

ROADMAP FOR A FORECAST-BASED EARLY ACTION SYSTEM IN ZIMBABWE AND IN THE ZIMBABWE RED CROSS SOCIETY



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Executive Summary

The Zimbabwe Red Cross Society (ZRCs), together with its partners, is about to embark on an interesting journey in spring 2019, when the development for a Forecast-based Early Action (FbEA) System will start. This report presents a roadmap for the FbEA system for the ZRCs and Zimbabwe in general, and provides recommendations, complemented with actions for the FbEA system development process.

FbEAs are taken based on forecast and risk information to mitigate and prevent the impacts associated with hydro-meteorological events. The early actions are funded by Forecast-based Financing (FbF), which enables automatic access to humanitarian funding. A FbEA system is a shift for the ZRCs from its current disaster response interventions to trigger action before the impending disaster, based on hazard and impact forecasts and other data. Thereby, the FbEA process provides the ZRCs an opportunity to shift toward more effective disaster risk management.

The ZRCs proposes to integrate FbEA into its activities through existing programmes. This will happen over a period of at least two years through pilot testing and building on existing ZRCs community-based warning/early action systems in the short term, while aiming to institutionalise the approach within government over the long term. However, this report stresses that FbEA requires the development of ZRCs early action capacity for larger scale disasters where pure community level warning/early actions are not enough, and that FbEA is different from pure community-based initiatives. An important component of the FbEA system is the automatic release of funding to implement the early actions, whether by the volunteers at the communities or ZRCs staff.

The recommendations and more specific actions given in the report are categorised under four priority levels of implementation: 1) must be done at the beginning of the FbEA system development process; 2) should start at the beginning of the FbEA system development process; 3) can be done during the FbEA system development process once the window of opportunity arises; and 4) can be done if resources and the situation allow.

The focus of the system development should be on El Nino induced drought and food insecurity in the first phase. Cholera outbreaks should also be considered. The FbEA possibility for cyclone induced flooding should be considered more in detail.

At first, system development should focus on the hazards and their impacts at a smaller scale, and simple, low-cost early actions to pilot FbEA within the ZRCs. As the priority of the ZRCs is to develop the system through existing community-based warning/early action initiatives, it should be kept simple in the beginning. This can be done by adding a small financing component to the community-based early action initiatives at the local level and integrated a financial contribution into the long term ZRCs and Partner National Society programmes.

Various financing options to undertake early actions should be considered. Subsequently, the development of two sets of Early Action Protocols (EAPs) is recommended: first, to address small-scale hazards/disasters not qualifying for Forecast-based Action by the DREF (Disaster Relief Emergency Fund) by using the crisis modified funds within the partner national societies, and, second, eventually working toward FbA through the DREF once experience has been gained.

Triggers for drought related food insecurity could be based on a combination of various forecasts (such as FEWS-NET, El Nino, seasonal rainfall forecasts), community surveillance and market monitoring. The first step of the project phase is to determine how the triggers from community consultation are identified, what tools from the Household Economy Approach (by the Livelihoods Resource Centre of the International Federation of the Red Cross, or similar) are used, and then define the triggers. The second step involves piloting of the triggers.

Cholera forecasting is difficult, and the feasibility of the on-going work of the International Federation of Red Cross and Red Crescent Societies (IFRC) on cholera preparedness, based on community monitoring, should be further assessed. Alternatively, research on forecasting cholera could be undertaken, but the benefits of this compared to the IFRC cholera framework should be carefully assessed.

Tropical cyclones associated with strong winds and particularly heavy rainfall cause major impacts in Zimbabwe. The forecast lead time at provincial level (approx. 24 hrs) and the damage formation and extent do not allow for effective large scale early actions. However, smaller, volunteer and branch-based early actions may be feasible. This should be investigated during the development process.

The EAPs require an assessment of the community level disaster impacts, vulnerabilities, capacities and particularly the beneficiary needs to develop effective early actions. The early actions developed should be effective, efficient and no-regrets: i.e. actions should benefit the beneficiaries and communities even if the hazard does not materialise or has no effect. For instance, cash transfers or school feeding, as food insecurity actions, benefit marginalised communities and vulnerable households in all instances, and, in the best case, prevent the use of harmful coping strategies.

To ensure the sustainability of the FbEA system, development should be done in close collaboration with the government of Zimbabwe and other national organisations. Partners, such as the World Food Programme, who have expressed their interest to collaborate, are also key. The potential for collaboration on trigger development and large scale food insecurity situations should be investigated. Other ZRCS stakeholders, such as Partner National Societies (PNSs) and their back donors, should understand and accept the triggers.

A government-led FbEA system is currently not feasible, although it would provide the most sustainable system. Nevertheless, the ZRCS, potentially together with other humanitarian actors working on FbEA should collaborate with all relevant government departments, and public authorities at the regional level to: 1) institutionalise FbEA within government structures, and 2) improve long-term disaster risk reduction and management in Zimbabwe.

If research is needed to support the FbEA system development, it should contribute to improving the currently scattered meteorological, disaster and climate change research in Zimbabwe. External experts could be used to mentor and supervise researchers in Zimbabwe and bring knowledge from research programmes existing elsewhere.

The development of an FbEA system has the potential to contribute to the long-term organisational development of the ZRCS, and to improve its general disaster preparedness and response capacity (also in situations when early actions are not feasible). The ZRCS and its PNSs should establish the necessary conditions for a sustainable FbEA system: leadership, commitment, engagement and resources. The ZRCS needs to allocate staff time, administrative support and leadership to establish the FbEA system. The PNSs must ensure that developing the FbEA system does not become an additional commitment that competes for the ZRCS's already overstretched resources.

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Abbreviations

BOCA	Branch Organisational Capacity Assessment
CADRI	Capacity Assessment of the Disaster Risk Management System
DCP	Department of Civil Protection
DREF	Disaster Relief Emergency Fund
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EAPs	Early Action Protocols
EM-DAT	Emergency Events Database
FAO	Food and Agriculture Organization of the United Nations
FbA	Forecast based Action
FbA by the DREF	Forecast based Action by the DREF
FbEA	Forecast-based Early Action
FbF	Forecast-based Financing
FEWS-NET	Famine Early Warning System Network
HES	Household Economy Security
GIS	Geographic Information System
IFRC	International Federation of Red Cross and Red Crescent Societies
IM	Information Management
MEAL	Monitoring, Evaluation, Accountability and Learning
MSD	Meteorological Service Department of Zimbabwe
NAP	National Adaptation Plan
NS	National Society
OCAC	Organisational Capacity Assessment and Certification
ODK	Open Data Kit
OSM	Open Street Map
PER	Preparedness for Effective Response
PNSs	Partner National Societies
PMER	Planning, Monitoring, Evaluation, Reporting
UNDP	United Nations Development Programme
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organisation
WRSI	Water Requirement Satisfaction Index
SARCOF	Southern Africa Regional Climate Outlook Forum
SIRDC	Scientific and Industrial Research and Development Centre
ZINWA	Zimbabwe National Water Authority
ZIMSTAT	Zimbabwe National Statistics Agency
ZIMVAC	Zimbabwe Vulnerability Assessment Committee
ZRCS	Zimbabwe Red Cross Society

Objectives, Background and Methodology

This report presents a roadmap for a Forecast-based Early Action system (from now on, FbEA system) for the Zimbabwe Red Cross Society (ZRCS) and Zimbabwe in general, and provides recommendations for the FbEA system development process starting in April 2019.

This is achieved by consolidating existing disaster risk information to select the natural hazards to target during the early stages of the system development, and analysing the gaps and capacities of various actors and information essential for the system development. The most urgent recommendations are given for the early stages of system development to be undertaken during a project starting in April 2019, but recommendations are also given for more long-term efforts as they were raised by various stakeholders during the feasibility study mission between late November 2018-early February 2019.

The FbEA process provides the ZRCS with an opportunity to shift toward more effective disaster risk management. Early action, per se, is not a new concept for ZRCS; it has had community-level warning-based early action components in several programmes. However, FbEA provides an opportunity to scale-up and institutionalise the existing early action efforts. The approach proposed by the ZRCS is to integrate FbEA into its interventions through existing programmes. This will happen during a two year period through pilot testing and building on existing ZRCS community-based warning/early action systems in the short term, while aiming to institutionalise the approach within government over the long term.

FbEA should not be considered as a project, but a system with various actors, relationships and components. The ZRCS must be committed to develop and maintain these elements to enhance its early action capacity. Once the FbEA system is in place, it needs to be maintained and function without project or external funding. Therefore, FbEA needs to be integrated into the core operational structures of the ZRCS, so that, eventually, it will become a routine way of doing humanitarian actions. The recommendations and suggested actions provided in this study aim toward achieving this goal. The success in adopting and implementing FbEA depends on the leadership, long term commitment and a focus on organisational development of the ZRCS, and an enabling environment in Zimbabwe to work together with public authorities and other actors. Naturally, forecasting capacity for the major hazards is a key issue, but beyond the direct influence of the ZRCS.

This feasibility study analyses FbEA system development from ‘innovation systems’ perspective. A system can be defined as a set of interrelated components working toward a common objective. Systems are made up of components, relationships, and attributes. These terms are not repeated in the feasibility study consistently, but the idea of system innovation has guided the analysis.

- *Components* are the operating parts of a system, such as actors (e.g. organisations, individuals, universities, government agencies); or artefacts (e.g. hydro-meteorological forecasts/warnings or disaster impact data).
- *Relationships* are the links between the components. Relationships are important, as the properties and behaviour of each component influences the properties and behaviour of the system as a whole (such as the relationship between ZRCS and public authorities).
- *Attributes* are the properties of the components and their relationships; they characterize the system (such as the accuracy of forecasts, or dedication of ZRCS).

The feasibility study was guided by the existing Forecast-based Financing Manual¹ and its feasibility study guide². The recommendations are based on meetings with ZRCS staff, Red Cross Partner National Societies (Finnish, Danish, British), the International Federation of the Red Cross and Red Crescent Societies (IFRC), IFRC Climate Centre, staff and delegates working on FbEA in neighbouring countries, and external stakeholders. Furthermore, an extensive desk study on available material was undertaken. Supporting material is provided in a separate document.

Forecast based Early Action

Forecast-based Financing (FbF) enables automatic access to humanitarian funding for early action. FbF and subsequent *Forecast based Early Actions (FbEAs)* are taken based on forecast and risk information to mitigate and prevent the impacts associated with hydro-meteorological events. The goal of FbEA is to anticipate disasters, prevent their impacts, and reduce human suffering and losses. The forecasts, risk analyses, the related early actions and roles, and responsibilities of the different stakeholders are described in an *Early Action Protocol (EAP)*, which will be developed during the system development.

¹ <http://fbf.drk.de/>

² <http://fbf.drk.de/manual.html#c34>

Conclusions

Forecast-based Early Action (FbEA) system is a new approach to prevent and reduce the impacts of hydro-meteorological events. The Zimbabwe Red Cross Society (ZRCs) staff and its volunteers take actions within potentially affected communities before the impacts of an impending hazard occur.

Based on the risk assessment presented in this report, and available forecast lead times (time to act before the impacts occur), and supported by ZRCs prioritisation and capacities, El Niño–Southern Oscillation (ENSO) induced drought and food insecurity has the highest feasibility and urgency for FbEA.

For the Early Action Protocols (EAPs), the triggers for drought-related food insecurity could be based on a combination of various forecasts (such as FEWS-NET, El Niño, seasonal rainfall forecasts), community surveillance and market monitoring. During the project phase, the first step is to design how the triggers from community consultation are identified, what tools from the Household Economy Approach (by the Livelihoods Resource Centre of the International Federation of the Red Cross, or similar) are used, and then define the triggers. The second step could be piloting the triggers.

The second type of disaster to be tackled could be cholera outbreaks. Cholera forecasting is difficult, and the feasibility of the on-going work of the International Federation of the Red Cross and Red Crescent Societies (IFRC) on cholera preparedness, based on community monitoring, should be further assessed. Alternatively, research on forecasting cholera could be undertaken, but the benefits of this compared to the IFRC cholera framework should be carefully assessed.

Tropical cyclones, associated with strong winds and particularly heavy rainfall cause major impacts in Zimbabwe. The forecast lead-time at the provincial level (approx. 24 hrs) and the damage formation and extent do not allow for effective large scale early actions. However, smaller, volunteer and branch-based early actions may be feasible. This should be investigated during the development process.

Development in forecasting capacity, particularly for river floods, should be monitored; as it may improve over the next five years through a development project starting in 2019 within the forecasting agencies. The potential impacts of a flood hazard can be tackled if: 1) the spatial resolution and accuracy of river flood forecast progresses, 2) ZRCs has the capacity to rapidly deploy staff and volunteers, and 3) the FbEA system development proceeds according to plans with the prioritised hazards.

Currently, there is not enough forecast capacity to trigger FbEA for small scale, rapid onset hazards (hail, local wind storms, flash flood). However, the possibility to integrate the FbEA approach into community resilience programmes should be further assessed during the system development.

The ZRCs also expressed their interest to use the concept of FbEA in crisis and conflict situations. Crisis and conflict situations are relevant in Zimbabwe. The application is slightly different to disasters associated with natural hazards, as the Red Cross cannot prevent the impacts of crisis or conflict beforehand. However, if early financing has been triggered, the response can be more effective. The ZRCs has experience with this type of a scenario through the successful election preparedness and response in 2018, and the approach can be further developed through general ZRCs response capacity enhancement. This is not assessed further in the report.

In Zimbabwe, large scale disasters and catastrophic events are not common. Therefore, the ZRCs can aim at undertaking FbEA in hazards and disasters of various scales. Forecast based Action (FbA) by the DREF (Disaster Relief Emergency Fund) targets hydro-meteorological events which occur on average once in every five years, with the likelihood of severe humanitarian impact. However, the ZRCs has funding available also through the Partner National Societies (PNSs) programme and crisis modifier funds. These funds could be used in EAPs for more frequent hazards, with smaller humanitarian impact or simpler early actions than required for FbA by the DREF. Based on the feasibility study, this should be given a priority, and it is also supported by the ZRCs vision which looks into small events that take place with a short return period. The trigger system developed for the smaller scale hazards and impacts should be simple, manageable, easy to update and maintain without the need for complex scientific analysis and external support. Eventually, the FbEA system can be developed to qualify for the FbA by the DREF. This requires the development of two sets of EAPs per hazard, one to be used with available funding for smaller hazards, and second to qualify for the FbA funded by DREF.

The EAPs require an assessment of the community level disaster impacts, vulnerabilities, capacities and particularly the beneficiary needs to develop effective early actions. The early actions developed should be effective, efficient and no-regrets: i.e. actions should benefit the communities even if the hazard does not materialise or has no effect, or alternatively should be low-cost such as disseminating the *early* warning information. For instance, cash transfers or

school feeding, as food insecurity actions, benefit marginalised communities and vulnerable households in all instances, and, in the best case, prevent the use of harmful coping strategies.

To ensure the sustainability of the FbEA system, it should be developed in close collaboration with the government of Zimbabwe, and other national organisations. The World Food Programme, and other potential partners, who has expressed their interest to collaborate, is also key. The potential for collaboration on trigger development and large scale food insecurity situations should be investigated. Other ZRCS stakeholders, such as PNSs and their back donors, should understand and accept the triggers.

A government-led FbEA system is currently not feasible, although it would provide the most sustainable system. If research is needed to support the FbEA system development, it should contribute to improving the current challenges faced by the scattered meteorological, disaster and climate change research in Zimbabwe. External experts could be used to mentor and supervise researchers in Zimbabwe and bring knowledge from research programmes existing elsewhere. Particularly, the production of parallel tools, which are or should be under development by a public authority, should be avoided. Instead, the ZRCS and its partners should work together with the government and other stakeholders in developing the tools.

A sustainable FbEA system led by the ZRCS is feasible, but requires leadership and long-term commitment by the ZRCS, and active ownership and maintenance of the system. More specifically, it requires development and enhancement of three aspects: 1) FbEA capacity within ZRCS, including financial capacity, 2) a stakeholder network of relevant public authorities, other humanitarian actors and researchers, and 3) ZRCS disaster risk management capacity, including information and data management capacity.

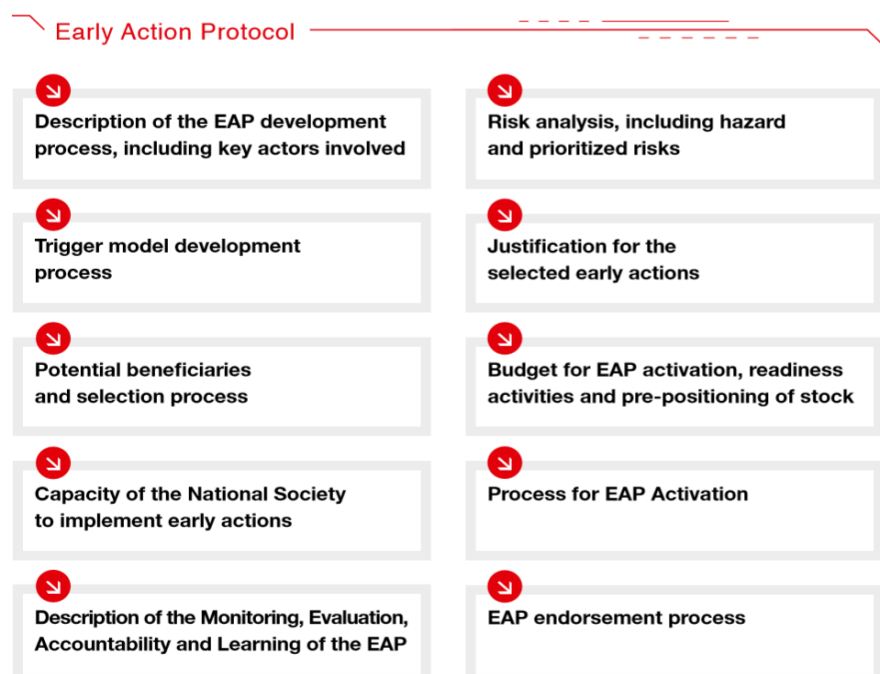
The development of an FbEA system has the potential to contribute to long-term organisational development of the ZRCS, and to improve its general disaster preparedness and response capacity also in situations when early actions are not feasible.

Below, the ten building blocks for EAPs are shown. Some of the steps, most notably the risk analysis for hazard selection and the capacity of the ZRCS to implement early actions, have been briefly covered in this report. Recommendations for the development of the MEAL (Monitoring, Evaluation, Accountability and Learning) approach are also provided. Further development for the other aspects is needed.

As the priority of the ZRCS is to develop the system through the existing community-based warning/early action initiatives, system development at the beginning should be kept simple. This can be done by adding a small financing component to the community based early actions initiatives at a local level and integrated into the long-term ZRCS and PNS programmes.

This report provides recommendations to achieve this, yet it also stresses that FbEA requires the development of ZRCS early action capacity for larger scale disasters where pure community level warning/early actions are not enough, and

that FbEA is different from pure community-based initiatives as an important component of the FbEA system is the automatic release of funding to implement the early actions, whether by the volunteers at the communities or ZRCS staff.



Recommendations: Roadmap for a sustainable forecast-based-action system in the Zimbabwe Red Cross Society

Forecast based Early Action (FbEA) is a shift for the Zimbabwe Red Cross Society (ZRCs) to trigger action based on various forecasts and other data. The FbEA system is feasible if 1) the ZRCs leadership and management are committed to it, 2) the staff and volunteers have the knowledge required and capacity to implement early actions, 3) the Early Action Protocols (EAPs) are developed in cooperation with key actors, including the potentially affected communities, and 4) the ZRCs has the resources to maintain the FbEA system developed for hazard and impact levels that do not receive funding from the Forecast-based Action (FbA) by the DREF fund. These recommendations aim at ensuring that 1) the FbEA system in the ZRCs becomes sustainable, 2) the ZRCs becomes an even stronger and self-sustainable humanitarian actor in Zimbabwe, and 3) the investment by the Partner National Societies (PNSs) during the system development is spent effectively and contributes to a sustainable FbEA system in ZRCs, thereby alleviating humanitarian impacts of natural hazards. The recommendations are given in four priority levels to reflect the urgency of implementation during the FbEA system development process, scheduled to start in April 2019³.

PRIORITY LEVEL 1: Implementation must be done at the beginning of the FbEA system development process

Recommendation 1: The ZRCs and its PNSs must establish the necessary conditions for a sustainable FbEA system; leadership, commitment, engagement and resources. All the following recommendations are made on the basis that the ZRCs will have the possibility to allocate staff time, administrative support and leadership to establish the FbEA system. The PNSs must ensure that developing the FbEA system does not become an additional commitment to ZRCs that competes for its already overstretched resources.

Action 1.1: The ZRCs must appoint a focal point for FbEA and someone (could be the focal point or other staff member) to with dedicated work time to develop the system until it is operational. The focal point could be the dedicated staff member running the operational FbEA system development or someone at the management level. If the FbEA system targets the 'FbA by the DREF' fund, the focal point would be responsible for notifying that the triggers have been met, and funding should be automatically released, as per planned in the EAPs.

Action 1.2: The ZRCs must ensure that the appointed staff member responsible for the FbEA system development can commit enough resources to the FbEA development until the system has become operational. Depending on the responsibilities, the developer would report to the focal point. Furthermore, a backup staff member should be appointed to ensure continuity of the system even in cases of staff changes. The developer needs to have a good understanding of FbEA, and sufficient time to interact with stakeholders from the government, academia, development partners (e.g. WFP, Start Network, FAO), ZRCs staff at all levels, volunteers, PNSs, IFRC and the IFRC Climate Centre. In the best case, and to ensure sustainability, the developer should be fully dedicated to the development process, at least in the beginning of the process. The developer and (if different), the focal point will need to receive support from the in-country PNSs and the Climate Centre.

Action 1.3: The ZRCs must include FbEA in the Strategic Plan 2019-2021, which was under development in March 2019. It has been confirmed by the ZRCs that this can be done.

Action 1.4: The ZRCs must establish an internal FbEA development working group, consisting of members from each operational section: finance, logistics, warehouse, Disaster Management, PMER (Planning, Monitoring, Evaluation, Reporting), PNSs and IFRC, provincial and district (branch) level, and external advisors, most notably IFRC Climate Centre and the 510 initiative. This would ensure that the FbEA system builds upon the expertise, knowledge and capacities of all units and harnesses all available resources. The required contribution of the Climate Centre and 510 initiative must be assessed at the beginning of the process. The use of the Climate Centre in providing technical support to the FbEA system design is recommended, and the 510 Initiative can provide technical support for information and data management.

Recommendation 2: Focus on El Nino induced drought and food insecurity in the first phase of system development. Cholera outbreaks must also be considered. The FbEA possibility for cyclone induced flooding needs to be investigated more in detail. Food insecurity during droughts has the largest humanitarian impact based on historical data. It occurs frequently, the existing lead time to implement early actions is substantially longer than for other hazards, and the ZRCs has identified food insecurity as a priority. Furthermore, plenty of forecast information and community and market monitoring tools for food security situation analysis are available. Furthermore, there is interest from other

³ With financial support from the Danish, Finnish and British Red Cross Societies.

humanitarian actors toward Food insecurity FbEA. Through community volunteers and drought relief committees (integrated with other assessment e.g. ZIMVAC), the FbEA approach must be context specific and focus on local people and their local circumstances. Cholera is a major hazard and claims many lives annually. Due to the impact of a potential epidemic and recurrence rate, there is a strong case to develop EAPs for cholera in the FbEA process. Cyclones cause major damage and can be forecast at a provincial level approximately 24 hours before the damage occurs.

Recommendation 3: The ZRCS, potentially together with other humanitarian actors working on FbEA (such as the World Food Programme - WFP), needs to work together with all relevant government departments, and public authorities at the regional level to 1) institutionalise FbEA in government structures, and 2) improve long-term disaster risk reduction and management. This is important as the ZRCS has a legally mandated auxiliary role to the government.

Action 3.2: The ZRCS must establish a steering committee consisting of government department for the FbEA system, and invite technical experts from other government departments or academia where necessary. In some programmes, the ZRCS has collected a steering committee from government departments. Recently, it has consisted of the Department of Civil Protection, Meteorological Services Department, Climate Change Management Department, Department of Inland Waters Control, Department of Rural Development and Rural Local Authorities. For drought-induced food insecurity, for instance, the Department of Social Welfare needs to be included. On a more technical side, SIRDC⁴ has strong expertise in earth observations.

Action 3.2: The ZRCS needs to engage with other humanitarian actors (most notably WFP), currently interested or working on FbEA/FbF in Zimbabwe. WFP expressed their interest to start collaborating with the ZRCS on FbEA, and a meeting with ZRCS and the current WFP FbF focal point needs to be organized as soon as possible. Start Network has initiatives related to drought-induced food insecurity, and the potential for collaboration with them needs to be assessed and initiated. WFP is also seeking technical support from IRI, Colombia University, a technical partner of the Climate Centre. The potential to combine resources should be looked into, and **the ZRCS, together with Climate Centre should engage with MSD to improve their seasonal forecasting capacity (interview with MSD identified potential development needs).**

Action 3.3: If possible, the triggers in the EAPs need to be developed together with the government and other humanitarian actors according to mandates and areas of expertise. The hosting of the triggers need to be decided as the system is developed and it becomes more evident which organisation is in the best position to host and maintain them. Currently, the government may not be an appropriate host, and as the ZRCS aims to focus on smaller scale hazards and impacts in the beginning, the most feasible option would be for the ZRCS to host the triggers during the FbEA system development.

Action 3.4: ZRCS must agree with national and regional public authorities concerning the mandate of the ZRCS to act early, based on a forecast. This needs to be done to avoid the risk of the ZRCS acting against the will of public authorities at national, provincial and district level. This is relevant if, for instance, the early actions are similar to government actions or affect government decision-making. The associated risks may be small, and the relevance of this action needs to be discussed with the government authorities at an early stage of the process.

Action 3.5: The ZRCS must agree with national authorities about the ZRCS mandate to develop various tools and analyses needed for FbEA. Public authorities have mandates regarding monitoring and forecasting natural hazards, and other disaster risk management and response activities. The ZRCS needs to discuss and agree on the efforts taken by the ZRCS and partners, and align them with the (potential) efforts of authorities. With the FbEA development funding available from the PNSs, the ZRCS has the potential to increase the FbEA knowledge and capacity and general disaster risk management substantially; the chance to take this up to the government level should not be missed.

Action 3.6: The ZRCS and its partners must use the opportunity brought by FbEA to shift the government focus of disaster response to disaster risk reduction (DRR). Even if DRR is not the focus in FbEA, its crucial role in reducing the risk of natural hazards cannot be neglected. In many cases, the socio-economic benefits of implementing actual DRR and general development measures substantially outweigh the cost of disaster response, and most likely also early actions. This applies both to food security and cholera outbreaks, as human and infrastructure vulnerability are the main reasons behind large-scale disaster impacts.

⁴ Scientific & Industrial Research & Development Centre <https://www.sirdc.ac.zw/>

Recommendation 4: Consider various financing options to undertake early actions, and consider developing two sets of Early Action Protocols (EAPs): one to address small-scale hazards/disasters that do not qualify for 'FbA by the DREF' fund, and eventually work toward 'FbA by the DREF' once experience has been gained.

Action 4.1: At first, focus on smaller-scale hazards, disasters and simple, low-cost early actions to pilot FbEA within the ZCRS. For instance, the crisis modifier allows for a possibility to develop a flexible, simple system which can be triggered for small-scale hazards and impacts, and simple early actions. Currently, 'FbA by the DREF' would require more analyses for the EAPs to be qualified for the fund. With the PNSs programmes and crisis modifier component, the FbEA system can be developed to eventually qualify for FbA by the DREF.

Action 4.2: Continue discussions with WFP and look into the possibilities to jointly develop triggers for larger-scale droughts, and to foster the already existing partnership.

Action 4.3: Develop the EAPs together with the PNSs and ensure that they are understood and accepted; agreement among HQs, back donors and other relevant institutions is required to avoid confusion or disputes on funding allocation.

Action 4.4: The ZCRS needs to develop capacity to mobilise their own funding for FbEA and ensure that its resources keep the FbEA system sustainable for small-scale, more frequent hazards and impacts.

Action 4.5: Keep track of other potential funding possibilities for FbEA, from humanitarian organisations or the government.

Recommendation 5: Keep the EAPs for food security and cholera as simple as possible. Design a process for community monitoring and surveillance to develop the triggers. Identify the early actions together with the communities, and develop early actions that benefit the communities or households even in the case the event does not hit the targeted area (various cash-based interventions for example), or do not require substantial efforts and can be implemented by volunteers and branch officers without the need of HQ assistance. This will save resources, maintain focus on the people at risk, and ensure that some actions can be taken also with shorter lead-time.

Action 5.1: For food security triggers, use a combination of FEWS-NET food security forecast, community and market surveillance and monitoring tools (for instance Household Economic Security) and potentially other information to develop the triggers. Pilot this approach during the development process.

Action 5.2: Identify the best way forward for cholera outbreaks; whether this means developing cholera forecasting, or developing early cholera response based on community monitoring. There is on-going IFRC work on cholera preparedness. The ZCRS has reported that the proposed Cholera FbEA process design will build on and integrate within the ZCRS disaster/epidemic preparedness and response plans in the short-term for a timeframe of at least two years, while aiming to institutionalise the approach within government over the long-term.

Action 5.3: Develop the early actions together with the potentially affected communities, addressing their specific needs. This is particularly relevant for food security, as the impacts vary depending on the community.

Action 5.3: The selection of early actions need to include a Theory of Change Process, which will facilitate the selection of the best possible actions based on the ZCRS's capacities and the impacts that are aimed to be reduced.

Action 5.4: Develop and assess the feasibility and benefits of various, innovative early actions based on community needs, forecast lead-time and ZCRS staff and volunteer capacities. Early actions should aim at reducing the impacts of the potential disaster. Learning from neighbouring country experiences is strongly encouraged.

Action 5.5: Focus on effective, efficient and no-regrets early actions. Early actions should benefit communities even if the hazard does not materialize or are not effect by them. For instance, cash transfers or school feeding as food insecurity actions benefit marginalised communities and vulnerable households in all circumstances and, in the best case, prevent the use of harmful coping strategies. For cyclones, for instance, early warning dissemination should be considered.

Recommendation 6: Decide whether the system development can cover entire Zimbabwe, areas where the ZCRS has on-going programmes or additionally other areas. The decision needs to be made based on the exposure assessment undertaken in 2016 (key results presented in this report), and ZCRS staff and volunteer capacity to implement early actions in different areas. Despite the general idea that the FbEA system should have a national focus, the ZCRS's capacity for implementing early actions may only be feasible in the provinces and districts where ZCRS has had programmes in recent years.

Action 6.1: Decide the geographical area of focus for the system development and the areas or communities where piloting will take place.

PRIORITY LEVEL 2: Implementation should start in the beginning of the FbEA system development process

Recommendation 7: Strengthen the capacity for community monitoring and surveillance and implement early actions by the ZRCS staff, at HQ and branch level, and its volunteers for the chosen hazards/impacts. The ZRCS has proven capacity to respond to both slow and rapid onset disasters, but the system development process must ensure that the capacity for community monitoring and surveillance, and to implement actions early, has been established. This also includes financial capacity to trigger funding automatically.

Action 7.1: Once the Priority level 1 - Recommendation 1 has been implemented, **ZRCS volunteers should be engaged via workshops to improve their general understanding of FbEA.** Once EAP development has started, a core team of staff and volunteers should be trained on the implementation of the actions identified in the EAPs.

Action 7.2: **The recommendations for capacity enhancement provided in the 2018 ‘institutional capacity analysis on structures, systems, processes and tools of ZRCS related to cash-based assistance’, undertaken in relation to the WFP ZRCS partnership, should be followed.** If cash-based assistance is considered as one of the potential early actions, the recommendations provided in the report should be considered in the FbEA system development.

Action 7.3: **If the early action protocol for the chosen hazards involve the distribution of in-kind contributions (food or non-food items - not cash or other less tangible actions such as early warning dissemination or awareness campaigns), a thorough inventory of the ZRCS warehouses and logistics capacity should be undertaken** before any procurement takes place. After the warehouse inventory, non-usable items should be recycled/discarded, and usable items put on pallets and wrapped. The inventory should be tracked via the use of bin cards (to record a running balance of the stock on hand, received and problems) and stock cards (to register incoming, stored and outgoing stocks). Earlier recommendations on warehouse management should be followed urgently.

Action 7.4: **The procedures for quick dispersal of funding should be assessed and developed based on the assessment.** Some bottlenecks related to the banking system in Zimbabwe were identified during the feasibility study. Solutions to overcome the bottlenecks should be developed with the finance experts at the ZRCS and PNSs. If the system development aims at EAPs for the ‘FbA by the DREF’, the procedures to access the money when needed must be developed together with the fund.

Action 7.5: **Peer-to-peer visits between sister national societies are encouraged. The ZRCS should be inspired by the work that has been implemented by the Zambia, Malawi and Mozambique RCs.**

Recommendation 8: Develop a FbEA Monitoring, Evaluation, Accountability and Learning (MEAL) strategy based on the recommendations from the FbA manual⁵ and lessons learnt from neighbouring national societies. The FbEA MEAL strategy should build on the existing PMER strategies of the ZRCS, and consider the ZRCS PMER capacities.

Action 8.1: **Develop impact evaluation based on the Theory of Change or other feasible methods as a facilitated process with all disaster management experts in the ZRCS, PNSs, and other technical expertise available.**

Action 8.2: **Experiences gained and lessons learnt during the FbEA system development, and once the system has been activated, should be incorporated in the regular ZRCS meetings to further system development.**

Action 8.3: **Consider analysing the cost-effectiveness of early actions if there is doubt about their effectiveness, together with Theory of Change.** External expertise from an academic institution could be used.

Action 8.4: **If considered relevant and feasible, establish relations with academic institutions that could support the impact analysis process during FbEA activation.**

Action 8.5: **Use Open Data Kit (ODK) for data collection of impact evaluations, and include geospatial data during data collection.**

Action 8.6: **Nurture beneficiary accountability.** The suggestions include: 1) sharing data and information collected from, and for, the beneficiary population, for example key learnings from post-trigger impact surveys, and 2) creating a clearly articulated and readily available complaint mechanism so that beneficiaries can communicate project-related grievances to the implementers.

⁵ http://fbf.drk.de/fileadmin/Content/Manual_FbF/07_Monitoring_Evaluation_Accountability_Learning/FbF_MEAL_Guide_v2_beta.pdf.

Action 8.7: Assess the feasibility of FbA manual suggestions:

- External actors should be used for data collection. This will allow RC volunteers to focus on disaster response and relief, and strengthens the independence and impartiality of the assessment.
- To deploy data collectors as soon as possible after a disaster has occurred, it is important to develop data collection tools and sampling procedures in advance, and to establish an agreement with a data collection or research organization during the planning phase.
- The agreement or contract should specify its activation only in the event of a disaster. University departments or consultancy companies may be suitable for this purpose.

PRIORITY LEVEL 3: Implementation can be done during the FbEA system development process once the window of opportunity arises

Recommendation 9: The ZRCS, and particularly its partners, could engage with the government to improve hydro-meteorological forecasting, research, and tools and analyses to improve disaster risk management and response and to up-scale and institutionalise FbEA.

Action 9.1: Follow-up on the Meteorological Services Department (MSD) and Zimbabwe National Water Authority (ZINWA) forecasting capacity development, and, if resources allow, engage in their development project and support their capacity enhancement. DMS identified that their current research capacity is limited. FbEA resources and IFRC Climate Centre and its partners' expertise in hydro-meteorological research could potentially be used to provide supervision for DMS research efforts. DMS and ZINWA have started a development project supported by the Swedish Hydro-Meteorological Institute.

Action 9.2: Work together with Department of Civil Protection (DCP) to develop a consolidated disaster impact database based on DCP data, media, the EM-DAT database, DREF appeals, situation reports issued during and after past disasters and other sources. The ZRCS should discuss the possibility to support the government in their efforts, for instance, on the Sendai indicator database development.

Action 9.3: If river flooding becomes a focus of FbEA development later in the process, all available exposure maps from DCP could be requested and their usefulness assessed.

Action 9.4: Open Street Map (OSM) development could provide significant potential in mapping exposure and vulnerability, and provide detailed maps for Zimbabwe in general. The baseline map making should be done together with the Survey General Office, as only through collaboration the effort can be sustainable and beneficial for various initiatives, also outside the ZRCS. OSM could potentially be used to provide an improved understanding of the cholera-prone communities, as cholera is largely affected by poor infrastructure. Examples from abroad should be looked at. Furthermore, once flood forecasting capacity becomes available, and if the flood EAP development starts, OSM could be a potential way to develop exposure and vulnerability data to develop FbEA triggers. Mapping of flood-prone areas would improve the capacity to assess the potential damage, and thereby better target early actions.

Action 9.5: Work together with SIRDC in identifying their capacity to provide more detailed maps based on Earth Observations.

Action 9.6: In case national or district level risk maps, including social vulnerability factors, are needed, ZIMSTAT should be consulted on the availability of population and socio-economic data for district level vulnerability assessments.

Action 9.7: Assess freely available, global databases to determine the possibility to use them in provincial and district level vulnerability assessments.

Recommendation 10: Start the EAP development for hazards and disasters that qualify for the 'FbA by the DREF' once experience on the feasibility of FbEA within ZRCS and Zimbabwe has been gained during the FbEA process development.

Action 10.1: Work closely together with the IFRC Climate Centre and other relevant stakeholders to develop the early action protocol for major droughts. The fund, so far, does not have experience with drought EAPs, although there is interest toward these, and it provides access to larger funds than the crisis modifier.

Action 10.2 Analyse the relationship between the chosen hazards (drought, cholera and cyclones recommended, flooding if flood forecasting develops) and their impacts. This is based on past hazard and impact data. As the ZRCS priority is to focus initially on small scale hazards and disasters, not much further analysis is needed on the hazards and their impacts as is currently available.

Recommendation 11: The ZRCS should develop its own income generation capacity to be able to implement early actions with its own funding, and monitor the possibility to access nationally available funds.

Recommendation 12: The ZRCS should assess the current state of its organisation and disaster response capacity by using the RCRC movement tools. This becomes urgent particularly if EAPs for rapid onset disasters (cyclones and floods) are developed, or the aim is to develop national level capacity for FbEA. However, it is not recommended that this be the focus in the first phase of the development process. A key feature of FbEA is the shift in ZRCS operations, to act before the impacts occur. In the long-run, the capacity to implement FbEAs in rapid onset disasters requires assessing all aspects in the current disaster preparedness and response capacity of the ZRCS. For cash-based interventions, capacity assessment was completed in 2019.

Action 12.1: Use assessment tools provided by the RCRC movement and develop a workplan to improve ZRCS early action capacity based on the assessments. Tools include Organisational Capacity Assessment and Certification (OCAC), Branch Organisational Capacity Assessment (BOCA), and Preparedness for Effective Response (PER). The tools can be adapted to the ZRCS needs in order to design a work plan to improve ZRCS disaster management capacity.

PRIORITY LEVEL 4: Implementation can be done if resources and the situation allow

Recommendation 13: The ZRCS could step-by-step develop its information and data management capacity by developing a knowledge management strategy and hiring new staff member(s). This would improve understanding of the ZRCS's early action capacity, improve its beneficiary targeting, and encourage generation of new ideas for FbEA. However, considering the currently overstretched ZRCS staff, the ZRCS should prioritise the resources needed, and new staff could be hired based on the prioritisation. Referring to Priority Level 1 – Recommendation 1, the most urgent need is to ensure that the FbEA focal point or other dedicated staff member (developer) can dedicate the required work-time to developing the system and establishing an internal and external working group.

Action 13.1: In the long run, and if resources allow, the ZRCS could consider hiring at least one skilled information and data specialist, preferably with GIS (Geographic Information System) skills, to develop data collection and analysis.

Action 13.2: Detailed up-to-date data on ZRCS resources should be made available: warehouse locations and their detailed, up-to-date inventory and number and location of active volunteers that can be activated for early action. This (volunteer) data should be implemented in GIS format to be able to overlay the data with existing risk maps. These recommendations are given for the potential situation that the development EAPs for rapid onset disasters starts.

Action 13.3: A resource management tool for planning purposes could be developed. Currently, there is no clear, up-to-date resource database in use. Ideally, a resource database should consist of detailed, *up-to-date* data of the ZRCS staff, volunteers and their capacities (e.g. trainings completed), assets (fleet, etc.), warehouses etc. Furthermore, with GIS facilities and capacity, various risk maps, census data, Vulnerability and Capacity Assessment data and other data collected in projects could be stored in the database to understand and plan ZRCS early actions. The ZRCS has experience with Open Data Kit (ODK) but currently it does not contain spatial information. Once the database is in place, overlaying various data sources can be used for gap analysis: whether the human and material resources of ZRCS are in locations where they are likely to be needed the most.

Recommendation 14: Follow-up on the development of the Emergency operations Centre and determine if FbEA by the ZRCS could play a role. The focus of the Emergency Operations Centre is monitoring disasters taking place. However, actual forecasts and early actions could potentially be situated there. This is more relevant for rapid onset disasters, most notably cyclones, where the Department of Civil Protection has the leading role, and becomes relevant if the FbEA development addresses these.

Recommendation 15: Collaborate with the IFRC Climate Centre and IRI/Columbia University to improve flash flood forecasting for FbEA. The Principal Investigator in IRI focusing on the topic mentioned that impact data collection on past flash flood events could improve the capacity to forecast flash floods.

Recommendation 16: Consider addressing other hazards, or conflict/crisis situations.

1st Step for a Sustainable Forecast-based Early Action System: ZRCS Leadership and Capacity

FbEA system development and maintenance requires leadership and long-term commitment by the ZRCS. The development process provides the ZRCS with an opportunity to shift toward more effective disaster management and engage in organisational development. Eventually, the FbEA system needs to be maintained and function via the ZRCS's own resources; not via projects. FbEA should be integrated in the ZRCS's core operational structures and all new programmes relevant for the topic, and eventually should become a routine way of doing humanitarian actions for all feasible hazards. The recommendations for ZRCS capacity strengthening, at all priority levels, aim toward achieving this goal, and this section provides brief background and justification of the recommendations. It should be noted that organizational and system development is a learning process. It takes time and should be approached patiently. The FbEA system development process provides a great opportunity to develop ZRCS capacities at many levels.

The ZRCS has clearly expressed their willingness and commitment to FbEA system development. This includes the involvement from every level of the ZRCS board, management, staff, and volunteers, as well as all relevant stakeholders, to ensure its acceptance and institutionalisation. This was evident during discussions with the ZRCS management and the internal workshop held during the feasibility study mission. The ZRCS is in the process of revising its Strategic Plan for 2019-2021, and this provides an opportunity to integrate FbEA into ZRCS core structures and programmes. FbEA has been mentioned in the 'Working Plan for the definition of a Food Security strategy for ZRCS'.

However, it must be emphasized that the current capacity of the ZRCS at the HQ level to implement programmes and develop new initiatives is overstretched. This assessment is based on experience gained during the feasibility study mission by the team leader, and discussions with ZRCS staff, PNSs, and the IFRC. Capacity is heavily influenced by the lack of staff and a high number of existing programmes and operations. Various commitments, including disaster response, take up most of the staff's resources. Due to historical reasons, the ZRCS has not hired new staff members for a considerable period of time. At some point, however, it will become absolutely necessary to hire new staff if the ZRCS is planning to develop new initiatives and improve its disaster management capacity.

Based on the experiences gained during the feasibility study mission, it is obvious that ZRCS staff and volunteers are trained and experienced in disaster response. However, it was challenging to assess the national level all-hazard ZRCS disaster management capacity, as no systematic information or data on ZRCS resources and capacities is available, nor have any assessments been done recently. National Society (NS) capacity assessment should be an important part of a FbEA feasibility study, as the capacity of the NS to implement early actions is based on its general readiness and response capacity. Based on a consultation with the ZRCS head of PMER (Planning, Monitoring, Evaluation Reporting), the latest internal capacity assessment was completed around 2009.

'Institutional capacity analysis on structures, systems, processes and tools of ZRCS related to cash-based assistance' was undertaken in relation to the WFP ZRCS partnership⁶. The analysis provides many recommendations on how to develop ZRCS capacity to provide cash assistance, for example, to food insecure communities. Although the recommendations have been provided with cash assistance in mind, their implementation will contribute to the general capacity of ZRCS and the development of the FbEA system; particularly if cash transfers are one early action measure. The FbEA feasibility study team leader was monitoring cash distribution in Kariba during the feasibility study mission and observed that in general, the ZRCS has experience and capacity to implement successful cash distributions. Based on the capacity assessment, the most notable development areas are financial service provider contracting, market assessments, and design and delivery of cash transfer programmes. However, the ZRCS will gain further experience with cash transfer programming through the WFP-ZRCS partnership. Furthermore, the WFP is interested in FbEA collaboration. In January 2019, WFP was waiting for funds to start the work on FbF, and they have expressed their interest to commence discussions concerning future collaboration.

The Red Cross Red Crescent movement provides various tools to assess and measure organisational capacities and revise contingency plans, to assess actual response capacity and preparedness for response planning. The tools will also include an element of FbEA. However, already during the feasibility study mission, several aspects of improved information management and response capacity became obvious, and they have been provided in the recommendations.

The ZRCS has disaster response teams in all provinces. The lead-time for deployment depends on the nature of the emergency. E.g. in hailstorms and flash floods, response teams can carry out assessments within a day and respond the

⁶ In 2019, the ZRCS is starting a partnership with WFP on lean season assistance. The capacity assessment was done as part of the partnership. The assessment provides several recommendations on improving lean season assistance and particularly cash transfer capacity.

following day. In principle, there are 120 branches, many at the ward level. The ZRCS has an estimated 17 000 volunteers nationally (WFP CTP assessment). However, the actual volunteer base, their activity and their response capacity is not known. Currently, the ZRCS is most active in the districts where it is implementing programmes: Binga and Kariba (Mataberland North) through programmes funded by the Danish Red Cross, Mangwe (Mataberland South) through a Finnish Red Cross programme funded by EU DG ECHO; Muzarabani (Mashonaland Central) through a Finnish Red Cross programme, and Mwenezi (Masvingo) and Chipinge (Manicaland) through a British Red Cross funded programme.

Information management (IM) systems are essential for effective response and anticipatory operations. Data preparedness is an area of work that will enable the ZRCS to develop many aspects for FbEA, and have the best possible tools and data to act effectively upon warning. Enhancing IM and particularly data preparedness capacities will result in a better selection of early actions, effective targeting of potential beneficiaries and better triggers, and better early action capacity (as well as better programming of resilience programmes). It is recommended to start this process step-by-step focusing initially on strengthening basic information management, and if the conditions are optimal, developing a more comprehensive data preparedness process. Quantitative, spatial data collection, management and analysis could become a standard practice within the ZRCS. The ZRCS has experience in using Open Data Kit (ODK), but overall the capacity for systematic collection and analysis of survey or spatial data does not exist.

2nd step for a sustainable FbEA system: Public authorities' engagement and capacity for FbEA

Government capacity to be involved and develop FbEA, as a general approach to anticipatory disaster response and preparedness, seems to be limited due to complex economic and political factors. Some of these factors, political and economic unrest, were evident during the feasibility study mission in late 2018-early 2019. If these trends continue, it will most likely exacerbate the situation. Government agencies are reported to be under-resourced and under-staffed⁷. However, engagement of the public authorities in developing the FbEA system is very important to ensure the system's sustainability.

Potentially, the ZRCS FbEA system could serve as an example to develop the approach by public authorities in the long run. A long-term goal should be an institutionalised, government-led FbEA system where the ZRCS is mandated to implement early actions agreed with the government. Despite the government's current lack of capacity to develop the FbEA system, they have been and are currently developing many highly relevant initiatives; including flood risk mapping, impact data collection and impact database development for Sendai Framework Indicators⁸.

Based on the meetings held with relevant government departments (See stakeholder list in Appendix A), FbF and FbEA are new concepts to most authorities: such as the Department of Civil Protection, Department of Meteorological Services, and the Zimbabwe National Water Authority. The Department of Social Welfare is aware of FbF, as it has been involved in trainings by the African Risk Capacity. This situation is somewhat surprising considering the WFP FoodSecure pilot on FbF for food security implemented in 2015-2016⁹, but this analysis can only reflect the views of those interviewed. Nevertheless, beneficial discussions were held during the meetings, and there was interest from the government departments to become engaged in the development process.

In 2017, a Capacity Assessment of the Disaster Risk Management System (CADRI report) in Zimbabwe was published. The assessment provides several recommendations for the development of disaster management capacity with the public authorities, and if implemented, will also benefit the development of the FbEA system (e.g. impact database). The responsibility for implementation of the recommendations lies within the public authorities and will affect the feasibility and implementation of the recommendations provided in this report.

Similar to the core idea of all Red Cross National Societies, the ZRCS is an auxiliary to the government of Zimbabwe in responding to disasters¹⁰. The legal mandate gives the ZRCS a possibility to act when needed and not necessarily wait

⁷ e.g. <https://www.insiderzim.com/zimbabwe-allocates-only-120-000-to-civil-protection-department/>
<https://www.chronicle.co.zw/japan-to-the-rescue-hands-over-harare-street-map-to-surveyor-generals-dept/>

⁸ <https://www.preventionweb.net/publications/view/54970>

⁹ <https://www.wfp.org/stories/wfp-helps-farmers-facing-drought-zimbabwe>

¹⁰ The ZRCS Act states that the Objects of the Society are 4c) **on its own initiative to organize emergency relief to victims of disasters, however caused, where possible in accordance with a national plan**; and 4d) **in co-operation with public authorities where this is possible**, to encourage, support and carry on any activity which relieves suffering and promotes the health and welfare of the community, and to provide public instruction in such activities: Provided that, save in circumstances which the Society considers to be exceptional, the Society shall not subsidize any scheme or assume any responsibility which is the legitimate function of some public authority.

for the government to request assistance or declare an emergency. However, implementing actions prior to the disaster differs from disaster response, and may create some opposition in government agencies.

Based on the CADRI assessment, the mandated actor at the national level, the Department of Civil Protection (DCP), does not have enough capacity to implement the Civil Protection Act with priority. The DCP's lean structure and hierarchical levels makes it difficult for the Department to effectively undertake their role in coordinating DRM activities.

The government does not have a holistic Disaster Risk Reduction (DRR)/Management Act. The legislative framework for Disaster Risk Reduction and Management is currently the Civil Protection Act of 1989. This indicates that the DRR/DRM system in Zimbabwe is predominantly focused on civil protection and emergency management, as opposed to a holistic approach to DRM, including risk prevention and mitigation. To replace the Civil Protection Act, a draft DRM Bill has been under development since the early 2000s. It has been revised on three occasions, however it is still not endorsed. As of January 2019, there is no knowledge about the ratification of the revised Act.

The lack of holistic DRM legislation does not directly imply that FbA would not be feasible or desirable, as the Civil Protection Act focuses specifically on emergency management. However, a general lack of priority for DRR in sectorial legislation implies that: 1) as DRR through legislation and policies (DRM and particularly sectorial legislation on building codes, land use, forestry, agriculture, social protection, general economic development policies etc) and their implementation is currently not taking place effectively, hazards will lead to disasters in Zimbabwe and FbA is a potential band-aid for this challenge, and 2) in case the DRM Bill comes on the table again, development partners could potentially lobby for the inclusion of FbF in the Bill. The feasibility of this, however, is highly uncertain.

A National level Contingency Plan from 2017 exists. However, based on a DCP interview, it is not consulted when responding to disasters. According to DCP, if all goes well, an integrated emergency operations centre would be opened by the end of 2019. It would provide a platform for all stakeholders to feed and exchange information during a disaster or crisis. Potentially, in the future and if lead-times allow, the emergency operations centre could be activated based on forecast information, and coordinate not only disaster response, but also early actions.

Hazard selection for trigger development

1st Step for Hazard Selection: Weather and Climate Risk Assessment

The outcome of the weather and climate change risk assessment should guide the preliminary selection of hazards and impacts for the EAP development. Forecasting capacity, and ZRCS capacity and priorities, will guide the final selection.

Because FbEAs are actions taken based on hydro-meteorological forecasts, warnings and in Zimbabwe, potentially based on other monitoring data, this risk assessment consolidates the existing knowledge on the:

- data available for the risk assessment, and identifies gaps in the information for the development of an effective and efficient FbEA system.
- main hazards in Zimbabwe to understand forecasting needs and recommended hazards to be addressed during the FbEA system development process;
- hazard-prone regions to understand where actions should be taken and the ZRCS capacity to act in these regions;
- impacts of these hazards to the development of effective FbEAs;

Risk information available

The report *Mapping of Selected Hazards Affecting Rural Livelihoods in Zimbabwe: A District and Ward Analysis*¹¹ from 2016 provides the first assessment of the key hazards. This can be complemented by Think Hazard and other sources if necessary¹². Plenty of nationally produced material to understand the hazards and spatial exposure is available. Complementary data is provided by international institutions and can add value to the national data and analyses. As the ZRCS priority is to focus initially on small scale hazards and disasters, not much further analysis is needed on the hazards and their impacts as is currently available. However, for EAPs approved for the FbA by the DREF, more data on the disaster impacts is needed, and particularly analysis to understand the relationship between various hazards and their impacts.

¹¹ http://www.zw.undp.org/content/dam/zimbabwe/docs/Poverty%20Reduction/UNDP_ZW_POV_Hazard-mapping.pdf

¹² ThinkHazard was designed to increase awareness of natural hazards anywhere in the world. It does so by providing a simple overview of different hazards and their 'hazard levels' for any given area, delivering recommendations and information to aid users in managing their risk to those hazards. <http://thinkhazard.org/en/report/271-zimbabwe>

The *Mapping of Selected Hazards Affecting Rural Livelihoods in Zimbabwe* report provides a spatial analysis of nine hazards. Four of these are directly relevant for FbEA: drought, mid-season dry spells, floods and diarrheal diseases. Three of the nine hazards may exacerbate the food security situations and can be linked to hydro-meteorological conditions: crop pests and diseases, animal diseases, and cereal and livestock price changes. HIV/AIDS prevalence¹³ () is also mapped. Landmines are not considered relevant for FbEA.

A challenge for detailed risk analysis is the availability of exposure maps, which overlay hazard maps with e.g. settlement and (critical) infrastructure data. The Department of Civil Protection (DCP) has used the University of Zimbabwe to produce flood maps based on Survey General Office data. Access to the shape files requires authorisation, but the maps are available on request. There was no possibility to obtain these maps during the feasibility study mission; hence, the quality of the maps is unknown. Exposure maps are particularly important for flood risk assessment and impact-forecasting, and to some extent also for storms and cyclones.

Exposure maps are easiest to produce and most useful for river flood risks, where the exposed area is relatively well known compared to other sudden-onset hazards. If maps are considered important for the FbEA system, a potential solution for map making could be the increasingly popular OpenStreetMap (OSM)¹⁴. In January 2019, urban areas in Zimbabwe have been mapped to some extent, but most of Zimbabwe has not been mapped¹⁵. A lot of the existing mapping was done in 2017, and some ground data collection has been done by the American Red Cross. The vast majority, however, appears to be based on remote digitization of satellite imagery. In February 2019, a Missing Maps mapathon was organized in Harare. When information is digitized by volunteers on the ground, there is a possibility to include vulnerability attributes in the data. For example, if a residential house is mapped, it is possible to include an attribute related to construction materials, condition of the house, and other relevant vulnerability data that could be used to understand cholera hotspots and to set up FbEA triggers. As an example, in Malawi, it took a team of approximately 12 members two weeks to map one district along the Shire river. The mapping was done by visiting the district, not through OSM mapathons. Malawi Red Cross Society is also participating and organising mapathons to develop the quality of the OSM in Malawi. Mapathons are organised in collaboration with the Survey General Office.

Detailed, up-to-date population and infrastructure vulnerability data at the national level are not easily available. Vulnerability data does exist and is potentially available at district level, but it is becoming outdated, and is hard to access due to recurring network problems. Key vulnerability data at the provincial level is available by the National Statistical Agency ZimStat¹⁶. District level data should be available through ZimStat hosted ZIMDAT database system¹⁷. The latest data point is from January 2105, but the majority of the data are older. The latest census was published in 2012 (data from 2011)¹⁸; and there is no information on plans to undertake a new one. The challenge with ZIMSTAT and ZIMDAT is that the website is slow and the database search and download functionalities are limited. Nevertheless, plenty of district level data exists to develop vulnerability analysis. Some of it can be extracted from African Union opendataafrica.org website for Zimbabwe¹⁹; however, the database search and download facilities are again, limited. Data is also in many cases outdated (e.g. Proportion of households with access to safe drinking water, % data is from 2003). Plenty of global data sources to map exposure and vulnerability is also listed in the UN OCHA Centre for humanitarian data platform²⁰.

Historical disaster impact data are not systematically collected by the DCP, but there are event reports, which can be complemented with other data sources to consolidate a database on historical impacts. Data on disaster impacts from Zimbabwe are not (yet) available on the DesInventar Sendai Database²¹, but DCP is working on a data system which would be Desinventar Sendai compatible. DREF appeals, and various organisations responding to disasters collect and report (in sit reps) impact data. All these could be used for developing the initial database.

¹³ *Households with people living with HIV and those who are on ART and TB treatment* was used as one of the selection criteria for the 2018-2019 lean season cash distribution and can be considered as a vulnerability indicator for drought-induced food insecurity.

¹⁴ OpenStreetMap (OSM) is a collaborative project to create a free editable map of the world. Rather than the map itself, the data generated by the project is considered its primary output. The creation and growth of OSM has been motivated by restrictions on use or availability of map information across the world, and the advent of inexpensive portable satellite navigation devices. <https://www.openstreetmap.org/#map=7/-19.161/28.427>

¹⁵ www.osm-analytics.org "Distinct Tags", "building=yes" tends to indicate if mapping was done remotely.

¹⁶ <http://www.zimstat.co.zw/>

¹⁷ ZIMDAT supports both UN-defined human development indicators (related to the Sustainable Development Goals) as well as user-defined indicators. ZIMDAT is compliant with international statistical standards and operates both as a desktop application as well as on the web, thus making it accessible from anywhere in the world. <http://www.zimdat.zimstat.co.zw/zimdat/libraries.aspx/Home.aspx>

¹⁸ A report on the results https://unstats.un.org/unsd/demographic-social/census/documents/Zimbabwe/ZWE_CensusPreliminary2012.pdf

¹⁹ <http://zimbabwe.opendataafrica.org/ZWSECD2015/socio-economic-data-zimbabwe-2015>

²⁰ https://data.humdata.org/search?q=zimbabwe&ext_page_size=100&sort=score+desc%2C+metadata_modified+desc

²¹ <https://www.desinventar.net/DesInventar/> is a Disaster loss data for Sustainable Development Goals and Sendai Framework Monitoring System

General extreme hydro-meteorological and climate change risk

Zimbabwe is vulnerable to weather variability and change, and lacks the readiness to improve resilience to climate change and other global challenges. Out of 181 countries analysed, Zimbabwe ranks 168th in the ND-gain Country index²², implying that Zimbabwe is in the bottom 10% when it comes to 'vulnerability to climate change and other global challenges in combination with its readiness to improve resilience.' When adjusted to GDP, ranking rises slightly to 165 out of 181 countries. Various socio-economic and political factors explain the reasons for these rankings. With the economic and political situation in the beginning of 2019, the situation cannot be expected to substantially improve in the coming years. Based on the INFORM-index in 2018²³, the risk of humanitarian crisis and disasters in Zimbabwe is high.

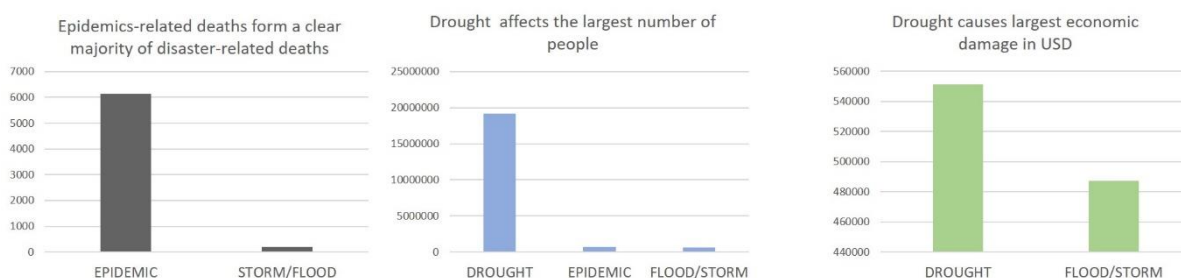
The integration of disaster and climate change risk into policies, legislation, and regulation (e.g. agricultural policy, building codes, land use) is one of the most effective ways to reduce disaster risks. Access to Zimbabwean legislation is difficult due to network problems, so no analysis on the legislation was conducted. However, based on expert assessment, the problem is not necessarily in the lack of legislation, but in their enforcement at all levels of governance.

Zimbabwe has developed a National Climate Change Response Strategy in 2015²⁴, and a Climate Policy was launched in 2018. The National Adaptation Plan (NAP) has been under development since 2016, when a stocktaking report for the NAP was started. The NAP is meant to operationalise the Response Strategy 2015. There is a plan to back up the NAP by District and Sectoral Adaptation Plans. In 2017, the Government of Zimbabwe and UNDP published a Human Development Report with a focus on climate change and human development.

Past disasters

Zimbabwe is exposed to various hazards. Based on the mapping from 2016, the most important hazards/impacts are droughts, mid-season dry spells, floods and diarrheal diseases. The risk of these can be exacerbated by crop pests and diseases and animal diseases, cereal price changes and livestock prices, also mapped in the report. This is confirmed by ThinkHazard²⁵, which states that the highest rated hazards are river floods, urban floods and water scarcity; furthermore, wildfires (veld fires in Zimbabwe) are listed. Although heatwaves are only classified as medium in ThinkHazard, it is important to consider the future trends in heatwave extremes due to climate change, which has the potential to affect particularly urban areas, and livestock; which may exacerbate the impacts of erratic rainfall on food security. Heat waves were not, however, considered as a major hazard in available documents or by stakeholders interviewed. Furthermore, local wind storms, hail and flash floods have caused major damage recently.

Based on the EM-DAT database²⁶, different hazards affect Zimbabwe differently (see figure below). On the one hand, drought is the most high-impact hazard reported in terms of the number of people affected. On the other hand, epidemics are the main cause of direct deaths. Economic damage is hard to assess in a country where the majority of people are outside the value added economic sectors (self-employed or subsistence farmers), and is not necessarily a suitable indicator in Zimbabwe. Furthermore, assessing indirect economic impacts of disasters is challenging, leading in many cases to underestimations of the total economic damage. Therefore, economic impacts and damage perhaps should not be used to determine the key hazards for FbEA; as, in the Zimbabwean context, reducing the direct humanitarian impacts is more crucial, particularly for the Red Cross.



The figures are based on the ten largest disasters reported in the EM-DAT database. There is a lot of uncertainty regarding the actual numbers. The point of the graphs is not to estimate the actual impact, but to show which hazards cause what type of damage.

²² <https://gain.nd.edu/our-work/country-index/rankings/> (Visited 28th of Jan 2019)

²³ <http://www.inform-index.org/Countries/Country-profiles>

²⁴ <https://www.gwp.org/en/GWP-SouthernAfrica/About-GWP-SAF/more/News/Zimbabwes-Climate-Change-Response-Strategy-Adopted-at-final-consultation-meeting/>

²⁵ <http://thinkhazard.org/en/report/271-zimbabwe>

²⁶ EM-DAT provides a database on historical disaster impacts at a very aggregated level (national level) and the reliability of the data is not known. Therefore, EM-DAT data needs to be verified with local data and information. <https://www.emdat.be/database>

Between 2008-January 2019, 13 DREF appeals have been submitted for Zimbabwe, and one for the Southern Africa country cluster. Out of the 13, five were floods (one originally categorized as a cyclone); four food insecurity, three cholera outbreaks, and one Diarrhoea outbreak²⁷. Final reports of the DREF appeals provide an overview of the most common impact types, and gives estimates of the number of people or households affected or objects damaged or destroyed.

Plenty of information, especially from the biggest disasters, is needed for identifying the FbEAs, particularly for FbA by the DREF. One challenge in the aggregate data collection (more detailed was not possible in the study) was that the data are reported by many organisations (the government, WHO for health²⁸, OCHA, UNICEF...), and, as of now, no single data source exists. During the feasibility study mission, an attempt to find an existing consolidated impact database by various international organisations was undertaken. However, it was not successful.

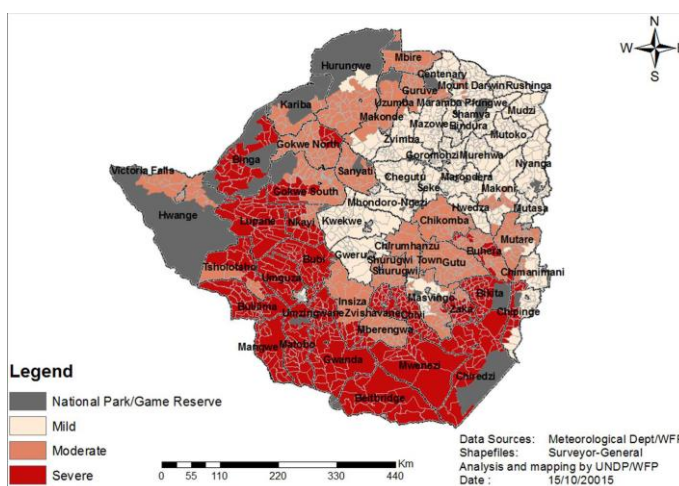
Consolidating a disaster impact database is an important long-run step toward developing an FbEA system. It can be used to understand the early actions that should be taken, and to develop impact-based forecasts. However, common impact categorizations (e.g. used in DREF appeals or in the Sendai indicator - DESINWENTAR database) do not necessarily provide detailed enough information for e.g. drought related food insecurity impacts in Zimbabwe, as the impacts and long-term consequences of the people affected vary depending on the community. In a ward-level Contingency Plan (Fishing Camps Ward 3 in Kariba), potential effects identified by the community members are malnutrition, poaching, early marriages and prostitution.

Drought related food insecurity & livelihoods

Zimbabwe is prone to food and nutrition insecurity due to a number of socio-economic, political, climatological, and environmental factors. Based on EM-DAT data, droughts have affected a large number of people, ranging from 55 000 in 1998 to 6 million in 2001. The numbers are not comparable due to climatological, socio-economic and demographic reasons, but show the high amount of people affected. Based on EM-DAT data, major drought years have been 1991, 1998, 2001, 2007, 2010 and 2013. During the 2015-2016 drought, estimated 4 million people were food insecure, and now in the 2018-2019 lean season, the situation is becoming serious in terms of the number of people in need of aid.

The reliance on rain-fed agriculture makes small-holder farmers exposed to variability and change in the seasonal rainfall patterns, as existing irrigation systems are currently highly nonfunctional²⁹. *The Agricultural Policy Framework (2012-2032)* notes that one of the major challenges facing the agricultural sector is inadequate investment in the rehabilitation and development of irrigation systems to combat the effect of recurrent droughts.³⁰ Lack of property rights is a major challenge for smallholder farmers. Land degradation and deforestation are exacerbating the situation by changing the micro-climatological conditions and soil quality. Economic factors, such as high inflation rates witnessed in the past and in 2018-2019, and lack of access to farm inputs, seeds, fertilizer, chemicals, are major contributors to the situation.

Only 68% of rural households had access to acceptable diet all year round and 35% of children aged between 6 to 59 months consumed less than three meals a day³¹. Zimbabwe is classified into five natural or agro-ecological regions on the basis of rainfall and land potential for agriculture. Rainfall and agricultural productivity decrease from Region I to V and consequently there are wide fluctuations in agricultural production potential across the country. Two-thirds of the rural population live in the less productive Regions III, IV and V. High population densities in these marginal lands puts pressure on the environment through over grazing of livestock, over cultivation, natural resource extraction and deforestation causing environmental degradation. Crop yields have remained low due to erratic rainfall and declining soil fertility. Environmental degradation



²⁷ <http://www.ifrc.org/appeals>

²⁸ <https://www.who.int/hac/crises/zwe/sitreps/en/>

²⁹ According to the Ministry of Agriculture, Mechanisation and Irrigation Development, the country has a total irrigation potential area of 5 million hectares that can be developed at an estimated cost of US\$10.6 billion. However, the current functional area is 161 000ha of which 45 000ha requires rehabilitation. (A study done by ZINWA)

³⁰ <https://documents.wfp.org/stellent/groups/public/documents/communications/wfp290422.pdf>

³¹ ZIMVAC 2014 <https://www.wfp.org/sites/default/files/ZimVAC%20Rural%20Livelihood%20Assessment%202014.pdf>

accentuates poverty, which in turn causes more environmental degradation.³²

Based on the risk mapping done in 2016, the most drought-prone provinces are Matabeleland North, Matabeleland South and Masvingo.

The map combines meteorological drought (derived from the Standardised Precipitation Index) and agricultural drought (calculated from the Water Requirement Satisfaction Index (WRSI) for maize as a proxy for drought). Meteorological and agricultural drought were combined and mapped using the following three point scale: Mild: wards ranked mild for both droughts; Moderate: wards ranked at moderate for one or both droughts; Severe: wards ranked severe for both droughts. The combined scale does not indicate the return period for droughts, but provides a mapping of the drought prone regions. Return periods are provided in the ThinkHazard analysis, which complements the mapping by concluding that Matabeleland North and Matabeleland South are classified as high drought-prone regions. ThinkHazard, implies that droughts are expected to occur on average every 5 years. However, as the return period for drought in Zimbabwe is likely to increase due to climate change and deforestation, knowing the drought-prone regions is more important than the actual return period.

Mid-season dry spells are another factor affecting rural livelihoods and creating food insecurity. In the risk mapping, dry spells are defined as prolonged periods of dry weather of at least ten consecutive days that happen after the onset of the wet season³³. The mid-season dry spell is described in terms of its length expressed in days and the frequency of occurrence. Its impact is directly related to the length and time of occurrence and therefore scores can be treated as one combined score. The map shows that approximately the same areas are exposed to droughts and mid-season dry spells.

In this feasibility study, it was not possible to undertake any community-based assessments on drought impacts or vulnerabilities. However, existing information highlights that understanding the community context in drought FbEA is important.

Severe food insecurity causes several negative impacts due to the harmful coping mechanisms that people and households may have to use, and recovery processes can last for years. Vulnerability of smallholder farmers, communities, households and individuals to drought is context-dependant³⁴, implying that the early actions must address the needs and capacities of the communities potentially affected.

In a ward-level Contingency Plan (Fishing Camps Ward 3 in Kariba), potential effects identified by the community members are malnutrition, poaching, early marriages and prostitution. Taking children away from school has also been identified. The way people and households are affected by food insecurity varies depends heavily on their situation. WFP reports that "Households with fewer productive tools are finding it more difficult to be food secure; there are also big differences according to geographical area, level of expenditures, level of production, and gender of household head." (Document provided by Lorenzo).

The chaotic economic situation of late 2018 and early 2019, has contributed to increasing food security risks and vulnerability of the population in general. This shows how situations may change rapidly, implying that the situation on the ground should be monitored constantly, and that up-to-date data is key in understanding community-level situation.

Seasonal rainfall exacerbates cholera risk

Cholera is a major health hazard in Zimbabwe. There have been 16 major cholera outbreaks in the last 20 years. In 2018, a major outbreak claimed the lives of over 40 people and recorded 1000 cases. A decade earlier, a cumulative total of 98,592 cases and 4,288 deaths were recorded by 31 July 2009. The mid-month September 2018 data on cholera cases

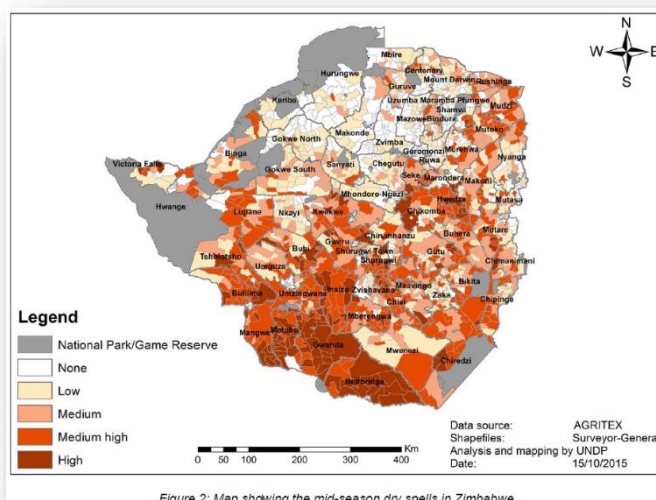


Figure 2: Map showing the mid-season dry spells in Zimbabwe

³² <https://documents.wfp.org/stellent/groups/public/documents/communications/wfp290422.pdf>

³³ A 5-point scale was adopted after consulting with Agronomists and Crop Science Specialists at the AGRITEX Headquarters in Harare: **None:** 0 -10 days; **Low:** 11 -14 days; **Medium:** 15 -21 days; **Medium high:** 22 -31 days; **High:** > 32 days.

³⁴ Rurinda, J., et al. "Sources of vulnerability to a variable and changing climate among smallholder households in Zimbabwe: A participatory analysis." *Climate Risk Management* 3 (2014): 65-78; Mtambanengwe, F., and P. Mapfumo. "Organic matter management as an underlying cause for soil fertility gradients on smallholder farms in Zimbabwe." *Nutrient Cycling in Agroecosystems* 73.2-3 (2005): 227-243.

has shown a 51% female and 49% male infection distribution. The results show an almost equal distribution among 10 years age-groups from (5-15) years, (15-25) years and (25-35) years, while for children under five the case load is more than the double as for any other age group.

The most significant factor contributing to outbreaks in Zimbabwe is the poor water, sanitation and hygiene (WASH) infrastructure; which has deteriorated, possibly to a level of disrepair, after years of neglect. Humanitarian actors may struggle to prevent cholera from spreading unless local officials address sanitation shortfalls. Only a quarter of daily water demands are met in Harare, leaving huge shortfalls. The lack of available water has led residents to use alternative water sources, including unsafe boreholes and open wells. Hygiene awareness is low across Harare, and a 2017 survey by MoHCC indicated 55% of those surveyed had faecal matter on their hands. For instance in DREF Emergency Appeal No. MDRZW004 in 2010 Final Report “The last cholera outbreak was a result of weakened public health and municipal services, with local authorities unable to provide adequate access to safe water, waste disposal and sanitation. In the revised UN Consolidated Appeal for 2009, partners in the WASH cluster estimated that six million people in Zimbabwe had limited or no access to safe water. This was largely due to the unavailability of water treatment chemicals, irregular refuse collection and inadequate sanitation facilities, in addition to the lack of resources to repair damaged infrastructure.” Some of the areas identified as at high risk of cholera outbreak in Zimbabwe are Chipinge, Chiredzi, Mudzi, Beitbridge, Mutare and Harare which experience outbreaks almost every year.

Flood risk

In the 2016 mapping, flooding is defined as an overflow of water onto land that is normally dry. Flooding occurs due to heavy rains, tropical cyclones or rising dam levels that results in the destruction of crops and structures such as homes and other infrastructures.

Based on the analysis, the most flood-prone districts are along the Zambezi river in Mbire and Centenary (Mashonaland Central); in Beitbridge (Matabeleland South) and Chiredzi (Masvingo), and in Thsolotsho (Matabeleland North). Along the Zambezi river in the north, Hurungwe district is mainly classified as national park. Some low and medium level flood risk areas are also identified.³⁵

The map does not show the extend and damage level of the floods. In principle, one flood in ten years (classified as low flood risk area) could have been more damaging than the floods in the high flood prone areas. Based on DREF appeals, e.g. the DREF appeal in 2017 on the floods induced by the tropical depression Dineo, risk maps based on historical information do not necessarily provide an up-to-date or realistic risk profile for the country: Flooding in 2017 affected districts which are classified as medium or even low risk areas.

Currently, there are no risk maps provided for flash floods and urban floods. The risk of these is increasing due to various, mostly non-meteorological factors. Climate change will also increase the risk due to intensifying rainfall events. Flash flood risk in urban areas was mentioned in several interviews as an increasing risk. This is caused by unplanned urbanization, particularly in Harare where many of the cities natural wetlands are under threat.

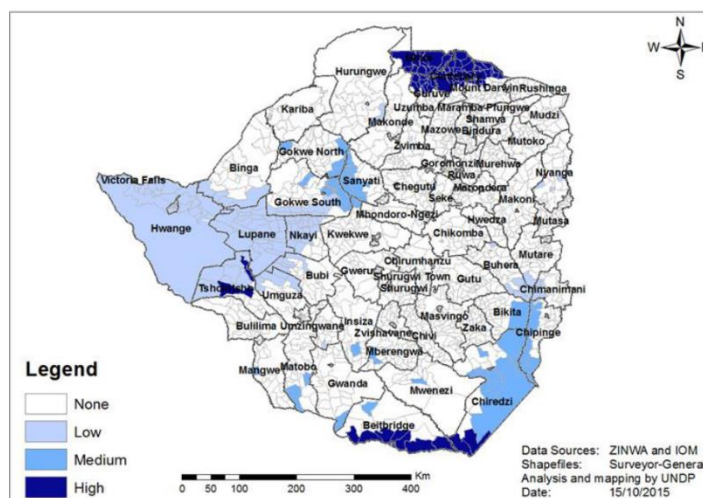


Figure 3: Map showing the flood proneness in Zimbabwe

Cyclone induced flooding

As the EM-DAT data shows, events categorized as storms or cyclones can have devastating effects in Zimbabwe. For instance the DREF n°: MDRZW012 on the 2017 cyclone/tropical depression Dineo or the most recent example from cyclone Idai that devastated the eastern part of Zimbabwe in March 2019 shows that the majority of cyclone damage comes from the heavy rainfall associated with the cyclone. Therefore, wind speed is not necessarily the best measure

³⁵ The scoring of the flood hazard map (Fig x) of Zimbabwe was based on recorded frequency of floods over a ten year period based on data from the Zimbabwe National Water Authority (ZINWA). The scoring was as follows: None: No recorded incidences of flooding; Low: 1 to 3 incidences of flooding; Low: 1-3, Medium: 3 to 5 and; High: > 5 incidences of flooding. Think Hazard analysis does not provide any additional information to the mapping done in 2016. Based on ThinkHazard, the high hazard level provinces are Matabeleland north (mostly low flood hazard area in Fig x), Manicaland (medium flood risk), Mashonaland central and Midlands (not a flood-prone area based on the 2016 mapping), the three first identified are also high risk prone areas to urban floods. This means that potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years.

to define the damage level. Dedicated hazard maps for cyclone-induced flood risk are not available, so it is not possible to determine if some areas are more impact prone than others.

Flash floods

Flash floods are a major concern in Zimbabwe during the wet season. It is particularly a problem in urban areas due to various problems in infrastructure, and areas down-stream from dams, as witnessed in 2014: “Heavy rains in parts of the country in late January and early February resulted in deaths and displacement of people, coupled with destruction of property”. The worst affected areas are Chivi and Masvingo districts in Masvingo province and Tsholotsho district in Matabeleland North. The Zimbabwe National Water Authority (ZINWA) in its hydrological update on 5 February warned that the country’s dam levels continue to increase due to the inflows from the rainfall activities in most parts of the country. The national dam levels increased significantly by 10.29 per cent since 27 January 2014 and now stand at 71 per cent full. Chances of flooding in flood prone areas such as Muzarabani, Gokwe, Middle Sabi, Tsholotsho, Malapati and Chikwalakwala remain high due to significant flows in the major rivers.”³⁶ Major impacts were casualties, destroyed homes and infrastructure, and displacement due to evacuation.

Hail storms, wind storms and wild fires

Many interviewees raised the issue of damaging hail storms as an increasing threat in Zimbabwe. Based on newspaper article search, hail has caused severe damage to agriculture in various places. Local wind storms have also created damage to infrastructure in many locations and occasions. Based on Think Hazard, the entire Zimbabwe is classified as high hazard level for wild fire, meaning that there is greater than 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year.

2nd Step for Hazard Selection: Hazard and impact forecasting capacity

To develop the triggers for the FbEA system, ‘sufficient’ hydro-meteorological forecasting capacity must be available. The better the forecast capacity, the lower the risk of acting in vain, i.e. in communities not affected by the natural hazard. This section briefly addresses the forecasting capacities of national and international hydro-meteorological forecast information and warning providers, providers of impact forecast information, and suggests other potential triggers to be developed in the project. Based on the risk assessment, the capacity to forecast the following hazards is assessed: droughts and dry spells on food security, river floods, tropical cyclones floods, flash floods, wind storms, hail and cholera outbreaks.

National providers of hydro-meteorological forecast information are the Meteorological Service Department of Zimbabwe (MSD) on weather and climate, and the Zimbabwe National Water Authority (ZINWA)³⁷ on hydrology. International providers potentially relevant for Zimbabwe are IRI-Columbia University, ECMWF, RSMC La Reunion-Tropical Cyclone Centre/Meteo-France and EU Copernicus programme. Food security situation is monitored and forecast by FEWS NET.

El Nino-induced drought and food insecurity has the longest lead time for effective early actions. Cholera forecasting based on rainfall data has been experimented in Yemen, but requires a substantial amount of analysis. For other hazards, the lead time and spatial resolution are a challenge. Thus, no-regret actions are of importance and the ZRCS and donors should accept some risk of acting in vain. The forecasting capacity for each hazard identified from previous section is given in the table below.

	Forecast and anticipatory capacity						
Forecast	Drought related food insecurity	Cholera outbreak	River flood	Flash floods	Cyclone winds	Cyclonic rainfall	Heat wave
Seasonal (3 months)	Good	Poor/ not relevant	Exists, but poor	None	None	None	No knowledge
Short term (6 to 10 days)	Not relevant	Could be developed	Poor	None	Poor	Poor	No knowledge
Short term (3 to 5 days)	Not relevant	Could be developed	Poor	None	Poor	Poor	Not relevant
Short term (24hrs)	Not relevant	Not relevant	uncertain	none	medium	medium	not relevant

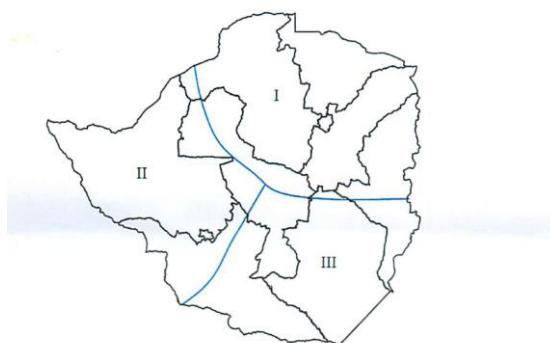
³⁶ <https://reliefweb.int/sites/reliefweb.int/files/resources/Flash%20Flood%20Update%201%20-%207%20February%202014.pdf>

³⁷ The ZINWA Act states that ‘Subject to this Act, the Water Act [Chapter 20:24], and any other enactment, the functions of the Authority shall be to exploit, conserve and manage the water resources of Zimbabwe with the object of— (iii) taking appropriate measures to minimise the impacts of droughts, floods or other hazards;’

High feasibility of FbEA for drought and food insecurity

FEWS-NET³⁸ assesses food insecurity situation months ahead based on multiple data sources, including El Niño forecast. First assessments of the food insecurity situation during the lean season 2018-2019 were already visible in June 2018: “Crisis (IPC Phase 3) food security outcomes are expected across most typical deficit crop-producing areas in the south, west, and extreme northern regions of the country between August 2018 and January 2019”. Early international forecasts for Southern Africa indicate increased probabilities for El Niño-induced below-average rainfall for the 2018-19 season. Although there is some uncertainty in this forecast, poor rains will likely affect livelihood activities from October 2018 to January 2019.”³⁹ Based on FEWS NET accuracy analysis, the FEWS-NET forecast capacity in Zimbabwe is good, except in the south in winter wheat areas.

The seasonal outlook provides a forecast on the total rainfall over the rainy season on a seasonal time scale for three rainfall zones over Zimbabwe. They are indicated as homogenous rainfall zones, but the demarcation was done a long time ago, and re-analysing them has been identified as one of the research areas at MSD. The forecasting tools are Systat, Geocof⁴⁰ and IRI CPT⁴¹. MSD indicated that the regions are not necessarily as homogenous as previously understood, so there is potential to improve the forecast.



The seasonal outlook is presented to stakeholders at the National Climate Outlook Forum, which is organised after the Southern Africa Regional Climate Outlook Forum (SARCOF). The ZRCS is part of the stakeholder group invited to the National Forum and has also participated in SARCOF.

The current format of the seasonal outlook implies that it cannot be used for FbEA on its own, because 1) it is not given in a probabilistic or in any other quantitative format that is required to develop quantitative triggers or reliably verify the forecasts, 2) the spatial resolution of the forecast is low, 3) it does not imply how hydro-meteorologically extreme (compared to e.g. climatological normal) the situation will become, and 4) it has not been properly verified, although some verification has been done.

The impacts of hydro-meteorological phenomena, particularly slow onset (such as drought) and rain-induced cholera outbreaks on communities cannot only be determined by the hydro-meteorological forecasts. Instead, the hydro-meteorological forecasts should be combined with tools that already exist within the RCRC (or in other organisations, such as WFP), and monitoring the food security situation within communities should be included in the FbEA mechanism for true early actions. Due to the uncertainty in El Niño forecasts issued by IRI, the forecast should not be used as a trigger for food security in Zimbabwe. For instance, the IRI ENSO forecast published on 19th of November, 2018, stated that “*El Niño-level SSTs were observed in the October average, and the subsurface waters also continued to be markedly warmer than average. However, the atmospheric variables showed mainly ENSO-neutral patterns.*”⁴²

Suggested trigger methodology

For the FoodSecure pilot project in 2015-2016 by WFP⁴³, a model was used which aimed at replicating the economic behaviour of households in the event of a shock. The input data was Demographics; Expenditures on food and non-food items; Days in which any food item from different groups has been consumed by household members over a seven-day recall period; Agricultural inputs; Land utilization and crop production; and Other agricultural-related information and project-related information.

The model was technical, and provided an assessment of the potential situation, not actual triggers for action. This was considered a problem during the implementation of the pilot. However, WFP is planning to continue working on WFP

³⁸ Famine Early Warning Systems Network: FEWS NET, provides early warning and analysis on acute food insecurity. It was created in 1985 by the US Agency for International Development (USAID). FEWS NET provides objective, evidence-based analysis to help government decision-makers and relief agencies plan for and respond to humanitarian crises. The network produces forward-looking reports on more than 36 of the world's most food-insecure countries. The products include: monthly reports and maps detailing current and projected food insecurity; timely alerts on emerging or likely crises; specialized reports on weather and climate, markets and trade, agricultural production, livelihoods, nutrition, and food assistance. <http://fewsn.net/about-us>

³⁹ <http://fewsn.net/southern-africa/zimbabwe/food-security-outlook/june-2018>

⁴⁰ <http://chg.geog.ucsb.edu/tools/geocof/>

⁴¹ <https://iri.columbia.edu/our-expertise/climate/tools/cpt/>

⁴² <https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

⁴³ <https://www.wfp.org/blog/blog/wfp-helps-farmers-facing-drought-zimbabwe> (Visited 17.12.2018)

in Zimbabwe, and is interested in collaboration with ZRCS on FbEA development. WFP is also seeking technical support from IRI, Colombia University, a technical partner of the Climate Centre.

As food security is a complex issue, it requires understanding of the societal, community and market conditions and constant monitoring of their conditions to trigger action. Therefore, a simpler approach, suggested by the livelihoods delegate of the British Red Cross based in Harare, is to use the Red Cross Livelihoods centre Household Economy Security (HES) or similar framework to develop the triggers for early action. The Red Cross Livelihoods Centre HES framework provides guidelines for assessing community livelihoods.

The HES framework provides the backbone of HES assessment and response design. It can be adapted to all HES deployment modalities and timeframes to allow for a systematic approach to ensure that the “humanitarian response meets the assessed needs of the disaster affected population in relation to context, the risks faced and the capacity of the affected people to cope and recover”. HES assessments achieve this by assessing the impact of a disaster/shock on people’s livelihoods and economic security, through a comparison of their situation now with their situation prior to the disaster.⁴⁴

As an example, based on the experience from 2018, the FEWS-NET assessment in June could already trigger community and market monitoring. If monitoring shows signs of a weakening situation in the communities, and latest if seasonal forecast indicates bias toward below normal rainfall, action could be triggered in August. The community and local market based triggers could be identified through community consultation (historical profiling and other HES tools). The triggers have to be ‘SMART’⁴⁵, and require a proper assessment before they can be used. However, once the assessment is completed and the triggers have been identified, community monitoring can be used to observe when the triggers are met, and early actions with available funding can be implemented. The main point is to understand what communities do when they are stressed due to food deficit and see how markets (local, community markets) react.

Improved Cholera preparedness

The relationship between cholera outbreaks and rainfall is complex. However, there have been developments on the causal relationships. In Yemen, experts used satellite information to determine the potential for a cholera outbreak to occur in Yemen. They were able to predict an outbreak that occurred weeks later. To make their predictions, the team used satellites to monitor temperature, water storage, precipitation, and land use. Combining this raw data with a specially designed algorithm, by a team trained on data from southern Asia and parts of Africa, they were able to predict which specific areas were most at risk for an outbreak within the following month. By dividing Yemen into county-sized sections, the team was able to map cholera outbreaks per area of landmass. They then worked on determining the likelihood of an outbreak by using satellite observations of the environmental conditions in that region, the rainfall and drinking water status. They also considered factors such as population density and temperature, to develop with a model with a 92 percent accuracy score capable of predicting where cholera outbreaks would occur and how they might spread.

Another approach is the IFRC framework for improved preparedness and more effective response for cholera outbreaks. This would focus more enhancing the volunteer capacity to monitor and report diarrhoea cases to improve the response before the cases turn into an outbreak.

Cyclone induced flooding

As highlighted in the risk assessment, the majority of cyclone-induced flooding in Zimbabwe may actually come from the associated rainfall. Tropical cyclone monitoring and forecasting is getting increasingly easier with improved satellite technology. MSD is monitoring the cyclones emerging in the Indian Ocean⁴⁶ and informing stakeholders, such as DCP, when the cyclone makes landfall in Mozambique. According to MSD, cyclone track and the amount of rainfall can be forecast at provincial level 24 hours beforehand, but the forecast gets more spatially accurate only a few hours before the event. Therefore, it is possible to warn communities of the impending impacts, and community-based actions can be perhaps taken, but more large-scale actions supported by provincial or HQ level are not possible without major uncertainty on acting in vain, in a community which is not hit by the floods.

Analysing the relationship between cyclones and rainfall is challenging, as was the case in Mozambique⁴⁷. The challenge was the small amount of recorded historical rainfall data in Mozambique. Various datasets were tried, but most did not agree on cyclonic rainfall levels, and the station network in Mozambique is so sparse that station observations for most of the cyclones have not been available. Therefore, it may not be possible to analyse how much rain had come with each cyclone in the past. Combining this challenge with a second challenge of finding a pattern for a certain amount of

⁴⁴ http://www.livelihoodscentre.org/documents/20720/100145/HES_Guidelines+3.0+%282014%29/92cb5220-9278-4cd2-9fa7-1f5af063f3b7

⁴⁵ Specific, measurable, attainable (or achievable), relevant/ realistic, and timely.

⁴⁶ http://www.meteo.fr/temp/domtom/La_Reunion/webcmrs9.0/anglais/index.html

⁴⁷ Consulted Erin Coughlan de Perez, IFRC Climate Centre on 22nd of January, 2019.

rainfall (best estimates from satellites or reforecasts) and certain amount of damage, it was not possible to define triggers for cyclone induced flooding.

Flood forecasting

ZINWA has no flood forecasting model in current use. ZINWA operates 324 manual flow monitoring stations around the country, where the monitoring is conducted daily. Approximately 10 automatic monitoring stations exist; 5 of them along the Zambezi river. A challenge with the current observation system is monitoring of peak flows, as the once-per-day observation is not sufficient for their monitoring. Nevertheless, forecasting of peak flows and flash floods requires substantial improvement in Zimbabwe.

The challenge with the automatic flood monitoring stations is the lead-time given to take early action measures, which is even more challenging for FbEA. Also cross-border sharing of data and warnings is vital in transboundary river systems, particularly in the Zambezi. This could increase the lead-time. However, the key development need is flood forecasting models that would give e.g. a 3-day lead-time for triggering the FbEA system.

In the absence of national flood forecasting capacity, GloFAS⁴⁸ can provide a potential alternative. The GloFAS seasonal outlook provides forecasts of unusually high or low river flow up to four months ahead. The seasonal forecast products are updated once per month and made available via the forecast viewer on the 10th of each month. GloFAS has been operational since April 2018. The challenge with GloFAS is that the forecast is provided on a monthly bases, so it may not catch extreme events which occur rapidly. Better understanding of the GloFAS lead time could enable the development of flood EAPs, but due to the development project within MSD and ZINWA, this is not a priority as national information providers should be favoured to develop the forecasting and early warning capacity in Zimbabwe.

Forecasts for rapid onset weather events by the Meteorological Service Department

Spatial resolution and accuracy are the main challenges the MSD currently faces. It provides medium-range and short-range forecasts only at the provincial level. MSD is using WRF and Cosmo to downscale global models to province-level forecasts. Spatial resolution of forecasts and particularly the accuracy is a key factor in FbEA for small-scale, rapid onset disasters (flash floods, strong wind storms), as the forecast should tell where early actions are taken. In particular, we should know 1) if the excess or below normal rainfall will hit an urban area, 2) an area with major topographical or micro-climatological differences leading to varying impacts across small spatial scales, or 3) a community particularly vulnerable to the hazard. With the current spatial resolution and accuracy, this is not possible. Potential for flash flood forecasting is currently developed in a project at IRI/Columbia University, and the project leader expressed an interest to collaborate as one of the target areas of the project is southern Africa. MSD also mentioned that it is aware and using the flash flood guidance system of the World Meteorological Organisation⁴⁹, but there was no possibility to assess in which situations it has been used, and what has been the lead time.

Many interviewees also noted the importance and destruction caused by hail storms, which are very local events and therefore hard to predict with enough lead time to trigger FbEA system. The seasons for increased risk of hail and local windstorms are known, as they are associated with the atmospheric conditions. However, the location of hail and local windstorms can in principle not be predicted until just before they hit. Hail storms are very hard to predict in general, but perhaps some community-based measures could be taken. This is, however, beyond FbEA due to lack of possibility to mobilise funding within the lead time.

MSD confirmed that they do not have plans to develop more detailed impact-forecasts, which would aim at quantitative impact predictions. However, it already provides qualitative, impact-based forecasts: “there will be damage to infrastructure, uprooting of trees, electricity blackouts, food security will decrease, etc”. At this stage, effort should be on developing the general meteorological forecasting capacity, although based on improved knowledge on past disaster impacts, MSD could provide more detailed impact information without substantial efforts.

Forecast-based Financing options

A core element of a FbEA system is the existence of a financing mechanism(s). Funding is be automatically disbursed according to the pre-defined EAP, which outlines specific forecast triggers, pre-planned actions, roles and responsibilities. This mechanism must allow for the timely implementation of actions, while guaranteeing transparency and accountability with donors and the communities at risk. In Zimbabwe, a key consideration for any financing options is the slow and bureaucratic nature of the banking system.

⁴⁸ The Global Flood Awareness System (GloFAS), jointly developed by the European Commission and the European Centre for Medium-Range Weather Forecasts ([ECMWF](http://www.ecmwf.eu)), is a global hydrological forecast and monitoring system independent of administrative and political boundaries. <http://www.glofloods.eu/>

⁴⁹ <https://public.wmo.int/en/resources/bulletin/operational-regional-flash-flood-guidance-systems>

Currently, the ZRCS has highest interest toward small-scale hazards and impacts, but if considered possible, the 'FbA by the DREF' could be a very attractive way to develop the ZRCS capacity to implement early actions in large-scale disasters. FbA by the DREF fund focuses on events which occur on average once in five years with potentially a major humanitarian impact. The time it takes for funds to reach Zimbabwe from Geneva is uncertain and may depend on individual situations. The IFRC is looking for different options to disperse funding more rapidly.

At this point, the crisis modifier has the highest potential to enable early actions, assumed that the money is accessible. The crisis modifier enables also the development of a flexible, simple system which can be further developed into a system eligible for FbA by the DREF fund. In general, funding mobilization should be a key aspect in the FbEA system development.

All the PNSs supporting ZRCS have crisis modifier components in their existing programmes. According to the Danish Red Cross country representative; if the crisis modifier fund is in Copenhagen, it takes approximately a week to receive the money in Harare. With the Finnish Red Cross, the money is available in Zimbabwe in principle, as it is part of the programme budget, but there is no guarantee of this.

Monitoring, Evaluation, Accountability & Learning (MEAL)

Monitoring and Evaluation in the context of FbEA aims to build an evidence base on the potential benefits of acting early and how these benefits can be assessed, as well as to monitor the activation process and gather critical lessons for system improvement, which includes NS, action and trigger performance. **Learning** should be an ongoing process during project implementation, and a priority for periodic moments of reflection where available data is reviewed and lessons learned are drawn.

The ZRCS has two staff members working on M&E, and the capacity to undertake standard programme M&E is overstretched. The ZRCS is familiar with the Theory of Change approach, as it is used in the British Red Cross Resilience building programme. However, the use of the approach may not have been very successful. Capacity to carry out Cost-Benefit Analyses, or other economic assessments, does not exist.

ZRCS capacity and resources to develop and implement a fully functional FbEA system should be the key criteria in assessing the feasibility of the entire system and its individual steps. Currently, the ZRCS does not have capacity to develop a full MEAL framework due to lack of adequate staffing in the PMER department.

Cost-Benefit Analysis (CBA) is suggested as part of the MEAL package. CBA can assess the monetary benefit of a certain amount of money invested (cost). In the context of FbEA, it can be used to assess the net present economic value of a FbEA, and in the best-case, CBA should be done by comparing a disaster occurring with vs. without FbA interventions. Depending on whether FbEAs were taken (the cost of action), we expect to see a different economic impact of the disaster (the benefit of having taken action, or the cost of inaction).

CBA is a valuable, relatively straightforward tool to use in cases where costs and benefits are known. However, this is rarely the case. To undertake a CBA, the monetary value of the impact variables suggested for the community-level monitoring should be captured in the assessment, to the extent possible. For example, survey respondents can be asked for an estimate of the cost of repairing damages to their house, or health expenses in the aftermath of a disaster. In many cases, however, the true monetary dimension is not captured, or it is hard to measure. For instance, in Zimbabwe, adequate health care which would capture the total cost of the health impact may not be available.

In principle, major data collection efforts are required for CBA results to be reliable, and the analyst should have knowledge of methods for sensitivity analysis. Value of human life and health is heavily debated in economics, and in the humanitarian context, it should not be valued. Therefore, using CBA is not recommended as it may not be the best economic tool to measure the success of a FbEA, as the total economic cost is most likely not captured.

Crisis modifier

Crisis modifier is a budget component in existing long-term development programmes to “enable early action and rapid response” (ODI, 2017) and is “designed to be ring-fenced budget contingency lines, built into existing multi-year grants; [...] set up to be released when agreed early warning triggers of emerging crises are met”.

ODI 2017

<https://www.odi.org/publications/10975-crisis-modifiers-solution-more-flexible-development-humanitarian-system>

Forecast based Action by the DREF

Forecast based Action by the DREF is an IFRC funding mechanism specifically designed to fund Early Action Protocols (EAP).

Possible amount to be funded: Up to 250,000 CHF (~USD 251 000 26.1.2019)

Once the EAP is approved, the NS is eligible to an annual readiness fund to ensure “readiness” to activate the system (max 25% of the total budget), and stock pre-positioning funds (max 40% of the budget).

EAP Timeframe: 5 years

EAP Target population: Minimum of 1000 (approx.) households.

<https://www.forecast-based-financing.org/wp-content/uploads/2019/01/FbA-Documents-for-National-Societies.pdf>

<http://fbf.drk.de/manual.html#c32>

Therefore, an alternative to CBA, Cost-Effectiveness analysis could provide a more feasible, yet potentially also a laborious and uncertain, approach. Cost-effectiveness analysis (CEA) is a form of economic analysis that compares the relative costs to the non-monetary impacts of different courses of action. In principle, cost-effectiveness analysis assesses how to reach a certain non-monetary target (e.g. reduction in disaster impact) with the least cost.

There are at least three accountability relationships between ZRCS and its partners: the relationship with and among the main FbA stakeholders (including the government), with beneficiaries, and with the funding agencies. Accountability toward stakeholders and funding agencies has been highlighted elsewhere, and meaningful accountability relationship with beneficiaries should be nurtured.