

Forecast-Based Early Action (FbA) in Indonesia:

A Scoping Study

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Project Summary

Project Name:

Forecast-based Financing in Indonesia: A Scoping Study

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Australia Red Cross, Red Cross Red Crescent Climate Centre, PMI, IFRC

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Acronyms

ADPC	Asian Disaster Preparedness Centre
APIK	Adaptation to Climate Change and Resilience (USAID program)
ARIMA	Autoregressive integrated moving average
ARR	Automatic Rainfall Recorder
AWLR	Automatic Water Level Recorder
AWS	Automatic Weather Station
BASARNAS	Badan Nasional Pencarian dan Pertolongan (National Search and Aid Agency)
BBWS	Balai Besar Wilayah Sungai (National River Management Department)
BIG	Badan Informasi Geospasial (Geospatial Information Agency)
BMKG	Badan Meteorologi, Klimatologi dan Geofisika (Meteorological, Climatology, and Geophysics Agency in Indonesia)
BNPB	Badan Nasional Penanggulangan Bencana (National Disaster Management Authority)
BOCA	Branch Organizational Capacity Assessment
BPBD	Badan Penanggulangan Bencana Daerah (Regional Disaster Management Agency)
BPS	Badan Pusat Statistik (Central Bureau of Statistics)
BTN	Bank Tabungan Negara (State Savings Bank)
BTT:	Belanja Tidak Terduga (Unexpected Expenses)
CARE	Cooperative for Relief and Assistance Everywhere
CBDP	Community Based Disaster Preparedness
CBRR	Community Based Risk Reduction Program
CCA	Climate Change Adaptation
CTP	Cash Transfer Program
DIBI	Data Informasi Bencana Indonesia (Indonesian Disaster Information Data)
DM:	Disaster Management
DRR	Disaster Risk Reduction
DRRI	Disaster Risk Reduction Indonesia
DSP:	Dana Siap Pakai (ready to-used budget/contingency fund)
EAP:	Early Action Protocol
ECMWF	European Centre for Medium-Range Weather Forecasts
ENSO	El-Nino Southern Oscillation
ESDM	Energi dan Sumber Daya Mineral (Energy and Mineral Resources)
FEWEAS	Flood Early Warning and Early Action System
FGD	Focus Group Discussion
GFS	Global Forecast System
HOT	Humanitarian OpenStreet Map Team
ICBRR	Integrated Community Based Risk Reduction Program
IFRC	International Federation of Red Cross and Red Crescent Societies
ITB	Institut Teknologi Bandung (Institute of Technology in Bandung)
KEMENDIKBUD	Kementerian Pendidikan dan Kebudayaan (Ministry of Education and Culture)
KEMENKEU	Kementerian Keuangan (Ministry of Finance)

KEMENKES	Kementerian Kesehatan (Ministry of Health)
KEMENSOS	Kementerian Sosial (Ministry of Social Services)
KLHK	Kementerian Lingkungan Hidup dan Kehutanan (Ministry of Environment and Forestry)
LAPAN	Lembaga Penerbangan dan Antariksa Nasional (National Institute of Aeronautics and Space)
MPBI	Indonesian Society for Disaster Management
NAD	Nanggroe Aceh Darussalam (Aceh province)
NGO	non-governmental organization
NOAA	National Oceanic Atmospheric Association
Perpres	Peraturan Presiden (presidential decree)
Permen	Peraturan Menteri (ministerial regulation)
PLN	Perusahaan Listrik Negara (State Electricity Company)
PMI	Palang Merah Indonesia (Indonesia National Society Red Cross)
Posko:	Pos Komanda (Command Centre, for emergency situation)
PU	Pekerjaan Umum (Public of Works)
RCP	Representative Concentration Pathways
RFL	Restore Family Links
SADEWA	Satellite Early Warning System
SCM	Smart Climate Model
SIBAT	Siaga Bencana Berbasis Masyarakat (Community-Based Action Team, PMI volunteers)
SST	Sea Surface Temperature
USAID	United States Agency for International Development
UU	Undang-Undang (law)
VAMPIRE	Vulnerability Analysis Monitoring Platform for Impact of Regional Events
WMS	Watershed Modeling System
WRF	Weather Research Forecast Model
WVI	World Vision Indonesia

Introduction

This study is an investigation into the feasibility of Forecast-based Early Action (FbA) in Indonesia. FbA is a mechanism which facilitates humanitarian action based on a predetermined forecast trigger.

FbA is innovative in that it puts in place the protocols, funding, and commitment to early action that permits practitioners and communities to take action based on the forecast of a disaster, rather than responding in the aftermath of the disaster. This preemptive approach is part of a larger shift towards anticipatory approaches within humanitarian assistance (FAO, 2017; ECOSOC, 2018); these approaches protect lives and assets, enable communities to take actions needed to mitigate risk, involve lighter resource use, and reduce suffering.

Although the standardization and institutionalization of humanitarian action based on a forecast is groundbreaking, research for this study also revealed the long history of early action across Indonesia. *Siaga Darurat*, meaning alerts in advance of an emergency, is embedded both in policy and in practice. Interviews with disaster-impacted individuals and visits to communities highlighted the richness of situated knowledge, adaptive strategies, and traditional knowledge practices that people use to mitigate risk and act in advance of a disaster. From traditional bamboo *kentongans* (noisemakers) that villagers use to communicate landslide risk, to whatsapp groups warning others downstream that a flood is about to come their way, to stories of the ebb and flow of evacuating and coming back to fields fertilized in ash that comes from living on the flanks of one of the world's most active volcanoes, many Indonesians have an intimate understanding of what it means to experience hazard events and what they can do to mitigate the consequences for themselves and their families.

This prevalence of early action at a community level speaks to the important role that FbA can play in upscaling these efforts through advocating for policy change and allocating resources. The fact that Indonesian governance is decentralized and that early action efforts occur at a regional level does not take away from FbA. Rather, the program design that is proposed within this study is one which attempts to bolster and build off of this community-level expertise, blending advanced forecasting capacities from climate science with traditional knowledge and practices that community members use in the face of disasters through the mechanism of FbA.

Defining Forecast-Based Early Action (FbA)

Forecast-based Financing (FbF) is “a mechanism for releasing humanitarian funding triggered by a pre-established forecast threshold” (Climate Centre, 2017). It operates in the window between a forecast trigger and a disaster event, as illustrated in dark green in Figure 1 below. Therefore it serves to bridge longer term disaster risk reduction (DRR) and response post-disaster.

Figure 1: Visualizing FbF (GRC, 2018).



FbF builds on Early Warning Early Action (EWEA) efforts in focussing efforts on standardizing and systematizing Early Action protocols and securing funding well in advance of a disaster event (Climate Centre, 2018; Coughlan De Perez, Van Den Hurk, Van Aalst et. al., 2015).

However, recent dialogue has begun to acknowledge that the term ‘financing’ places undue emphasis on the *funding* aspect of the mechanism without being inclusive of other standardization and early action elements that are vital to FbF. Key actors within the movement have instead begun to re-define FbF as Forecast-based Early Action (FbA), a term which moves beyond a focus on financing to encompass the full spectrum of early actions and interventions that are possible. FbA mechanisms build on earlier EWEA efforts “by placing considerable emphasis on decision-making protocols, so actors know what to do on the basis of a forecast; on ex ante financing of early action; and by using cost–benefit analysis more

rigorously to help promote ex ante investment in disaster risk reduction (DRR)” (Wilkinson, Weingartner, Choularton et.al., 2018). As such, FbA reflects a commitment to resourcing and planning early action based on weather forecasts and historical data, in whatever form that may take: financing, resources, Non-Food Items (NFIs), assistance with evacuation, expertise, and / or personnel.

In choosing to use the term FbA the authors of this report build off of the shifts in language that emerged in the January 2018 report entitled “Forecasting hazards, averting disasters: Implementing forecast-based early action at scale” (Wilkinson, Weingartner, Choularton et.al., 2018). This decision also reflects language adopted by IFRC’s Disaster Relief Emergency Fund (DREF), which in May of 2018 established an FbA mechanism that for the first time opens up a funding stream that is accessed using forecasts in advance of a disaster (Cochrane and Freebairn, 2018; IFRC, 2018). For the purposes of this report, FbA shall refer to the overall mechanism, with FbF being used to designate the financing component of FbA. FbF will also be used to refer to FbA projects which have already been implemented using the language of FbF.

Purpose of Study

The key objectives of this study are:

- To inform PMI strategic vision for resilience building and community-based approaches for the next five years;
- To provide analysis of forecasting skill, institutional capacity, and organizational capacity within the Indonesian context;
- To map FbA stakeholders;
- To recommend steps for program design, funding, operationalization, and up-scaling of FbA in Indonesia.

Methodology

Analysis for this scoping study was comprised of both primary and secondary research methods.

Consultants sought out opportunities to gather first hand information through interviews and focus group discussions. These included a wide range of actors: from technical to institutional to organizational; from public, private, and research spheres; and from community-level up to national level. The research team engaged with practitioners who have already implemented FbA in other countries, actors from across Indonesia who would be potential FbA implementers, and community members who are involved in disaster management or who have themselves been impacted by disaster. In total, the team interviewed more than 65 actors to help inform this feasibility analysis.

The research team conducted literature reviews of existing Early Warning Early Action (EWEA) and Forecast-based Early Action (FbA) initiatives across Indonesia in both Bahasa and English, as well as reviewing key legal, technical, and policy documents and reports.

Findings and analysis are presented according to the structure outlined in the IFRC, Climate Centre, and German Red Cross collaborative FbF guide “criteria for identification and design of Forecast-based Financing interventions” and shaped by conversations from implementing partners from the Climate Centre and Australian Red Cross.

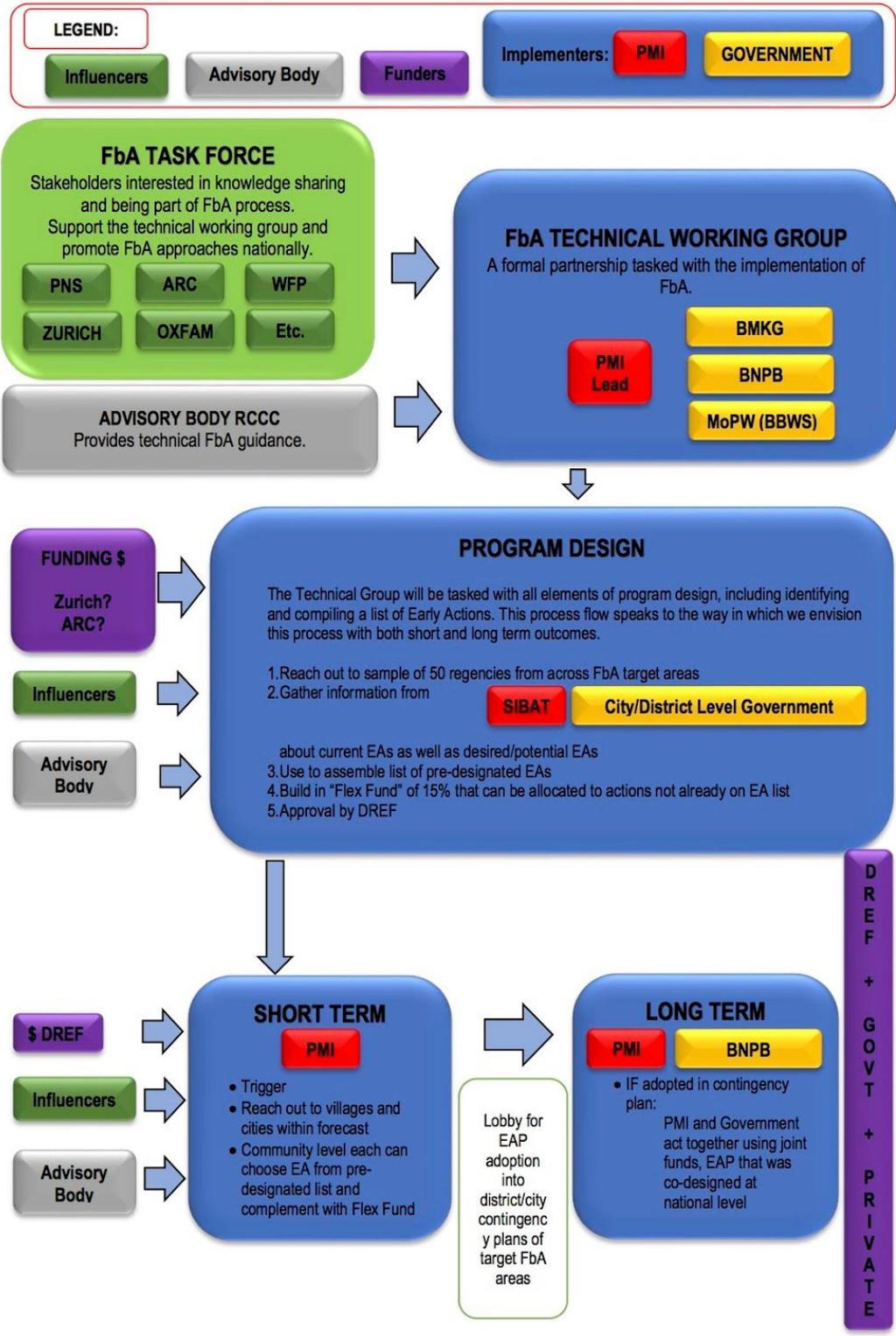
FbA Vision

The vision for FbA in Indonesia is to shift the current disaster management mindset of response to a disaster, to one that is ‘response to a forecast’--a shift that leverages current capacities and strengths and applies them to anticipatory approaches. We envisage an approach which factors in the decentralized governance approaches of PMI and the Indonesian government and uses this to build FbA architecture that embraces the expertise and local knowledge found at a community level. In the words of one PMI community-level volunteer, “locals know what locals need,” and the strength and the success of this program will lie in recognizing this and promoting pre-existing early actions and resiliency innovations from communities. Finally, we desire that FbA in Indonesia be a multi-stakeholder process in which collaboration and knowledge-sharing is embedded into program design; this so that the overall outcome will be a regime shift towards anticipatory approaches that empowers those impacted to take action to mitigate the effects of a disaster.

Process Design

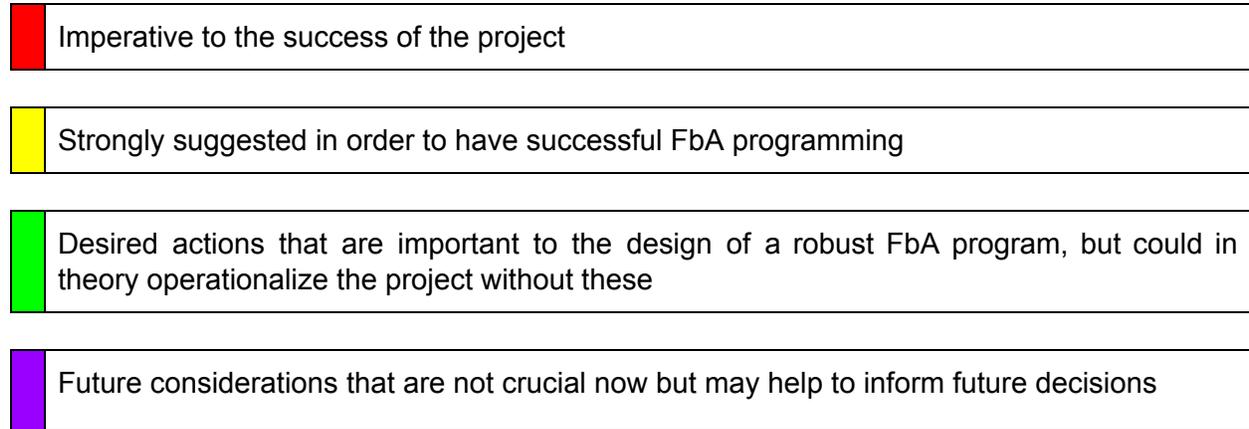
Guided both by the above FbA vision as well as by the complexities of the policy, political, institutional, and climate-meteorological landscape in Indonesia, our team has designed a suggested process flow for the implementation of FbA. Below is a visualization of the suggested process; it will be followed with more expansive explanations and justifications in the subsequent section: A Roadmap to FbA.

The proposed process design captures two end outcomes: operationalization of FbA in the short term, and institutionalization within government over the long term. Due to the decentralized governance system in Indonesia, institutionalizing FbA within government would not be possible until each of the 508 districts and autonomous cities has formally adopted the EAP into their contingency funds. The ‘short term’ process flow identifies a pathway in which FbA can still be implemented while working towards full institutionalization. More in-depth justifications and explanations of each of the steps is explained in the next section: Roadmap to FbA.



Roadmap for FbA: Next Steps

In order to facilitate the development of FbA in Indonesia, researchers for this study have formulated specific recommendations and concrete next steps to lay out as clearly as possible what the suggested steps for implementation and institutionalization of FbA would be. These have been prioritized according to the following schematic:



These recommendations have been further broken down into four sections: as soon as possible, short term recommended steps for program design, long term recommended steps for program design, and recommended considerations for program design.

As Soon as Possible

Create a Technical Working Group i.e. the ‘implementers’: (As seen in Process Flow Above). It is recommended that the Technical Working Group be the group that is responsible for leading the process of FbA in Indonesia. We recommend that it include the following members:

1. **PMI.** We propose that PMI lead and facilitate the Technical Working Group. Although the goal is long term institutionalization of FbA within government, the current capacity, knowhow, funding, and momentum all exist within the Red Cross movement. Moreover, the decentralized nature of Indonesian governance as well as the complex challenges posed by current legal and policy infrastructure are such that the government could not implement without the adoption of EAPs into the contingency plans of each district and autonomous city across Indonesia (of which there are 508). However, PMI will be able to bridge this gap in the interim as they have the authority to implement alone without government and with a national overarching EAP. Please see Section 2 on government capacity for expanded analysis.
2. **BMKG, BNPB, MoPW.** Despite the complexities presented by the current legislative environment, the government of Indonesia should be involved with and have very strong ownership in the development of FbA programming. This recommendation is a best practice identified by FbA practitioners in other countries, where they identified lack of government ownership and involvement as one of the key stumbling blocks to successful program implementation. Within an Indonesian context this is perhaps even more important; the government is very well respected and plays an active role in all elements of disaster management. PMI and PNSs should work to ensure that BNPB, BMKG, MoPW and other relevant government agencies are at the forefront of all phases of FbA development, or expect to encounter diminished authority and capacity to implement. More specifically, these three organizations have been selected due to their important role in weather and climate analysis, forecasting, and authority to disseminate early warnings (BMKG, MoPW), as well as in disaster management, awareness raising, and entrenchment into the institutional architecture of the country (BNPB). It is recommended that PMI develop a formal partnership including these three government departments, and that this process be initiated as soon as possible. Note that these three organizations currently do work together but could benefit from increased contact time, coordination, and information-sharing.

Increase collaboration through the creation of an FbA Task Force i.e. the influencers: (As seen in Process Flow Above). The task force will be comprised of stakeholders who

are interested in knowledge-sharing and the promotion of FbA approaches in Indonesia. Their primary function will be to support the Task Force when and where possible (i.e. with funding, resources, expertise, collaboration on programming) as well as to advocate and lobby for FbA. It is important to recognize that FbA is a multi-stakeholder engagement process which necessitates the involvement of many different actors to contribute to the many different facets of FbA development and institutionalization. This can therefore include PNSs, NGOs, research institutes, and other parties interested in contributing to the advancement of FbA in Indonesia. Suggested members include ARC, IFRC, Zurich Flood Alliance members, other PNSs, WFP etc. Bringing onboard multiple stakeholders is consistent with best practices recommended by FbA practitioners from other countries who have already implemented projects.

Set up a Multi-Stakeholder FbA Workshop in September 2018: The reasons for this are twofold. Firstly, some of the key challenges that have been identified are linked to high staff turnover, institutional memory loss, and holes in understanding of FbA processes and how it differs from EWEA. This has resulted in actors having access to different messaging and different pieces of the puzzle, without a full understanding of how the pieces tie together and what needs to happen in order to implement FbA. It is important that all stakeholders have a similar understanding of FbA and that misconceptions are addressed early on in the design process. Therefore it is strongly suggested to host a workshop in which an FbA advisor from the Climate Centre or other body with experience in FbA be present to walk stakeholders through FbA building blocks and processes, as well as best practices from other FbA programs.

Secondly, it is important to convene FbA actors together in advance of the Zurich Concept Note meeting (on October 1-2, 2018), in which Zurich Foundation will design their FbA process and outline budget commitments to FbA over the coming 5 years. It would be beneficial to have FbA interested parties agree on what their ask of Zurich would be in advance.

If this timeline is not feasible, it is recommended that at a minimum members from ARC, PMI, IFRC, Climate Centre and others who were a part of this study and of catalyzing FbA development in Indonesia convene to:

1. Set the nearest possible date for when such a workshop could happen
2. Collectively identify and agree on priority next actions as well as outlining their key ask for Zurich Alliance in terms of funding for FbA development (to be presented at the Zurich Concept Note Meeting Oct 1-2).
3. Design tailored pitches for BMKG, BNPB, and MoPW to outline incentives for their inclusion in the FbA Task Force, both long term and short term.

Therefore, the FbA stakeholder workshop would at a minimum include members of the proposed Technical Working Group (PMI, BNPB, BMKG, MoPW) who it is suggested would form the team responsible for FbA development and design (see above for process

flow). It would be beneficial to also include potential funders and any other members interested in knowledge-sharing around and promotion of FbA (i.e. the suggested 'task force') such as IFRC, ARC, WFP, Zurich, Mercy Corps etc.

Fund a permanent staff member dedicated to FbA within PMI. FbA is a multi-stakeholder process that involves repeated engagement, advocacy, follow up, and ongoing research to inform program design. While PMI has demonstrated that they are enthusiastic for FbA, concerns have emerged about the capacity of PMI to take on and prioritize FbA programming. To be clear, this is not due to a lack of will but to limits in capacity: small numbers of staff at a national level, who already have extensive portfolios, and who are often occupied responding to ongoing disasters without the capacity to focus on proactive program design. In order to ensure sustained efforts towards FbA as well as continuity in institutional memory it is strongly recommended that one staff member be hired to support the development of FbA. Further, it is recommended that this staff member be hired within PMI both to increase ownership as well as for FbA legitimacy within government.

When this idea was presented as a possibility to PMI members during the preliminary outline of findings from this study, it elicited mixed response. They signaled that extra support could be beneficial but also that one person working on solely an FbA portfolio while other staff members are inundated in many projects could spark jealousy and a hostile work environment. More follow up is needed to flesh out a concrete arrangement between PMI and funding bodies open to funding a staff member.

Expand beyond pre-definition of areas that is currently limited to West and Central Java. Narrowing the scope of FbA to specific areas is contrary to best practices that have been learned the hard way in country contexts where FbF has already been implemented, such as Bangladesh, Uganda, Peru, and Zambia. Pre-definition limits capacity-building to specific areas, can result in mismatch from where a major disaster strikes and the FbA implementation area, and will preclude practitioners from accessing DREF funding that has been only allocated for a specific area if a disaster is forecasted outside that area. It is suggested that any funders seriously consider whether investing in the ability to have FbA interventions occur in 2 of 34 provinces is a worthwhile investment. Therefore, the ideal recommendation that all FbA practitioners should be working towards is one in which there are no predefined areas and FbA can be implemented anywhere across the country that crosses a trigger threshold.

However, this recommendation must be blended with the reality on the ground, which is that Indonesia is a sprawling country of more than 17 000 islands and diverse climatic zones. *Currently, PMI does not have capacity to respond across the country.* In fact, PMI does not have presence on the ground across the country; just 20 out of 34 provinces have SIBAT members on the ground. Frank conversations with top PMI DM management officials have revealed that they do not feel that they would be able to have a presence on

the ground in advance of an impending disaster. And, as PMI is the suggested program lead for FbA, this is an important limiting factor.

Therefore, this research team recommends that FbA scope be expanded to the extent that is possible within the constraint of uneven PMI capacity to respond. It is recommended that practitioners use the BOCA analysis conducted in 2017 to guide their expansion. Of 34 provinces, 2 had strong capacity, 9 had mild capacity, 10 had weak capacity, and 13 were not assessed.

Our recommendations are as follows:

- 1) **We recommend that FbA scope be expanded to include the 11 provinces that had strong or mild capacity:** Central Java, Jakarta, Yogyakarta, South Sulawesi, West Sumatra, Lampung, Banten, Bengkulu, North Maluku, North Sulawesi, Aceh (ranked in descending order of capacity).
- 2) **We recommend that FbA scope also include West Java and East Nusa Tenggara.** Though these did not rank in the top 11, they were previously designated as priority areas by PMI, have significant flood and drought events that occur regularly, and have been identified as areas in which PMI feels comfortable implementing FbA.
- 3) **We recommend that the Technical Working Group evaluate the potential for the inclusion of the remaining 8 provinces with BOCA assessments and all other provinces, as among these are some of the most highly-impacted flood or drought regions. We recommend specifically that target timelines for expansion be established.** Of particular importance are those provinces that have been determined by the research team to have high impact or high frequency of floods or drought, which include Riau, North Sumatra, Sulawesi Tenggara, and West Nusa Tenggara. It is recommended that the Technical Group strongly consider the inclusion of these in FbA, that they be willing to invest the necessary resources to ensure enhanced capacity, and that a timeline for expansion be established so that FbA ultimately be able to be implemented nationwide.
- 4) **Based on recommendations issued by Pak Arifin (head of DM within PMI) during an initial presentation of findings, we recommend an additional expansion of FbA target areas based on PMI performance indicators.**

It is further recommended to note that these are preliminary findings from the BOCA assessments; going forward practitioners should take into consideration that BOCA follow up discussions will occur in September 2018 that may yield additional layers of analysis that could be helpful to the designation of intervention areas.

Focus on floods and drought for designing FbA program in the country. The technical working group can evaluate the prioritization with refer to the most impacted climate related hazards to human lives and assets. The FbA focuses on the impacts rather than the hazards. In addition, the FbA also emphasizes the elements of forecasts, which urges

climate related hazards such as floods, drought, typhoons/cyclones, and landslides to be considered. However, the most frequent hazards that lead to disasters will attract government and society attention to design actions to minimize the adverse impacts of the hazards. The Disaster Impact Information named Data Indeks Bencana Indonesia (DIBI) datasets can be referenced to see the most impacted hazards causing disasters to human lives and assets that covering large areas over the country. Another consideration is the capacity of climate services in Indonesia developed by BMKG are relatively adequate to forecast the two hazards. As for the geological hazards (earthquakes, tsunami, and volcanoes), which have high impacts, the forecast capacity for those hazards are still not developed yet.

Onboard Zurich Foundation for FbA to support with program design. Actors from Zurich have signalled that Zurich Flood Alliance 2.0 (running from 2018 - 2023) are very interested in using their funds (estimated at 333 000 CHF per project) to support the building blocks and set up of FbA. They have expressed a commitment to this regard to PMI, and will be hosting a workshop to design a concept note and budgeting for this on October 1-2, 2018.

It is recommended that the Technical Working Group and/or parties from the September FbA workshop prepare a proposal of specific next steps that they would like to pursue that can be done in collaboration with or with the support of Zurich. If this is not feasible within the given timeline, it is recommended that actors involved in catalyzing FbA in Indonesia as well as those involved in this study (ARC, IFRC, Climate Centre, PMI etc.) convene to identify specific deliverables which they would like to propose that Zurich Alliance Support with funding. Preliminary ideas could include funding an FbA workshop (recommended from page 12) so that all actors have same level of knowledge about FbA and next steps, funding the development of EAPs for floods and droughts, funding additional research into forest fires as a potential for FbA, and/or funding for a dedicated FbA staff member who sits with PMI.

Identify champions within PMI, PNSs, potential funders, and other stakeholders. FbA is a multi-stakeholder process with many moving parts. As such, (according to best practice from other countries who have already implemented FbA), it requires repeated engagement and promotion from a dedicated group of individuals or it will be difficult to have FbA gain momentum. Throughout the research process it became evident that many of the key champions for FbA in Indonesia have moved on to assume different roles and are no longer part of the day to day conceptualization of FbA. As such, it will be important to identify and/or cultivate new champions who will onboard FbA and lobby to make it happen. Potential ways to make this happen include through creating additional opportunities for over-worked, under-resourced actors to engage with FbA and learn of the importance of the function that it serves and to benefit from additional trainings and opportunities such as FbF Dialogue Platforms; hiring a dedicated staff member who will

champion FbA as their sole remit; continuing advocacy efforts; and creating mentorship opportunities through connecting interested actors with FbF practitioners elsewhere.

Short Term Recommended Steps for Program Design

Define accurate lead time differently for each hazard with regards to forecasting capacity of meteorological services. Understanding FbA focuses on impacts rather than hazards, the forecasting capacity should be developed to translate information from meteorological services to hazard prediction that can cause disasters. The potential strategies to refine lead time are below:

1. The technical working group should work together to define lead time for flood hazards that cause disasters across the country concerning the diverse in country capacity and climate variation. Currently, the BMKG claimed 75-77% of forecast accuracy of a-day and 3-day rainfall occurrence across country, and BNPB stated that they need information about floods about 3-days in advance. They should work collaboratively to define whether the rainfall forecasts with 3-day lead time can be translated to predict flood occurrences and impacts spatially.
2. On the basis of 10-day forecasts and seasonal rainfall prediction of BMKG, the lead time for predicting drought occurrences can be 10-day to 3-month in advances. BNPB explains that they are start preparing as the seasonal prediction is issued by BMKG. So, BMKG and BNPB should work together in evaluating whether the 10-day forecasts or the 3-month in seasonal prediction are the proper lead time for drought occurrences that lead to disasters, including the accuracy of the prediction spatially and temporally.

Follow FbA building blocks as outlined by the Climate Centre: In decisions concerning next steps the Technical Working Group should consult the Building Blocks guidelines from the Climate Centre so as to ensure that all aspects of FbA are being addressed (i.e. developing trigger methodologies etc).

Onboard the Climate Centre as an advisory body: As FbA is a new approach in Indonesia (no one has yet tried it), it will be important to have guidance from practitioners who have implemented elsewhere in order to avoid repeating mistakes, clarify the process, and provide training and resources to facilitate the process.

Have the Task Force work to create a coordinated Early Action Plan at a national level: (As outlined above in Process Flow: Program Design). Note that this is just one component of the next steps for FbA as outlined in the FbF building blocks document from

the Climate Centre. However, it is a step that this research team has deemed important to weigh in on.

As outlined in the FbA vision above, the long term goal should be to have FbA institutionalized within government. However, due to current legislative and jurisdictional hurdles (outlined in Section 2: Government Capacity), it seems as if in the short term PMI will have to implement FbA at a district level by themselves.

Also in accordance with the above vision as well as with FbA best practice, we are recommending to have as much government involvement in and ownership of the process as possible. Thereby, we recommend that PMI work together with the other members of the Technical Working Group to together create an EAP that can inform PMI action on the ground (in the short term), and that can be adopted into the contingency plans of district and city governments (long term - please see elaboration of this process under 'long term recommendations').

Proposed creation of this EAP might look like this:

1. Select a sample of districts or cities from among the FbA target areas. We propose 50, a number which represents a good sample size but is more feasible than approaching all areas (there are 508 districts + autonomous cities across Indonesia, TBD how many of them will be encompassed within the FbA target area).
2. Work closely with this sample cohort to assemble a list of Early Actions for flood or drought that FbA could expand upon, strengthen, or introduce. If possible, invite all other regions to participate to a lesser extent (perhaps via whatsapp rather than meetings).
3. Include this list within the overarching EAP, which is then submitted to DREF for approval.
4. Also include in the DREF proposal a 'flex fund' (suggested 15%) that could be used towards Early Actions that were not pre-identified or pre-approved. This will ensure that the needs of regions which were not included in the sample cohort can also be accommodated.
5. Conduct regional trainings and information dissemination campaigns via whatsapp to all districts within the FbA target area, sharing the EAP and outlining that in the future they may be contacted if their area passes a trigger threshold for disaster, and that this would be the list of actions that they could choose from and FbA could support with.
6. Note that it is *not feasible* to implement FbA using a top-down approach; national PMI and BNPB have neither the authority or the capacity to do so. Instead, interventions must be from the bottom up. In the short term, we propose that PMI approach communities within a forecasted disaster zone with the EAP and ask which of the actions they would like to implement. In the long term, we hope that this EAP would be modified and adopted within each of the districts or cities of the FbA target areas (see: long term recommendations).

Enhance capacity on applying risk information platform for contingency plan and early action

BNPB has developed Ina-Risk and Ina-Safe that are relevant for FbA. Ina-Risk provide risk information and map (hazard, vulnerability and capacity) for risk assessment, while Ina-Safe provide impact modelling (on population and building) to serve emergency needs analysis for contingency plan and operation plan. Both platform are managed by BNPB and accessible to public. To ensure success of integration FbA into contingency plan and early action, a significant number of PMI staffs have skill on using the platform is strongly needed. It is equally needed for program and IT staffs equipped with the skill.

The following activities is needed to reach the objective:

1. Training of Trainers for PMI HQ and branch office on developing contingency plan, on platform Ina-Safe and Ina-Risk, and the use of the two platforms in developing contingency plan and early action.
2. Workshop with regional BPBD on climate forecast, on developing contingency plan, on platform Ina-Safe and Ina-Risk, the use of the two platforms in developing contingency plan and early action.

Lobby BMKG for expanded climate and weather analysis that includes forecasting element for hazards. BMKG has strong desire to develop impact based forecasts. The FbA initiative can be an excellent endorser to translate the weather and climate forecasts of BMKG specifically on rainfall, temperature, and winds hazard prediction, working collaboratively with respective agencies as follows.

1. BMKG can expand coverage areas of their probability forecast of the rainfall amount, not only the rainfall occurrence, which are now only for certain places such as the weather forecasts for Nusa Tenggara. The forecasts of rainfall amount can be feed into hazard models for flood prediction so that accessibility to the forecasts should also be opened.
2. Seasonal rainfall prediction of BMKG should include prediction on the numbers of dry days or the number of days without rain every 10 days or a month to complete the prediction of the beginning dry season. The 3-month rainfall prediction should also be developed and employed for analysis of 3-month standardized precipitation index as a base for examining prone areas to drought occurrences.

Encourage the production of a flood forecast map: BMKG produces and releases a map of potential flooding every month on website and other media. The map does not clearly state the day of the potential flood event. In addition, the map is prepared not based on forecasts but based on the history of rainfall in each month / month. Making a flood map is not a compulsory to BMKG's according to the law but is done as an additional service product. Making a flood map requires collaboration with the Ministry of Public Works which has data on updated land use, river discharge and drainage. Regulatory certainty and/or interagency agreement is needed for the makers of flood forecast maps.

This goal can be achieved by:

1. PMI and its partners encouraged and facilitated a workshop to discuss opportunities and challenges in making flood forecasts together with BMKG and the Ministry of Work. BNPB which has flood history data can also be involved.
2. In the interim (before a nation-wide flood forecast map is available), PMI can work to maximize flood potential maps by understanding the sources of information on current maps and the correct interpretation of the maps. This can be done by holding a workshop or training with resource persons from BMKG and the Ministry of Work.

Developed an interface for integrated platform of existing relevant tools owned by government to forecasts the focussed climate related hazards. The existing tools operationalized by the government such as web-based INARISK/INASAVE (BNPB), mobile-based/android BMKG Info (BMKG), and web-based Monitoring System of Floods-MSF (BBWS/MoPW) are promising for sustainability and should be referred formally for defining planning actions. The technical working groups should evaluate the capacity of the existing tools for forecasting the focused climate related hazards as INARISK/INASAVE and MSF are designed for historical analysis and monitoring, respectively. An approach and methodology should be developed to interface the risk-based tools with Weather or Climate Forecasts of BMKG such as BMKG Info which. The technical working group can choose to expand the capability of a tool or to connect the capability of the three tools for forecasting the focussed hazards and their impacts. The Zurich Flood Program Phase 1 initiated the development of FEWEAS that interface the rainfall forecasts, resulted from downscaling the outputs of Global Forecasting System (GFS) Model using regional climate model named Weather Research Forecasting, with watershed model, named Watershed Modeling System (WMS), to predict flood occurrences and magnitudes. Regardless the robustness of the flood prediction that still needs validation, the FEWEAS offers an interface on how to integrate weather forecasts and flood modeling tools with which can be considered by the technical working group for connecting the existing government tools.

Build refresher trainings into the budget for FbA, especially within PMI. Currently trainings are frequently offered at the beginning of a program with limited follow up thereafter. This means that only individuals who were present at the inception of a project

have received training. Due to the high staff turnover, it is recommended that budget allocations be made for regular refresher trainings and workshops around FbA.

Start with funding from within the movement (DREF, ARC, other PNSs etc) as well as from supportive organizations (i.e. Zurich Foundation), then build the case for government & private funding. To operationalize FbA quickly it is recommended to utilize funds that can be readily accessed, such as those from interested donor PNSs or the FbA window of the Disaster Relief Emergency Fund (DREF). Zurich Foundation has also expressed enthusiasm for contributing funds to FbA development for the second phase of their flood resiliency project. USAID and DFAD have both supported cash interventions in Indonesia, and World Bank also has funds available. While FbA is being developed and operationalized using these funds, the Task Force should advocate for funding sources from within the private sector. This could either happen through PMI's resource mobilization unit or through the Partnership and resource development unit at a regional level, which is a gateway for private funds. Potential sources of funding include: telecommunications networks such as Telcomsel or XL, banks with CTP commitments such as Standard Charter, pre-existing PMI sponsors such as Bank Republic Indonesia, Alfamart, Indomaret, Indonesian Power, Mastercard or sources such as Green Bond. However, it should be noted that CSR in Indonesia is largely focussed on education, or on response to disasters, not preemptive action. In order to further build sustainable funding for FbA it will be important to institutionalize FbA within government; the proposed route to do so (as outlined in the process flow), is to have EAPs adopted into local contingency plans so that these governments can use pre-existing early action pools of money towards FbA. BBWS has also expressed interest in being a part of FbA, and is backed by funding for climate change research.

Onboard UN Pulse Lab in Task Force Group. They receive funding support through the government of Indonesia and have the mandate to blend social research and data science to accelerate innovation in humanitarian action. As such, they could help in visioning and exploring design potential for FbA, whether through expanding their VAMPIRE drought risk platform to include forecasting components or contributing to human-centered design processes and innovative use of data (i.e. understanding evacuation routes and patterns through tracking mobile phone use).

Onboard WFP in Task Force Group. They have experience in EWS already through droughts and the VAMPIRE platform. Moreover, they have their own sources of funding, and have expressed interest in collaborating on FbA and expanding their partnership with PMI/IFRC.

Long Term Recommended Steps for Program Design

Encourage adoption the EAP into the contingency plan of regional government. A number of local governments (provinces, districts, cities) have developed contingency plans for disaster management. A number of contingency plans contain only activities for the emergency response phase, and another of contingency plans has disaster preparedness component, however lacking in the use of weather forecast information for early action. A number of local governments renew contingency plans every year or more. This is an opportunity for EAP integration into contingency plans. At present a number of donor agencies / international humanitarian organizations support the government in the development of climate-triggered disaster contingency plans, among others are USAID APIK program and WVI-SIGAP.

This goal can be achieved, including, by:

1. Mapping of the Regional Governments that have, have not yet and are preparing for development climate-related disaster contingency plans and also mapping on humanitarian organizations that have programs to support the preparation of contingency plans to regional governments.
2. PMI jointly organize a workshop with other humanitarian organizations to discuss the adoption of EAP into contingency plans, especially against contingency plans that are being or will be prepared by partner organizations with the regional government and assist in the process of drafting the contingency plan.
3. PMI organizes workshops with regional government to include EAP into contingency plans, especially to regional government who receive no support from others in developing contingency plans

Design future FbA programming to accommodate current government priorities. For example, several stakeholder interviews revealed that the government of Indonesia is focussing on expanding mobile cash over the next few years. Looking forward to future trends and priorities can help align and institutionalize FbA. It is therefore recommended to have government involvement in FbA as outlined in the above process flow.

Maintain Red Cross engagement in CTP National Working Group (co-ordinated by UN OCHA). It is important that FbA practitioners be abreast of CTP developments so that they can begin to advocate for the infrastructure and capacity necessary to be able to use for FbA interventions.

Consider expanding hazard interventions beyond hydro-meteorological ones.

- **Pandemics:** Health has been signalled as a priority for PMI. Moreover, there are already some fledgling initiatives to support work in this field; the city of Semarang has a forecast-based Early Action dengue initiative which is promoted by the Ministry of Health, and in 2017 World Vision / USAID started running an EWEA mobile app for dengue in Jakarta (and are looking to expand to Surabaya). Going forward PMI reps (specifically Teguh from DRR) have expressed interest in exploring the possibility of FbA for water or vector borne health issues, in conjunction with the health division of PMI. This could be supported by UN Pulse Lab, who have expressed that they are open to collaboration on conducting a 'research dive' into pandemics.
- **Forest Fires:** PMI Preparedness and DM departments have also signalled that they are keen to explore the possibility of using FbA to intervene for forest fires. It is currently a high impact hazard and PMI has low capacity to address it or mitigate it. This recommendation is bolstered by recent government willingness to invoke *siaga darurat* (early action) for forest fires, signalling a government commitment to early action that FbA could help to operationalize. Preliminary conversations with PMI and Hydromet about impacts and potential Early Actions all revolved around provision of water, provision of gas masks due to smoke inhalation, and provision of tools for on the ground volunteers to create fire breaks etc. While helpful, these suggestions were the exact same as current preparedness and response measures. If fires are found to be a priority hazard going forward, it is recommended that additional research be conducted to find high-impact, implementable Early Actions that warrant the resource investment needed to develop FbA EAPs and triggers etc.

Recommended Considerations for Program Design

Build mechanisms for community involvement into the design of the FbA program, such as the involvement of community members in the design and compilation of potential Early Actions for the EAP. While community-level approaches are consistently highlighted in Indonesia, this extends to PMI volunteers (SIBAT) and other disaster practitioners, and not to potential beneficiaries and community members. Creating space for voices from potential beneficiaries or impacted populations was consistently overlooked in dialogue around FbA, and requests by researchers to meet with community members were not given priority. Community members have the right to help shape interventions that will impact their lives. Including community voices in the design of FbA will ensure that proposed priorities and interventions match the needs of the communities and households that will be beneficiaries of FbA. Further, it matches the governance systems of both the government of Indonesia and PMI, which are very decentralized and have disaster management addressed with bottom up approaches (starting at a village level, then

regency, and only escalating to provincial or national level if the disaster spills across borders or is unmanageable by the impacted level).

Use Whatsapp as a communication tool. Email is very formal and not frequently used in Indonesia. Whatsapp can facilitate communication both internally in the FbA design process as well as to communicate with regencies and stakeholders across Indonesia. All disaster management and SIBAT actors already have whatsapp groups for coordination and information dissemination; it is recommended that FbA practitioners embrace this pre-existing mechanism and integrate it into FbA design. Note however, that while free, Whatsapp caps members in a group to 200; for a platform that permits more members in one group consider Telegram's 'supergroup' which permits 5000 and is also sometimes used in Indonesia.

Learn from the experience of FbA practitioners in other areas. As part of the research for this study, we interviewed stakeholders who have implemented FbA in other areas to ask them about their best practices, recommendations, things they wish they had known, and what they would do differently could they start over. While the Indonesian context is unique and the FbA program should be tailored to that, it is also important to build off of the knowledge of those who have ventured down this road already. Some of their recommendations are woven throughout this roadmap. Those that are not are presented below:

- **Start small, then scale up:** actors spoke of taking on too much, too soon. For example, they feel that they have spread themselves too thin by addressing too many hazards. They recommend starting with 1-2 hazards and building from there. They expressly add that they *do not* mean starting with a smaller pre-defined geographical area.
- **Things take longer than you think they will:** drafting EAPs, receiving committee validation from DREF, having key stakeholders fully grasp what FbA is. They recommend allocating more time than you think you'll need.
- **Focus on training, advocacy, and capacity-building from the very beginning:** FbA is a departure from standard operations that takes time for stakeholders to fully grasp. Initially they default back to response and DRR. It will take time, trainings, and repeated conversations to shift mindsets, and to emphasize how quickly FbA must work. Offering trainings on specific skill sets such as data collection for beneficiary identification is suggested. Also suggested was starting training with headquarters then moving on to field staff, who must also understand FbA if they are to implement it at a field level.
- **Manage expectations and front load that FbA is different:** again, communities and stakeholders often conflate FbA and preparedness and may have expectations of similar levels of funding or involvement in other projects such as livelihoods etc. Be clear with them from the very beginning what FbA does and does not involve.

- **Adopt a growth mindset:** expect mistakes, unlearning, and relearning. Approach FbA knowing that it is not a straightforward process and expecting to be reflexive and flexible. Ensure that your program design is not rigid and allows for flexibility.
- **Be strategic in choosing your hazards:** actors suggested setting yourself up for success by first working with hazards that have a longer lead time (i.e. 7-10 days), figuring out what works there, and then moving to hazards with shorter lead times.
- **Build partnerships from the very beginning:** stakeholders can share learnings and build working groups with other agencies and PNS interested in FbA. For example, some PNS collaborate on funding for research or EAP development. Or agree to cover specific areas of a country in which they already have projects and networks.

Language Matters. Use FbA not FbF; “financing” is a sensitive and controversial word within PMI & Indonesia more broadly. This is especially important for advocacy efforts within government. ‘Financing’ contributes to misunderstanding that this is an ‘insurance’ project and to associations of money. Also important to emphasize is to use ‘programming’ not ‘projects’ among community members and beneficiaries, as the latter carries connotations of large amounts of funding attached.

Explore innovative Early Actions that expand beyond the current repertoire of interventions. As an anticipatory approach, FbA operates in the window between preparedness and post-disaster response, thereby offering the opportunity to re-imagine the way that humanitarian actors address disasters. Impactful FbA programs will harness this opportunity by identifying niche actions that do not fit into archetypal preparedness or response programming. It is recommended that practitioners do not default to early actions that they are comfortable with but instead embrace the opportunity to rethink what is possible and to interrogate assumptions about what FbA design ‘should’ look like. They can do this by deliberately making space for collaborative brainstorming and by being open to unorthodox approaches such as games or human-centered-design. Some steps in this direction could include approaching the Climate Centre about their repertoire of games for learning and dialogue (Climate Centre Games, 2018), or reaching out to Moritz Goeldner and Daniel Kruse at the Department of Technology and Innovation Management at Hamburg University of Technology (both of whom have been involved in identifying innovation for flood resilience across Indonesia, including low-cost DIY rain gauging devices for EWS).

Involve women in the decision-making process and embrace the leadership that women show in disaster preparedness. Throughout the course of research for this study, all of the decision-makers at a district, provincial, or national level related to disaster management were male. At a community level more women were actively involved in disaster preparedness and response, although usually not in positions as decision-makers. Not making space for women to be part of the leadership invisibilizes the needs and lived

experience of half of the population who impacted by disasters. It does not account for the way in which women experience and in turn are impacted by disasters differently; for an example pertinent to Indonesia refer to the 2004 Indian Ocean Tsunami, in which four women died for every male (Tanner, Markek, and Komuhangi 2018, p. 17). This recommendation aligns with best practice from across the disaster management field, including from within the Red Cross movement (Australia Red Cross, 2011; IFRC, 2003; IFRC Asia Pacific Zone, 2010; Tanner, Markek, and Komuhangi 2018, p. 17; Zorn, 2015).

Remember that re-orienting to an anticipatory approach thinking takes training and time. PMI has strong capacity in and a long history of emergency response. Although some PMI staff at national level have been introduced to FbA through workshops, it will take repeated conversations and trainings to begin to shift from a default response mindset to one that is anticipatory. This is consistent with lessons learned from other FbA programs.

Recognize that willingness to implement Early Actions will vary widely according to the action, exposure, type, and nature of hazard. In repeated interviews and conversations about anticipatory approaches, stakeholders and community members emphasized that Indonesian approaches are generally more reactive than preemptive. Yet interviews revealed that cultural perceptions of risk are themselves shaped by the type, frequency, and exposure to hazard. Evacuation orders due to flooding in a community which regularly floods might be met with resistance due to increased resilience and coping capacity, as well as a sense that the flood is somewhat predictable and slow-onset. On the other hand, evacuation orders for events such as volcanic eruptions from Merapi were shown to have almost universal compliance; in part because the volcanic eruption was viewed as sudden, large-scale and dangerous, as well as because surrounding populations have the 2010 eruption fresh in their minds. In this it is also important to remember that both space and time matter; spatially with the Merapi explosion it was not the communities closest to the volcano that suffered deaths (they all evacuated) but those who were slightly further away and felt out of reach of the volcano and therefore did not take evacuation notices seriously. The 2010 Mount Merapi explosion also shows us that time matters; communities that now have the damage of the volcano fresh in their minds are currently very willing to take anticipatory action to safeguard themselves and their livestock, whereas they recounted that previously they had not had a large eruption in decades and so were complacent with evacuations.

Though this evidence is largely anecdotal (recounted by community members on the flanks of Mount Merapi, and supplemented by the research of Indra Baskoro, a graduate researcher examining long term changing behaviours to disaster events) and though the current recommendation is not to work with geological hazards for FbA, it serves as an illustration of larger considerations that should be made when conceptualizing FbA. Practitioners must understand that familiarity, past experiences, and diverse conceptions of risk will influence the extent of buy in that FbA programming will have in encouraging people to take anticipatory action based on a forecast.

Recognize that Indonesian society is very collective and community-oriented. Within current disaster management this generates incredible capacity to mobilize and to disseminate Early Warnings on short notice. Communities are well-networked and can and have disseminated Early Warnings on very short notice, ensuring that all have been accounted for. It is likely that this will also be a huge enabling factor for the successful implementation of FbA.

Beware of the potential impact of false media on community willingness to act on a forecast. Both PMI and community members have identified that the spread of false news through social media and whatsapp has lessened trust in official forecasts; community members are not sure when a warning or forecast is real, and therefore might be unwilling to act on it. It will be important for FbA implementers to take this into account and find ways to assure end users that they are receiving official forecasts or warnings.

Know that it will be a challenge to use Social Protection lists for beneficiary identification. It seems that government and telecommunications networks are reluctant to share social protection lists or the citizen registry, and no other INGOs that we spoke with were able to access these lists. Instead, other agencies have had success in collaborating with telecommunications networks and the government to direct research, rather than having access to specific data sets themselves. This adds weight to the recommendation to work in collaboration with government and other stakeholders.

Section One: Forecast Capabilities

The review highlights the FbA in Indonesia should be focused on floods and drought, as the two most impacted hazards on human lives and assets, occurring relatively in many provinces in the country (particularly the West and Central Java), with refer to the available DIBI datasets from 1972-2018. The implementation of FbA for the two hazards is also promising with regards to available and accessible forecasted rainfall occurrences and amount (e.g., one day, 3-day and 10-day prediction, and seasonal forecasts) provided by BMKG nation-wide. The BMKG claimed that the forecast skill on rainfall occurrence is about 75-77% for the rainfall prediction; however, the forecasts for rainfall amount do not have the same skills, and the accuracy will diminish as forecast time goes further in the future. Unfortunately, the forecasts have not been connected with flood or drought models nationally so that there is not much information on the forecast-lead-time for floods and drought. However, understanding the temporal period for rainfall forecasts and prediction, the lead-time for forecasting floods and drought can be about 3 days and 10 days to 3 months, respectively.

The web-based and/or mobile-based (android) tools are already available for forecasting 1-day and 3-day rainfall provided by BMKG (named of the tool “BMKG Info”) and for analyzing prone areas (risks) to flood and drought provided by BNPB (tool named “INARISK”) nationwide. However, the two systems has not been integrated or combined so that currently there is no such tool available for forecasting climate-related (hydrometeorological) hazards and its impacts nationally. The estimated impacts of the hazards have not been modeled as the INARISK is categorized the impacts with regards to historical information on the disaster impacts (fact sheets of the impacts). WE suggest that modeling the impacts should be part of trigger-based development for FBA. Although the coverage areas are limited, the initiatives on forecasting floods have been made such as by the Zurich Phase 1, developed FEWEAS Citarum. The tool interfaces weather forecasts and flood models to predict flood occurrences in the Citarum Watershed. The BBWS of MoPW in Citarum Watershed and bengawan Solo has also established real-time monitoring of water table and discharge that can be utilized to estimate the reaching areas to floods in 6-7 hours in advance. The BMKG also issued standardized precipitation index (SPI) for drought analysis of 3- to 6-month period to inform prone areas to meteorological drought. The BMKG shows enthusiasm to develop impact based forecasts and wants to improve its weather services continuously. The BMKG initiated National Digital Forecasts (even prediction to throughout Indonesia) in 2015, and now is starting to use the high resolution model (ECMWF) to increase the quality of weather forecasts in Indonesia.

The scoping study reveals that one of major challenges is on communicating and utilization of the weather forecasts. The accuracy of the forecasts such as rainfall is more on the occurrences, whereas forecasting the rainfall amount completed with estimated probability is still lacking or only available for a specific region. The impact based forecasts still require much efforts to connect existing tools on weather forecasts and historical hazard analysis/monitoring such as those initiated by BNPB (InaRisk) and BBWS of MoPW (i.e., BBWS Citarum and BBWS Bengawan Solo).

Forecasting Recommendations

Improve local actors' capacity in interpreting weather and climate data and information. The weather and climate information that is provided by the Government of Indonesia has not been used optimally by emergency alert actors. It is needed training, workshop, and others programs to increase the actors capacity, so the climate/weather data and/or information can be used optimally.

Expand historical drought analysis to forecast based analysis. BMKG have the drought meteorology index, namely Standardized Precipitation Index (SPI). SPI is designed to quantitatively identify rain deficits at various time scales. However, until now BMKG only use the onset data for press-release drought warnings, not yet utilize SPI index. For the future, BMKG can utilize the concept of SPI to forecast as a base for defining models for drought events in Indonesia.

Encourage BMKG to model the possibility of ENSO events for predicting flood and drought events. BMKG has a prediction of the ENSO occurrences but has not been used for predicting flood events and droughts. On the other hand, ENSO events can aggravate flood and drought events.

Equalize the weather and climate forecast capacity across the country. The outputs of weather forecasts are vary across areas in Indonesia. For example, BMKG of East Nusa Tenggara already releases probability forecasts of rainfall amount, which are not yet available in other regions. The rainfall amount is required as inputs to predict the flood event.

Encourage BMKG to collaborate with BBWS of MoPW. BBWS monitoring system is a tool for flood warnings based on water table or discharge in the upper stream. BBWS have completed climate and weather data (precipitation and temperature) on specific watersheds. For example, BBWS Bengawan Solo developed an integrative web-based system starting from measuring rainfall, air temperature, and water level of Bengawan Solo river, which are installed in 96 points along the Solo River Basin, to visualizing the real time monitoring. Considering the advance of BBWS monitoring system, the inclusion of BMKG weather forecasts into will offer a potential collaboration for forecasting floods along the watersheds. For this purpose, methods of translating weather forecasts to hydrological floods should be developed and validated using the real time monitoring system.

Establish robust validation system for weather forecasts and climate prediction.

The BMKG products are merely validated with regards to the occurrences; whereas, the magnitude such as the amount of rainfall has not been validated temporally and spatially, particularly on the capacity in capture weather or climate extremes. Regular methods for validating weather/climate forecasts temporally and spatially can be applied or expanded to measure the accuracy of the forecasts across the country. For this purpose, BMKG should develop the achieve system for the forecasts and prediction. Academic institution or other entities working on weather and/or climate science can be engaged to establish the validation system. The feedback can also be collected from the end-users, such as PMI regional office and the task forces. A validation team can also be established to develop and execute work-plan for validation procedures.

Develop cyclone and landslides disaster forecast. Cyclone and landslides are included in the most disastrous hazards in Indonesia. They had low frequency but high impact. Although currently BMKG has not developed the model for cyclone and landslides disaster yet it necessary steps for long term consideration.

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Section Two: Government Capacity

Indonesian Disaster management law Number 27 / Year 2007 and its operationalized regulations provide clear foundation to implement forecast based early action. They provide clear institutional arrangement, financing mechanism and bottom-up process in declaring and implementing every stage of disaster management, including emergency preparedness. Financing for emergency preparedness is available at national budget through DSP fund (contingency fund) and available for regional government upon request. Meanwhile, local budget is not possible to fund emergency preparedness according to Ministry of Home Affairs Regulation Number 21/Year 2011 on Management of Regional Financing. Limitation on amount from routine program budget of regional government and lengthy process to get DSP Fund are main challenge to have on-time, effective and efficient early action. Many regional government and two ministries have already raised the importance to revise the ministry regulation and allow local budget to fund emergency preparedness.

Many regional government (at provincial, district/city level) in flood, landslide, drought, and forest/land fire-prone areas have declared more than once emergency preparedness status 'Siaga Darurat', Indonesia). Under decentralized policy, declaration for disaster status is on district and city level government and could be escalated to provincial level. Declaration on emergency preparedness status for flood, landslide and drought is based on seasonal forecast (instead of daily weather forecast) from meteorological authority (BMKG). The status for emergency preparedness usually for 3-5 months until the season (rain or dry) is changed or transform into emergency respond when significant impact take place. Knowing that approved DSP Fund from national DM Agency (BNPB) usually takes a month or more, it is reasonable that the declared time for emergency preparedness last for several months. Jakarta Province and Makasar City are few or the only examples in which daily weather forecast, especially intensity of forecasted rainfall in coming days, are used to be trigger mechanism to activate emergency preparedness status.

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Recommendations: Government Capacity

Maximize routine budgets for early action: Routine program budgets of regional government (provincial, district/city) are usually used to fund early actions, along with DSP funds (if obtained). For areas that are experiencing re-current climate hazards, such as floods, landslides and droughts, the required early actions can be estimated, among other, through surveys and feedback. The routine budget can be maximized to fund early action.

Both PMI and partners need to do the following activities to reach the objective:

1. Surveys and input from the community and BPBD (regional DM Agency) after the implemented- early action to find the suitable early action.
2. Encourage the Regional Government to include the crucial early action into the budget plan of each technical unit, including BPBD.
3. Dialogue to the Ministry of Finance and the Ministry of Home Affairs to make adjustments to the performance evaluation of the Regional Government in the assessment of the remaining budget. Negative assessments should not be given for the remaining budget from early actions that are not used because the emergency preparedness status is not issued or the threat of climate hazards does not take place.
4. Together with BNPB to develop an assessment guide for the implementation of early action/emergency preparedness. PMI can use this guide, and or with the regional BPBD, to evaluate and record lessons learned from the implementation of early action that has been and will be carried out for improvement in future. Generally, the Regional Government does not make written documentation of the results and learning from the implementation of emergency preparedness nor response. Implementation and any challenges are discussed in internal meetings and some write them in meeting notes that are not properly archived.

Regarding Regulation on financing for early action: Work with relevant stakeholders to propose Revision of the regulation of the Minister of Home Affairs No. 21 of 2011 on “Guidelines for Regional Financial Management”. Revision has to be made on articles 8, 8-A, and 8-B regarding the use of Un-Expected Expenditures. This revision needs to be done so that the use of this budget-line can finance early action/emergency preparedness (*Siaga Darurat*, Ind.), which is currently only limited to emergency response. At this moment, regional government fund emergency preparedness from local budget and national budget (DSP fund). Routine budget program has several limitation to fund for early action, while requesting DSP fund from BNPB (National DM Agency) spend a month or more to be approved. The revision was carried out also for paragraph 8-B to expand the types of expenditure that are needed for early action. Surveys and input from the community and BPBD (regional DM Agency) after the implemented- early action need to be done to find out exactly the right early action.

Section Three: Organizational Capacity

Recommendations regarding PMI capacity are drawn from an analysis of overall PMI capacity as it pertains to FbA, and in accordance with the Climate Centre’s FbF Feasibility Guideline. Specific attention was paid to PMI readiness for FbA as well as to identifying skills and competencies that need development, areas for capacity building, and gaps to bridge or opportunities that could upscale PMI involvement. Note that recommendations which involve PMI in addition to other stakeholders have been included in the blended recommendations in the ‘Roadmap to FbA’ section above.

Overarching takeaways from the research can be summarized as follows:

PMI has expressed enthusiasm for FbA and has begun to participate in FbA workshops and dialogue platforms. Despite this, significant gaps in understanding of FbA and how it differs from current DRR or EWS efforts remain. Likewise, high turnover in involved partners (i.e. within the IFRC etc) have already created gaps in institutional memory, whereby actors who were involved in early conversations have had very different messages and understanding of FbA than current actors involved. Committing to developing mechanisms for the transfer of institutional memory, increasing understanding of FbA, and increased collaboration and communication between partners (internal and external) will be key to PMI success in FbA.

The strength of PMI lies in their extraordinary capacity to mobilize volunteers and respond on very short notice, a key competency which will contribute to successful FbA implementation. PMI is decentralized, meaning that community and district level volunteers (SIBAT) and branches have autonomy to manage their own programming, and will only upscale when a hazard is beyond their capacity or overlaps into other jurisdictions. PMI is also strong in information dissemination and in making information meaningful and relevant to the communities in which it works. At a national level PMI also has a dedicated core staff of disaster management staff who have years of experience and have undertaken many trainings.

Areas which have been identified as challenging to PMI and which could bear on FbA implementation include geospatially uneven capacity, challenging interdepartmental collaboration, a reactive rather than proactive organizational culture, lack of sustained engagement or follow through, and strained capacity in which other programming seems to be put on hold and staff redirected to response when there is a hazard event (of which there are many).

For a more in-depth analysis of PMI capacity, please refer to the Section on “Organizational Capacity” in the appendix.

Recommendations: Organizational Capacity

Although PMI is proposed to be the project lead for FbA, PMI should embrace this as a facilitative role rather than attempting to lead in all areas of FbA. Part of this means recognizing that other members of the Technical Working Group have key competencies and expertise that PMI lacks (i.e. weather and climate prediction, or the authority to disseminate Early Warnings). In supporting other stakeholders to build off of their pre-existing capacity, PMI should also be willing to take the lead in specific areas, especially those in which PMI has advanced competencies or there is a gap left by other stakeholders. Suggested areas in which PMI could focus efforts include:

- In communicating and disseminating EWS from BNPB/BMKG to potentially impacted communities. There is currently a gap between the hazard analysis and being able to translate this into meaningful information for communities. Further, there are limited opportunities for feedback loops (i.e. for community members upstream to report flooding and warn communities downstream). Many stakeholders interviewed identified that BMKG experiences difficulties in communicating meteorological information effectively. PMI has the capacity to assume this role. WFP has a strong working relationship with BMKG and would be pleased to help bridge that gap.
- In mobilizing volunteers on the ground at short notice. PMI's reach and capacity in this regard is unmatched and admired by other stakeholders engaged in disaster management.
- PMI is also very strong in logistics, procurement, and the movement of resources.
- As part of the Red Cross movement, PMI has access to advisory bodies (the Climate Centre), technical expertise from other FbF programs, and initial sources of FbA funding (DREF) that other stakeholders do not. PMI should be willing to mobilize these resources for the benefit of all stakeholders who want to contribute to FbA in Indonesia.

Increase Inter-departmental collaboration within PMI: Currently PMI organizational culture has very siloed approaches. PMI will need to increase information sharing and coordination between departments in order to successfully implement FbA.

Rethink how FbA is framed within PMI. PMI is recognized as an organization with very strong capacity in Emergency Response. Going forward, efforts should be made to leverage this strength for FbA. Practitioners can highlight the many ways in which both ER and FbA have overlapping capacity requirements; that FbA is in fact the ability to mobilize on short notice, with the difference being that the mobilization is in response to a forecast rather than a disaster. It is believed that this framing will help PMI better leverage their

pre-existing capacities for FbA. When this was raised in a workshop presenting findings from this study it was well-received by PMI staff.

Shift PMI culture to embrace proactive risk analysis and approaches by embedding FbA in their next 5 year plan. PMI is known to be, and prides itself, on being strong in Emergency Response. However, this has created a culture of reactivity that spreads throughout organizational culture and many of the other programs, at the expense of proactive measures. It is recommended that PMI embed FbA in their forthcoming 2019 five year plan. This will hopefully signal a commitment to FbA as well as to shifting their organizational culture and vision to expand beyond a reactive, response mindset to one that also prioritizes ongoing proactive program design and anticipatory approaches.

This ideas was presented to PMI in a preliminary presentation of findings and was met with willingness to include FbA in their forthcoming strategic plan.

Encourage PMI to expand capacity beyond their current priority areas. (See recommendations related to program design and expansion of FbA target area). Though PMI is adamant that they would like to first try FbA in two regions and then expand, it is imperative that they be encouraged to implement in the 13 provinces recommended above, and to work to expand capacity in regions where they are weak so that FbA can be implemented at the scale of forecast nationally.

Potential avenues could include the FbA Workshop suggested above (to clarify misconceptions) as well as linking PMI and other FbA stakeholders to FbF practitioners from other countries who can share their lessons learned and why they vehemently discourage working with targeted, pre-defined areas.

Build mechanisms for sustainability of PMI engagement into FbA program design (i.e. releasing funding in increments). BOCA gave PMI just 19 out of 100 possible total on sustainability of activities (BOCA, 2017). This is consistent with the testimonies gathered from internal and external stakeholders, who emphasized that PMI is often enthusiastic to onboard new projects but does so without adequate capacity to follow through effectively. Consequences that were identified include initiating meetings without further follow up actions, lags or gaps in financial reporting, reluctance to hire new staff, and giving staff large portfolios that are challenging to manage. BOCA again corroborates these findings in giving PMI a score of 33.3 for 'financial information system and reporting' and 28.6 to 'support for National Society growth' (BOCA, 2017). It is recommended that potential funders ensure that PMI is committed to implementing FbA over the coming years, and that they value the program for the opportunity it offers to act in a window that previously was not possible rather than viewing it as supplementary funding for their preparedness or response programs.

Support PMI to have continued engagement with FbA. This is the flip side of embedding mechanisms for sustainability in program design. Part of creating the conditions for PMI to be able to maintain sustained engagement is allocating money to hire a PMI staff member for FbA (as recommended in the 'Roadmaps to FbA' section). Beyond this, it is important to work with PMI to conduct a workload analysis and to identify which resources and trainings are needed to ensure their success -- and to commit to follow up with the support that PMI identifies is needed.

Provide training to increase PMI capacity to translate technical weather analysis into meaningful action points for stakeholders and beneficiaries. Currently PMI has high capacity to disseminate information but not to translate it into relevant information (i.e. don't communicate that there will be '50 mm or rain,' communicate that 'there will be floods in x,y,z areas that requires evacuation). This has also been indicated by PMI as a priority.

Explore different approaches to identifying target areas. Currently, PMI DM department prioritizes those areas with frequent hazards and high population numbers. This differs from an FbA impact-based forecasting approach, in which vulnerability, infrastructure, and resiliency are factored in in addition to exposure. Therefore, it is quite plausible that FbA intervention areas might be quite different from areas in which PMI has a focus (and therefore from areas in which PMI has capacity). It is strongly recommended that conversations around these different approaches happen early so that all stakeholders can be on the same page and so that plans can be made to expand capacity beyond pre-existing priority areas as needed.

Develop a policy advocacy plan and team within PMI: It is recommended that program and activities within Disaster Management Team include policy advocacy and dialogue with relevant government agencies and stakeholders to improve policy and practice on disaster management and health. For sustainability of impact and learning, it will best for PMI to increase staff personnel to facilitate this new role for policy advocacy and dialogue for various challenges in disaster management (including health). Policy advocacy and dialogue on FbA is a starter.

1. To Have FbA team within PMI Disaster Management Division to exclusively implement FbA component of PMI and build dialog and partnership with relevant stakeholders.
2. Ensure policy advocacy and lobby on disaster management and health within PMI is included in the next PMI Strategic Planning, including outcome/output indicators to measure performance.
3. Having this included into the Strategic Planning provide justification for having the necessary resource to carry policy advocacy and lobby activities within PMI.