**Background**

Java is one of the most populous islands in the world and home to a number of river systems. Of significance, Citarum – one of West Java’s largest rivers and 297 kilometers long, serves 44.5 million people in its surrounding provinces including the capital Jakarta. The Bengawan Solo River, which runs through Central and East Java, is even longer at 600 km. These rivers provide water and support the daily lives of millions of people, through irrigation for agriculture and fisheries, hydraulics for industry and for electricity plants that supply power for Java and Bali.

Every year Java experiences at least one significant flood, typically between October and March. The river basins are prone to flooding, but due to changing climate and environmental conditions, floods have become more extreme, with huge implications for the people who live along the rivers.

To assist communities in protecting themselves against floods, the Indonesian Red Cross (Palang Merah Indonesia, PMI) with the International Federation of Red Cross and Red Crescent Societies (IFRC) and support of Zurich Insurance Indonesia, implemented the Community Floods Resilience (CFR) programme in the areas surrounding the rivers of Citarum, Bengawan Solo and Ciliwung. The CFR programme is aimed to develop effective solutions for reducing disaster risk and building community resilience, working through Community Based Action Teams (CBAT) with focus on: disaster, environmental rehabilitation, waste management, and innovation through technology.

PMI collaborated with Institute Teknologi Bandung (ITB), a local academic institution, to develop an internet-based application to predict and monitor rainfall and flooding – the Flood Early Warning Early Action System (FEWEAS). The application was first developed for the Bengawan Solo River in 2015, taking nine months to develop and launch, followed by dissemination and promotion to communities and stakeholders. The second FEWEAS was developed for Citarum River and launched in December 2017.
The application features information data related to weather forecast, climate prediction, rainy season forecast, climate change adaptation and river water levels; triggering appropriate early actions needed at specific levels. FEWEAS operates on a Common Alert Protocol (CAP) used by the local government authority. The other partners supporting this initiative are BNPB (National Disaster Management Agency), BPBD (Local Disaster Management Agency), PT. Jasa Tirta, Ministry of Public Work and River Basin Area Authority.

**What did the action seek to change?**

- PMI community volunteers through CBAT, together with local government, disaster response agencies and weather agencies, are able to utilize the information provided by FEWEAS for flood preparedness and mitigation activities, to trigger early action such as early warning and evacuation.
- With the basic information provided through their mobile phones, the community can monitor the weather and prepare for action to protect themselves against floods, as well as report on floods.
- Community members can use information on medium term weather patterns and predictions can be used for plan livelihood activities, farming and planting.
- Longer term prediction capacities enable policy makers to make informed decisions about land allocation and climate change.

**What were the key actions taken to achieve this change?**

The key action for this goal is collaboration among researchers, local government, stakeholders, NGOs, and society (the community) to integrate data and information from the forecast system and information from the communities to develop one system that is the FEWEAS.

**What were the essential steps taken along the process to bring about this change?**

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Approach relevant stakeholders including government counterparts, policy makers, weather agencies, communities and CBAT to collaborate, outline roles, exchange data and information, develop common protocols and processes for a community-focused system for flood EWEA that incorporates a web-based application.</td>
</tr>
<tr>
<td>Step 2</td>
<td>Establish partnership with ITB to contribute technical knowledge for development of the application, data models and website interface as a relevant, useful and user-friendly system.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Establish a coordination centre, training of staff and volunteers to monitor and interpret weather data produced by FEWEAS, and transfer of knowledge for operationalising the system developed.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Promote and disseminate information on FEWEAS to stakeholders, users and communities. Flood-prone communities have access to FEWEAS and can report floods locally.</td>
</tr>
<tr>
<td>Step 5</td>
<td>Monitoring and using information for flood early warning early action, in parallel with CFR strategies and provisions for safe evacuation routes, sites and equipment.</td>
</tr>
</tbody>
</table>
What SFDRR principles were applicable to this change process?

Principle 1 Enhancing disaster preparedness for effective response.
Principle 2 Strengthening disaster risk governance to manage disaster risk.
Principle 3 Investing in disaster risk reduction for resilience.

What were the Achievements and the Impacts?

PMI Provincial and District staff and volunteers are using the FEWEAS to monitor floods along the Bengawan Solo River in East Java, and along the Citarum River in West Java. These communities are being assisted to protect themselves against floods.

The FEWEAS enable a shared platform for community and government to address issues upstream and downstream in formulating appropriate strategy, planning and ground action for floods. Within a collaborative multi-stakeholder partnership that brought together community networks and coordination (PMI and IFRC), corporate support (Zurich Insurance and private companies), the government and technical agencies, and a local academic institution (ITB) to develop a local system deploying technology and innovation driven by community.

While the application provides flood alerts and updates to the community through smartphones, the communities and CBAT can update their response, upload photos, videos and relevant information to further inform response actions.

FEWEAS and the web-based application will continue to exist and serve the communities after the completion of the Community Flood Resilience programme.

What were the key Lessons Learnt?

- Discussion among the partners creates solutions to maintain the sustainability of FEWEAS. This a key learning where the system could be sustained by engagement of academia, government, NGO, and communities.
- Efforts are required to increase the accuracy of flood forecast through post event analysis and comparison between forecast data and real data from actual flood.
- PMI and ITB are jointly conducting advocacy with local government authorities and local partners to maintain the running of the application.
- ITB commits to maintain the data in their server, PT Jasa Tirta commits to allocate funds for operational costs, while BPBD as local government authority at Provincial level also commits to utilize the FEWEAS as a point of reference to receive information in addition to the official meteorological agency.

What were the Good Practices arising from this action?

<table>
<thead>
<tr>
<th>Good Practice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Practice 1</td>
<td>FEWEAS increased communities’ awareness of flood disasters, the need for early warning and action, and their roles in protecting themselves ahead of and during floods.</td>
</tr>
<tr>
<td>Good Practice 2</td>
<td>Improve the communities’ adaptive capacity for flood disaster.</td>
</tr>
<tr>
<td>Good Practice 3</td>
<td>CBAT and PMI Volunteers at village level are the main actors in operationalising Flood Early Warning and Early Action as a community-focused action.</td>
</tr>
<tr>
<td>Good Practice 4</td>
<td>FEWEAS addresses flood risks in regional long- to-medium-term development plan.</td>
</tr>
</tbody>
</table>

1 e.g. Primary responsibility of the State, Shared responsibility, Protection, All-of-society-engagement, coordination mechanism, empowering local-decision makers, Multi-hazard approach and inclusive risk-informed decision-making, Sustainable development, Local and specific risks.
**Policy Relevance to DRR in Action**

In relevance to the implementation of the Sendai Framework for Disaster Risk Reduction, this case study:

- Increased the communities and stakeholders' understanding of flood disaster risk and its management through utilization of the application;
- Contributed to strengthening disaster risk governance and addressing disaster risk management in the National Development Plan;
- Provided a platform for public and private sector to collaborate for investing in disaster risk reduction for resilience in the form of flood protection system; and will
- Sustainably continue enhancing disaster preparedness for effective response and to “build back better” in recovery, rehabilitation, and reconstruction.

**Key Messages from this Case Study**

Collaboration and innovation were key elements joining the four priorities of action from the Sendai Framework in the design, development and implementation of a technology-integrated, community-centred Floods Early Warning and Early Action System to benefit the communities who live in the Citarum and Bengawan Solo river basins.

The FEWEAS is a successful innovative local application to help predict flood risks and provide early warning early action alerts, used by all levels of society affected – the community, volunteers, the Red Cross, weather technicians, policy makers and government. It complements a larger set of community-based preparedness and mitigation systems under the Community Flood Resilience programme. This case study may inspire other community and research efforts.

**References for this Case Study**

1. IFRC Jakarta, The Flood Early Warning Early Action System (FEWEAS), 2017
2. FEWEAS website for Bengawan Solo River Basin: http://feweas.jasatirta1.co.id/en
3. FEWEAS website for Citarum River Basin: http://smartclim.info/citarum
4. Red Cross helps flood-prone communities through traditional and modern approaches, 2016: IFRC web article