout/expedite minor embankment repair, etc.</p>		

## FbA Matrix for Floods: Community Level

The FbA matrix for community level is rather simplified (Table 2). There can be two phases; one is before flood, and other is during flood. Actions during a flood will remain open-ended, and the community will prioritize what actions should be taken based on the anticipated impact.

For actions before floods, the matrix is relatively simple and considers the available lead time. There will be a list of specified actions that the community can take at different lead times before floods which will be ranked or prioritized according to the available lead time of forecast and expected impact.

For the impact information, expected duration, exceedance probability, forecast trend, the vulnerability of different sectors, etc., might be considered. Therefore, communities may need to consider available lead time before the flood hits and the probable impact. Actions might vary with the same expected impact at the different available lead times and vice versa. On the other hand, same actions can be taken by the community at different lead times.

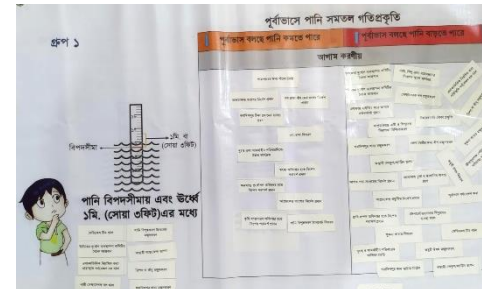
From the prioritized actions, the community, with the help from the Local Government Institutions, can determine which actions can be taken within their capacity and what needs financing.

Annex – I provides an example of community-level actions based on forecast/early warning accumulated from SUFAL pilot areas.

Table 3: Proposed FbA Matrix -Community Level

Actions	Lead time					
	1 day	3-5 days	5-7 days	7-10 days	10-15 days	>15 days
Evacuate homestead	x					
Shift livestock to high land	x	x				
Netting and raising perimeter of ponds		x	x			

Pictures from Early Action matrix consultations

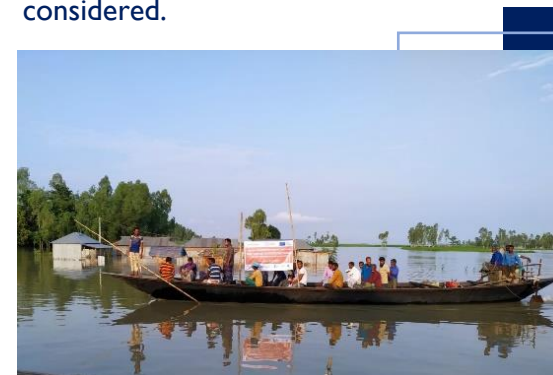


## Modified Early Action Matrix under 2020 Covid-19 Situation

Table 4: Modified Early Action Matrix under 2020 Covid-19 Situation

Type of Action	Early Action
<b>Level 1 Early Actions</b>  <i>Can be taken at 50-60% probability of a flood occurring</i>	Provision of protective gear for DMCs and volunteers (COVID19 considerations)
	Preparation of general advisory on forecast and flood risk for households
	Dissemination of forecast and early warning information to community <ul style="list-style-type: none"> <li>- Checking and repair of hand-held / mobile loudspeakers</li> <li>- Volunteer support, renting vans</li> </ul>
	Listing most vulnerable households for MPCG (Cross-check list of VGD/VGF) <ul style="list-style-type: none"> <li>- Selection criteria: poverty level, household location, gender/inclusion, Agri/WASH/health</li> </ul>
	Listing most vulnerable households for evacuation and other support
	Preparation of flood shelters and evacuation points (repair rooms, WASH facilities, electric supply, with provisions for gender and special needs, COVID19 considerations)
	Repair damage to access roads, evacuation routes, and embankments (Coordination with BWDB and using indigenous knowledge) <ul style="list-style-type: none"> <li>- Cash for Work (CfW) for fixing roads, evacuation points</li> </ul>
	Protection and repair of tube wells and toilets in common and large catchment areas (schools, flood shelters, evacuation points)
<b>Level 2 Early Actions</b>  <i>Can be taken at 75% probability of a flood occurring and when at least 5 days flooding is expected</i>	Multi-purpose cash grants (MPCG) to ultra-poor and poor households in flood forecasted zones (BDT 4,500)
	Distribution of water container/tanks to households (20L/500L), water purification tablet, soap, ORS (BDT2,500 - need to be crosschecked)
	Evacuation support to most vulnerable households with women, children, elderly, persons with disability (e.g., provision of boats and trawlers) <ul style="list-style-type: none"> <li>- Arrangement of transportation in case of evacuation (boats, trawlers)</li> <li>- Rent, fuel costs</li> </ul>
	Provision of face masks and/or first aid kits at shelters (Coordination with DoH and DPHE) <ul style="list-style-type: none"> <li>- Depending on the numbers of persons taking shelter at each point</li> </ul>

As it was not possible to finalize the institutional level FbA matrix through a consultative process before the monsoon season began due to the 2020 COVID-19 situation, the SUFAL project, in consultation with FFWC and DDM, set up an alternate trigger matrix for enabling FbA during the 2020 monsoon season. This trigger mechanism is rather simpler but thought to be feasible amidst the pandemic. The heightened risk from flood during the Covid-19 crisis has also been considered while proposing alternate triggers. The modified Early Action Matrix provides the simple two-stage triggers and corresponding short-listed early actions. It should be noted that while implementing the following matrix, the other considerations mentioned in the ideal institutional matrix, e.g., magnitude of water level, forecast trend, consistency, and lead time, may also be considered.

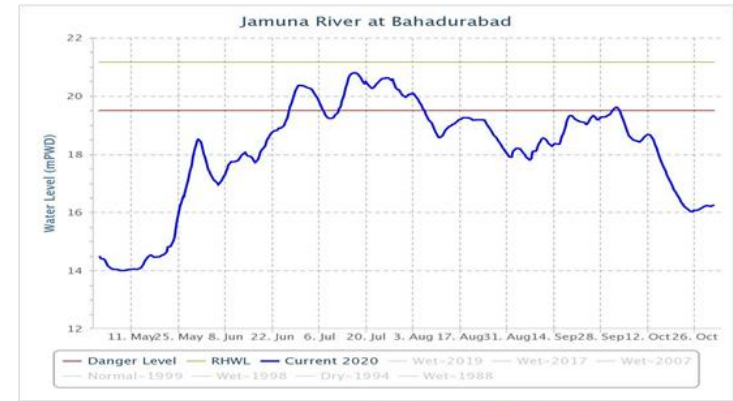


## The Scenario based Triggers and Experience in SUFAL

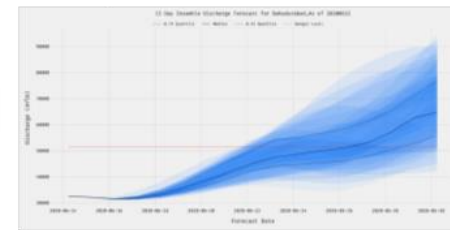
The FbA Matrix for monsoon floods developed under SUFAL project is designed as a subjective triggering mechanism compared to single deterministic trigger where a set of actions are triggered when a single threshold is exceeded. The approach adopted under SUFAL is where set of actions are triggered at different pre-determined scenarios. During the flood of monsoon 2020, which affected more than 5 million people and lasted more than a month in few places, the scenario-based trigger from the FbA matrix was used for piloting and evidence generation in SUFAL project areas which continued during 2021-22. The matrix is however evolving and incorporating early actions based on the lessons identified and co-production process explained in the next section.

It has been observed that the scenario-based triggers work better compared to deterministic trigger in case of multiple peaks/frequent floods during a single season. For example, there were 5 peaks and at least two consecutive floods during the 2020 monsoon season in the Northwestern part of Bangladesh which is located at the downstream end of the Brahmaputra River basin. In mid-June, the 15 days streamflow forecast indicated more than 80% chance of danger level exceedance at Bahadurabad station – the outlet of the Brahmaputra River basin. This activated level 1 trigger as described in Table 4 in SUFAL project areas. As the flood event unfolded the forecast provided more insights regarding the probable duration of flood which indicated at least 5 -7 days duration in the SUFAL project areas. This activated level 2 trigger and corresponding actions (Table 4). Through subsequent updates in the forecast (updated daily) there was an indication that water level in Brahmaputra-Jamuna River system may recede below danger level and again exceed it around 2nd week of July and the expected magnitude of flood was higher than the first. At this stage, trigger 2 was reactivated which allowed very adaptive early actions before the flood. Single deterministic trigger lacks this adaptability. For scenario-based triggering guidance on the prevailing scenario is needed from the forecasting authority. In addition, local level coordination is essential for effective early action implementation. This whole framework could be incorporated into a Standard Operating Procedure (SOP).

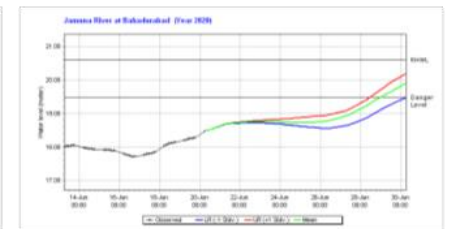
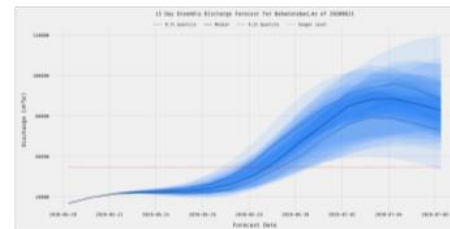
(a)



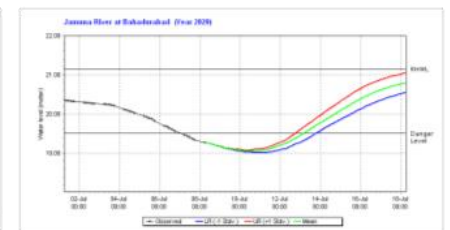
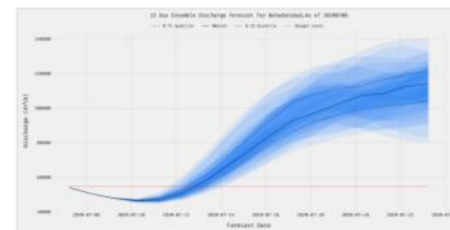
(b)



(c)



(d)



Trigger Phases during 2020 Monsoon Floods in Bangladesh: (a) showing the points of trigger in hydrograph of Bahadurabad station; (b), (c), (d) showing the 15 days and 10 days forecast available at the time of triggering

## Co-production of Early Action Matrix

During Monsoon 2020, a modified early action matrix was implemented at ground level. But as the COVID-19 situation improved, stakeholder and beneficiary consultations took place in three districts, and the early actions were listed in the draft matrix. During the consultations, participants provided feedback to update some scenarios. Considering the district-level consultation feedback which continued during SUFAL Phase II, the scenarios were updated in consultation with DDM and FFWC and finally the early action matrix has been modified with 7 scenarios. Islamic Relief Bangladesh and Save the Children are also working in Jamalpur and Gaibandha on anticipatory actions for floods. They are also using the same matrix for FbA implementation and has contributed in enriching the matrix contents through consultative process. Latest form of the early action matrix and draft matrix with early actions are given below. It should be recognized that the early actions are evolving which will result in evolution of this matrix over time and while the key action are same everywhere, based on localized context and needs, new or specialized early actions can be added.

Table 5: Updated format of Early Action Matrix

Forecast Trend → Danger Level ↓	Decreasing	Increasing
More than 1m above Danger Level		
At danger level and up to 1m above Danger Level		
Within 1m below Danger Level		>75% Probability of Danger Level Exceedance
		<75% Probability of Danger Level Exceedance





Table 6 Draft early action matrix with early actions

<b>Forecast Trend</b> → <b>Danger Level</b> ↓	Decreasing	Increasing
More than 1m above Danger Level	Monitor Flood Forecast, Emergency Medicine Distribution, Special Advisory from Agriculture, Livestock, Fisheries, and Public Health department, Water purification tablet distribution	Multi-purpose cash grant, Disaster Management Committee Meeting, prepare new flood shelters, Early Warning Dissemination, Ensure safety and security of women and children at shelters
At danger level and up to 1m above Danger Level	Monitor Flood Forecast, stockpiling of emergency medicine, Installation and repair of tube wells, Arrangements for vaccination of cattle, provide instructions for repair of broken roads and dams, provide special advice from the Department of Fisheries/Livestock/Agriculture, Repair and installation of latrines post flood event.	Disaster Management Committee meeting, Multi-purpose Cash Grant, Distribute water purification tablets, Provide special advice from the DPHE/DAE/DLS, Distribution of dry food and fodder, Make arrangement for cooked meal distribution at the shelters, Formation of regular flood situation monitoring teams by area, Storage of disinfectant (potas/ bleaching powder), Rescue activities for the needy and helpless families, Distribution of dry food and fodder, Distribution of emergency medicine, Establishment of temporary health center, Provide advance warning by milking in the area, Emergency medicine storage, Installation of temporary tube wells / latrines, Formation of women volunteer teams, Ensuring the safety of women and children in shelters, Volunteer team preparation, Dissemination of warning through mic announcement, community radios etc., Installation of temporary mobile charging stations (solar)
More than 1m below Danger Level	Monitor Flood Forecast, Special Advisory from Agriculture, Livestock, Fisheries; Repair embankments/roads, livestock vaccination campaign, instruction to leave flood shelter; temporary cooking stove prepare	<p><b>&gt;75% Probability of Danger Level Exceedance</b>            Disaster Management Committee Meeting, Repairing evacuation routes, Early Warning Dissemination, Multi-purpose cash grant, Shelter preparation, Making a list of destitute and helpless families, evacuate families at risk, storage of water purification tablets, storing dry food, storing fodder, harvest crops based on advisories from department of agricultural extension (DAE), formation of volunteer teams, formation of women volunteer group, storage of emergency medicine supply, Formation of medical team, Generator /Solar Power Management, making arrangements for temporary shelter, livestock vaccination campaign, prepare boats for evacuation, Repairing tube wells/latrines at shelters</p> <p><b>&lt;75% Probability of Danger Level Exceedance</b>            Shelter preparation/repairing, minor repair of embankments and evacuation routes, vaccination campaign for livestock, water purification tablet storage, store disinfectant and anti-venom, formation of Volunteer and Medical Team, prepare evacuation boats; form area-based flood monitoring teams, conduct rescue drills</p>

## Readiness Actions based on One Month Flood Outlook

In the preceding sections, the triggers were set based on short range (5-day lead-time deterministic) and medium-extended range probabilistic forecast (10–15-day lead-time). Forecasts are usually more accurate at shorter lead time and it might not be possible to predict exact conditions at precise times. Nevertheless, it is possible to make forecasts of the river conditions over an extended period of time (a month or a season), with a longer lead of up to many months, e.g. a forecast of monthly streamflow. These monthly forecasts from models are probabilistic, meaning that they typically come from multiple runs of the model (an ‘ensemble’). Probabilistic forecasting is now the standard approach used in major global modelling centres and accounts for inherent uncertainty in both the climate system and the models themselves. Probabilistic forecasts provide an estimate of the likelihood of some event occurring, e.g. a 30% chance of water level greater than danger level. It aids in decision making forecast-based decision making and allows to go for readiness actions with a greater ‘anticipatory window’.

Considering the lessons from SUFAL, the second phase of SUFAL will introduce readiness actions based on one-month probabilistic flood outlook. This outlook will provide an overview whether a significant flood event is likely during the next one month. RIMES is currently working on the technical development of such outlook for Brahmaputra River basin in collaboration with FFWC. Such outlook once operationalized will be updated once a week.

### Trigger for one month outlook:

Uncertainty increases with increase in lead-time of the forecast. Therefore, to utilize the extended forecast products, a higher exceedance probability will be considered. **Danger level exceedance probability** of 90% or higher will be used for one month outlook to trigger readiness actions. In this case the forecast should be consistent for consecutive two weeks.

### Readiness Actions based on One Month Outlook:

One month outlook will provide an idea about above normal streamflow, the probability of danger level exceedance following one month time. As it has a wider margin of uncertainty compared to other available forecast products, less sensitive actions can be undertaken following the outlook. Actions listed in the green boxes and other associated low value actions can be considered readiness actions and be triggered based on the one-month outlook.

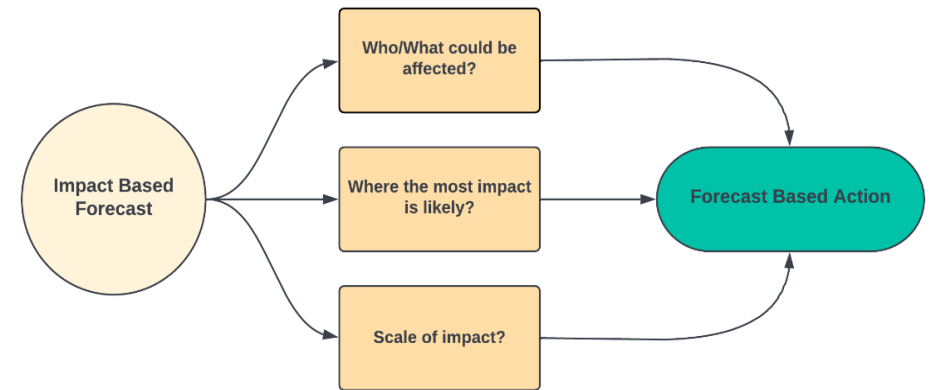
## Impact Based Forecasting as an Enabler for Early Actions

Forecast based early actions largely on understanding of the anticipated impact which depends on expected flood magnitude, inherent vulnerability of the area, the type and number of elements exposed etc. In the 7 scenarios of FbA matrix, there are number of actions listed in each matrix. Impact based forecast will enable stakeholders to prioritize among the actions and determine where to mobilize resources. For example, the distribution of multi-purpose cash grant which is considered a sensitive action, should be disbursed if high impact is forecast for particular location for more than 3 days. Up to 3 days it can be considered that communities are resilient enough to cope with such flooding. This approach will ensure the coping capacity of the communities are not undermined.

Forecast based action is dependent not only on hazard information but also where the hazard may have high impact and what is needed to minimize such in the area. Impact based forecasting is therefore very pertinent for effective forecast-based action.

## Impact Based Forecasting as an Enabler for Early Actions

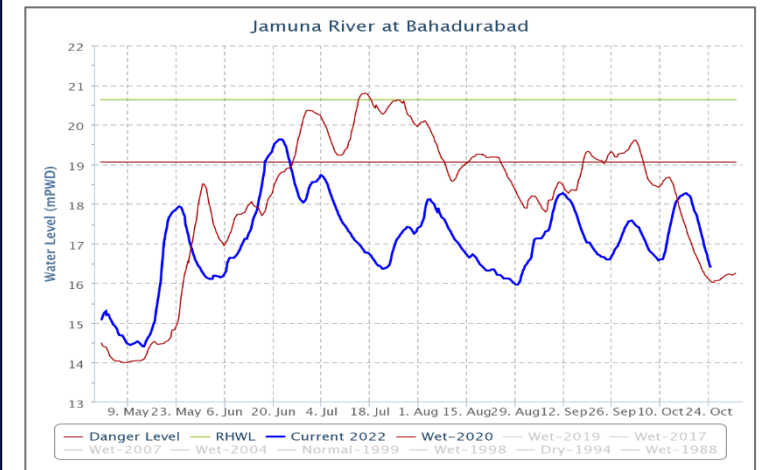
During the monsoon flood of 2022, impact-based forecasting played an important role in setting triggers and prioritizing early actions. As explained in the previous section sensitive actions (such as cash grant disbursement to beneficiaries) can only be triggered if the expected impact of the upcoming event is significant enough. During monsoon 2022, in the month of June the project area experienced short lived, comparatively low impact flooding. Through impact analysis, it was forecast that high impact levels will not persist for more than 5 days in most areas. This information assisted the actors in deciding appropriate early actions and helped to avoid taking actions that may have turned out to be contributing to negative coping capacity of the communities at the end.



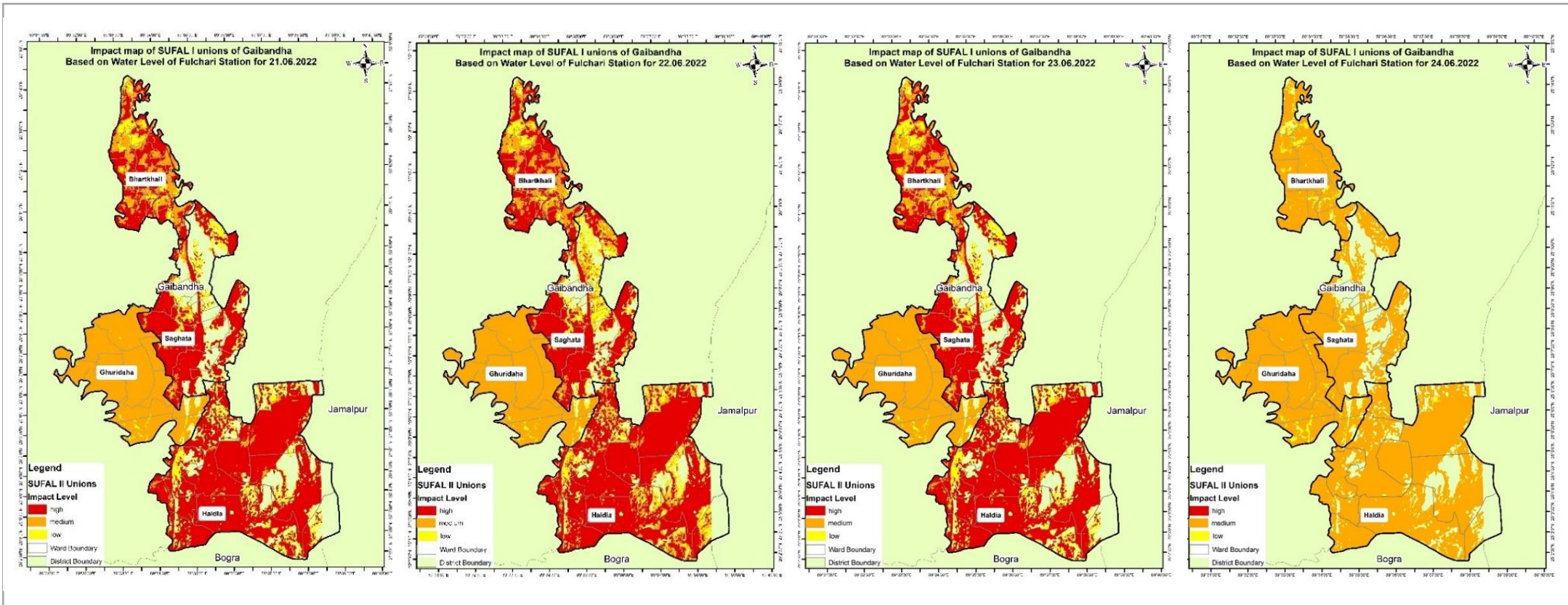
## Trigger or not to Trigger?

The Impact maps for Saghata upazila, Gaibandha (next page) reveals that the peak flood level as well for the previous day and following two days. As depicted in the maps, the high impact level zones do not persist for long and by 24<sup>th</sup> June many of the areas soon recovered to medium and low levels of impact. The insights obtained from this analysis guided the authorities and SUFAL consortium in taking decision on activating the trigger. There was more than 75% probability that the danger level would be exceeded. However, both the expected flood duration and magnitude were forecast comparatively low and high impact was not expected to be lasting more than 3 – 4 days most of the cases. Based on these, it was decided not to go for widespread and sensitive actions e.g. evacuation, multi-purpose cash grant distribution etc. However, in some low lying charlands some distressed families were supported in evacuation. So, during this event, in consultation with the local authorities SUFAL and other agencies like Islamic Relief, Save the Children did not disburse multi-purpose cash grant rather initiated limited early actions to evacuate families living in low lying areas of chars, supported beneficiaries to move livestock to safer place, ensured readiness of flood shelters, constructed bamboo foot bridges on need basis to keep communication uninterrupted etc.

This decision of not triggering was also supported by one month streamflow outlook, an experimental forecast product currently under development by RIMES in collaboration with FFWC, which did not indicate another subsequent flood peak. The decision was also discussed and agreed upon in the National FbA Working Group – a conglomerate of FbA actors in the country.



Monsoon 2020, 2022 hydrographs at Bahadurabad station indicating a short duration low magnitude flood in 2022 compared to 2020



Forecast Impact Maps produced for Saghata Upazila During June 2022 Flood: the peak flood was expected on 22nd June 2022 which quickly receded as seen in the hydrographs (previous page)

## List of Early Actions as identified by SUFAL for Kurigram, Gaibandha and Jamalpur<sup>1</sup>

Sl.	Early Action	Lead time (days)																
		>15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>Coordination</b>																		
1	DMC Coordination Meeting to assess the situation and decide on early actions ( <i>district, Upazila, union</i> )	x	x					x					x	x	x	x	x	x
2	Coordination with BDRCS volunteers, community volunteers, women's groups, FPP	x	x					x					x	x	x	x	x	x
3	Monitoring impacts on households, agriculture, health, and WASH ( <i>continuous process</i> )	x	x				x	x				x	x	x	x	x	x	x
4	Provision of protective gear for DMCs and volunteers (COVID19 considerations)	x	x	x	x	x	x	x										
<b>DRM</b>																		
5	Preparation of general advisory on forecast and flood risk for households		x					x					x	x	x	x	x	x
6	Dissemination of forecast and early warning information to the community - <i>Checking and repair of hand-held / mobile loudspeakers</i> - <i>Volunteer support, renting a van, boats, etc.</i>		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7	Listing the most vulnerable households for evacuation and other support		x	x	x	x	x	x										
8	Preparation of flood shelters and evacuation points (repair rooms, WASH facilities, electric supply, with provisions for gender and special needs, COVID19 considerations)	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
9	Distribution of temporary shelter kits for households evacuating from low-lying areas and areas outside embankments		x	x	x	x	x	x	x	x	x	x	x	x	x			
10	Repair damage to access roads, evacuation routes, and embankments (Coordination with BWDB) - <i>CfW for fixing roads, evacuation points</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
11	Distribution of materials for protecting and strengthening households (e.g. bamboo, bricks, stove)							x	x	x	x	x	x	x	x			
12	Cash grant to households for evacuation							x	x	x	x	x	x	x	x			
13	Provision of face masks, first-aid kits, medical support at shelters (Coordinate with DoH, DPHE) - <i>Depending on the expected numbers of persons taking shelter at each point</i>															x	x	x

<sup>1</sup> Initially, SUFAL project conducted consultations with targeted communities to identify potential early actions, and the kind of support community and households would need to mitigate impacts of anticipated floods in a 15-day timeframe. Later, this list was used for consultations at subdistrict (upazila) level with key institutions (local government administration, disaster management, agricultural extension, livestock services, fisheries, public health and engineering, women affairs, primary and secondary education). From this list, some early actions were tested in the 2020 monsoon season.

Sl.	Early Action	Lead time (days)																	
		>15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
14	Evacuation support to most vulnerable households: pregnant or lactating women, children, elderly, persons with disability, women-headed households (e.g. provision of boats and trawlers) - Arrangement of transportation in case of evacuation (boats, trawlers) - Rent, fuel costs																x	x	x
15	Provision of food and NFI (blankets, clothes) at flood shelters and evacuation points																x	x	x
<b>Agriculture</b>																			
16	Assessment and monitoring of the situation by DAE, DoF	x	x	x															
17	Preparation of advisory on agriculture, livestock, and fisheries (dependent on flood timing)		x	x															
18	Dissemination of awareness messages on the protection of agricultural assets		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
19	Listing the most vulnerable households for agricultural support		x	x	x	x	x	x											
20	Distribution of materials for the protection of agriculture and fisheries (e.g. fishing nets, fish feed)							x	x	x	x	x	x	x					
21	Cash grant to households for protection of agricultural assets							x	x	x	x	x	x	x					
22	Selling crops and fish (Coordination with DAE, DoF for market access)						x	x	x	x	x	x	x						
<b>Livestock</b>																			
23	Assessment and monitoring of the situation by DLS	x	x	x															
24	Preparation of advisory on livestock management		x	x	x														
25	Dissemination of awareness messages on livestock management		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
26	Stockpiling medicine/vaccination for cows, goats, and poultry (Coordination with DLS)		x	x	x	x	x	x	x	x	x	x	x	x					
27	Listing most vulnerable households for protection and evacuation of livestock		x	x	x	x	x	x	x	x	x								
28	Arrangement of location for sheltering livestock		x	x	x	x	x	x	x	x	x								
29	Cash grant to households for livestock protection and evacuation							x	x	x	x	x	x	x					
30	Distribution of medicine/vaccination for cows (Coordination with DLS)							x	x	x	x	x	x	x					
31	Distribution of materials for protection of poultry and livestock (e.g. fodder)							x	x	x	x	x	x	x					
32	Support to households for evacuation of small animals (e.g. trawlers)												x	x	x	x	x	x	
33	Provision of water and fodder in evacuation shelters/points												x	x	x	x	x	x	

Sl.	Early Action	Lead time (days)																
		>15	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
34	Selling poultry and small animals (Coordination with DLS for market access)						x	x	x	x	x	x	x					
<b>Health &amp; WASH</b>																		
35	Assessment and monitoring of the situation by DPHE and DOH	x	x	x														
36	Preparation of advisory on health and WASH		x	x	x	x	x											
37	Dissemination of messages on health and hygiene promotion; water source protection		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
38	Listing the most vulnerable households for health and WASH support		x	x	x	x	x	x	x	x	x							
39	Protection and repair of tube wells and toilets in common and large catchment areas (schools, flood shelters, evacuation points)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
40	Stockpiling water purification tablets, ORS, medicine for injury/illness, snake bites (community clinic)							x	x	x	x	x	x	x	x	x	x	x
41	Stockpiling menstrual kits (community clinic)							x	x	x	x	x	x	x	x	x	x	x
42	Distribution of water container/tanks to households (20L/500L), water purification tablet, soap, ORS							x	x	x	x	x	x	x				
43	Distribution of water purification tablets, ORS, medicine to households							x	x	x	x	x	x	x				
44	Distribution of hygiene kits (soap, towels, menstrual towels) to households							x	x	x	x	x	x	x				
45	Cash grant to households for health, WASH, including water source protection							x	x	x	x	x	x	x				
46	Medical evacuation support for sick and elderly															x	x	x
47	Provision of emergency healthcare facilities at flood shelters and evacuation points															x	x	x
<b>Social Protection</b>																		
48	Assessment and monitoring of the situation by DMCs and DSS/DSW	x	x	x														
49	Listing most vulnerable households for MPCG ( <i>Cross-check list of VGD/VGF</i> ) - Selection criteria: household location, poverty level, gender/inclusion, Agri/WASH/health	x	x	x	x	x	x	x	x	x	x	x						
50	Multi-purpose cash grants (MPCG) to ultra-poor and poor households in flood forecasted zones							x	x	x	x	x	x	x				
51	Distribution of food packages to ultra-poor and poor households in flood forecasted zones							x	x	x	x	x	x	x				
52	Distribution of baby food to ultra-poor and poor households in flood forecasted zones							x	x	x	x	x	x	x				

### **Document version 3.7; August 2022**

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