EXECUTIVE SUMMARY

Learning from the 2020 floods in Tabasco, Mexico

Delivering humanitarian aid in the 2020 floods in Teapa, Tabasco © By Javier Lara, Head of Training and Disaster Preparedness, Mexican Red Cross, 2020

Executive Summary

This report is based on the Zurich Flood Resilience Alliance's Post-Event Review Capability (PERC) methodology, which analyzes flooding in Tabasco, Mexico, in 2020. This brief presents resilience lessons and is based on key informant interviews and desk research.

In October and November 2020, a series of cold fronts and two cyclones caused severe flooding in the states of Chiapas, Tabasco and Veracruz. In Tabasco, in the month of November there was significant rainfall. Floods, landslides and the discharge of water from the Angel Albino Corzo "Peñitas" hydroelectric dam left the region under water. In total, the storms and resulting floods inundated 14% of the state and affected approximately 800,000 people, damaged close to 200,400 houses and flooded thousands of hectares of crops throughout the state. The floods also damaged 2,000 km of roads, and affected drainage systems and major urban infrastructure, which suffered damages of USD 37 million and USD 93 million respectively (see Table 1).

Given that much of Tabasco lies on a coastal plain, flooding is common in the state. Previously, for example, the 2007 floods left almost 80% of the state under water and caused losses of up to USD 3 billion. The 2020 floods caused losses of USD 677,802 (see Table 1). This suggests that, due to the impacts of climate change and ongoing land use change - including unplanned urban sprawl, oil activity, and deforestation - the region is likely to experience flooding of a similar, if not worse, magnitude in the future.

Key Points and Recommendations

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>
> *Tabasco is going to flood.*
>
> - PERC interview

Recognizing this, significant investments have been made in protection infrastructure and flood management, facilitated by the financial mechanisms for emergency response, reconstruction and prevention, as well as in the development of a robust national system that supports preparedness, response and recovery at different levels.

These investments have resulted in advances that minimize the impacts of flooding.

This PERC and the experiences from the floods of 2020 illustrate that learning continues and that successful practices need to be built upon to fill the gaps in risk management. PERC research highlights multiple entry points for increasing resilience, including: strengthening early warning systems, integrating grey and green infrastructure, investing in social and human capital, researching alternative housing models, pursuing land-use management policies, and improving dam management.
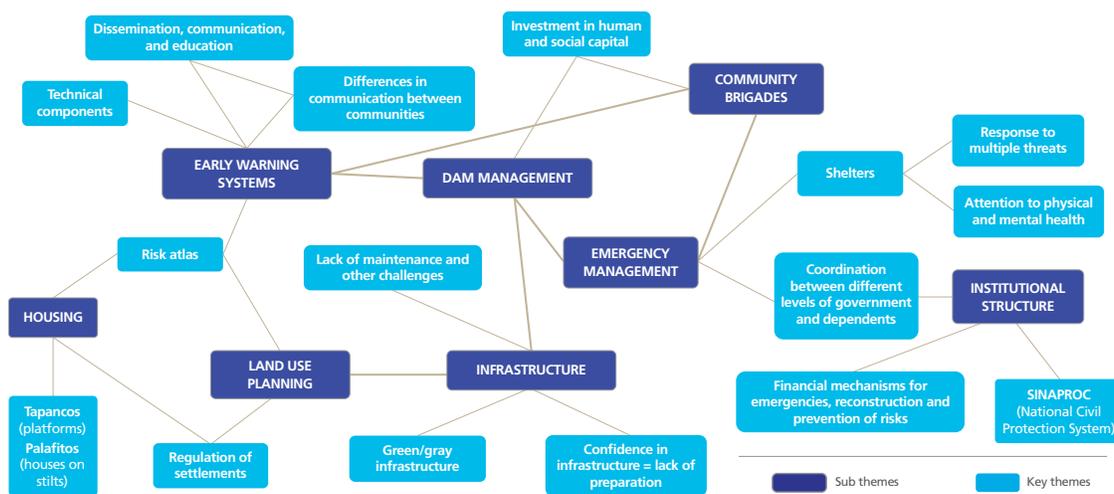

FIGURE 1

Central themes in the management of the 2020 floods

KEY POINTS

Mexico has a strong institutional structure to respond to disasters. Since the 2007 floods, flood response has improved.

- The National Civil Protection System (SINAPROC) has evolved from providing a reactive response to risk management, enabling the reduction of damages and impacts.
- An emergency response protocol was established outlining the coordination of tasks between the different levels of government and agencies.
  - In 2020, the majority of humanitarian aid was delivered through the funds managed by the Mexican government and was complemented by the support of the Mexican Red Cross, unlike during the 2007 floods, when, because of the lack of coordination and management, a higher percentage of the affected population was primarily served by the one institution.

Financial mechanisms were created for emergency response, reconstruction, and prevention.

- Resources to provide immediate relief to the population (evacuation and humanitarian aid) is delivered expeditiously via emergency declarations through the Natural Hazards Emergency Response Program.
- Resources for the reconstruction of infrastructure are released through declarations of natural disasters through the execution of the Response to Damage caused by Natural Phenomena Program. The objective of these funds is to finance programs that reduce vulnerabilities to future threats.
- Resources for the development of preventative actions such as the identification and reduction of risks, and to promote a culture of prevention and self-protection are released through the National Fund for the Prevention of Natural Disasters (FOPREDEN).

2020 Floods in Tabasco in the community of Torno Largo Second Section, Jonuta, Tabasco
© Paulo Cerino, Community technician, Mexican Red Cross

Tabasco has made significant investments in grey flood protection infrastructure. These investments have helped to reduce flood impacts, but the 2020 hydrometeorological events highlighted that:

- Grey infrastructure requires constant maintenance for it to function properly and it can only mitigate part of the risk.
- In some localities, community members place full confidence in existing infrastructure, and therefore do not carry out prevention and preparedness actions in case of floods. Community members need to know how to respond and what to do to reduce flood impacts in the event that infrastructure fails due to a lack of maintenance or because its threshold has been exceeded.

Different housing designs/models are needed in Tabasco to make houses more resilient to flooding. In the past, ancestral and alternative housing models such as tapancos (platforms) and palafitos (houses on stilts) have been used in Tabasco.

The floods illustrated that communication and coordination among decision-makers are critical for effective dam management. In December 2020, the Grijalva River Dam Management Commission was created to strengthen coordination among agencies and entities involved in dam management to determine the volumes of water released and the reservoir levels required to ensure people's safety.

Technical components of the early warning system exist, and bulletins and messages were disseminated and received in some areas. However, there are still gaps in early warning systems, which require improvements in the communication strategy, especially to reach the more remote communities. Additionally, there is also no warning system for dams, a critical gap that influenced the 2020 floods.

Taking into account the context of the COVID-19 pandemic, the flood shelters were well managed. The Ministry of Health carried out activities in support of general physical and mental health in parallel with COVID-19 specific actions. For example, the Ministry of Health provided influenza vaccinations and conducted spatial spraying of disinfectant to prevent epidemiological outbreaks. Medical consultations were provided to treat acute respiratory infections, mycosis, hypertension, diabetes and dermatosis. In addition, talks were given on gender issues and prevention of alcoholism.

The distribution of humanitarian aid by the Mexican Red Cross was more efficient than in the 2007 floods. Surveys captured basic family information on mobile phone devices which was later downloaded to a server and contributed to the creation of databases and censuses which helped to avoid the duplication of aid. This made it possible to know the exact number of families, children, people with disabilities, and elderly who were affected and needed help.

The land use planning process, coordinated by the Secretary of Agrarian, Territorial and Urban Development (SEDATU), is an opportunity to re-think land-use with a basin-wide approach. It is also an opportunity to instruct on how to "build better" in terms of flood resilient infrastructure and housing.

BOX 1. PROGRESS OBSERVED

Management of the 2020 floods

- The State Council of Civil Protection held daily meetings to review emerging issues and to coordinate emergency operations among the different sectors involved. They also carried out the actions necessary for extracting flood water and protecting the public.

- Coordination between the different levels of government and institutions involved in risk management was remarkable. The PERC review shows a notable improvement in inter-institutional coordination compared to 2007. Coordination is based on the legal foundation underpinning the National Civil Protection system in Mexico

Emergency shelters

- The emergency occurred in the midst of the COVID-19 pandemic. Shelters were considered to be well organized, despite the fact that the situation was unprecedented. For example, the officials maintained strict sanitation protocols.

- The Ministry of Health successfully carried out complementary measures to benefit the health of those staying in the shelters. For example, the Ministry of Health provided ongoing medical and psychological care, vaccinated people against influenza and conducted spatial spraying of disinfectant to prevent possible outbreaks of Dengue, Zika, Malaria or Chikungunya.

Community brigades

- In recent years, communities have participated in the disaster risk management cycle through community brigades, neighborhood groups, and civil society organizations.

- In the 2020 floods, for example, the community brigades facilitated the dissemination of early warnings and monitored the river using hydrometric scales painted on wooden stakes or trees.

RECOMMENDATIONS

1 **Improve early warnings so that they reach the most remote communities.** The technical components of the early warning system exist, but dissemination, communication and risk management education need to be improved, especially to reach the most remote communities.

What is needed?

- A comprehensive training program for both urban and rural populations where experts in early warning management explain in detail, using non-scientific language, how early warnings work. The training components should include dissemination and communication campaigns that involve traditional media such as radio and television, but also social networks (WhatsApp, Facebook, Twitter), podcasts and websites.

- Citizen science: train the public to record and monitor rainfall locally as part of a participatory monitoring network that shares information to contribute to the effectiveness of early warning systems, following the example of the MOP Rímac Network in Peru.

Expected results

- Urban and rural citizens will be better informed about the components of the early warning system and can respond more quickly in the event of an emergency.

- An active population that can collaborate with national authorities by providing data that complements official hydrometeorological data.

2007 floods in Villahermosa, Tabasco © Mexican Red Cross photo archive, 2007

BOX 2. PARTICIPATORY RAINFALL MONITORING NETWORK IN THE RÍMAC RIVER BASIN (MOP RÍMAC NETWORK).[1]

Citizen science is a form of collaboration in which lay volunteers actively participate in scientific research, contributing to joint knowledge to address problems in their environment.

The Participatory Monitoring Network of the Rímac River Basin (MOP Rímac Network) in Peru was created with the objective of recording local rainfall information in several different districts of the basin and collaborating with national authorities. The Rímac MOP Network is made up of members of the communities living in and around the Rímac river basin. Community volunteers are trained to measure rainfall using handmade rain gauges, complementing data from national monitoring networks and other sources. The active participation of community members who are exposed to risk and have local knowledge about the areas in which they live provides both communities and authorities with a more complete picture of risk, which can help make early warning systems more effective.

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1   https://infoinundaciones.com/noticias/capturando-informacion-valiosa/

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Go beyond grey infrastructure. While grey infrastructure helps in mitigating risk, as illustrated by the 2020 floods, it has limitations insofar as it manages to mitigate only part of the risk. These limitations include: lack of maintenance, hard thresholds that can have devastating consequences when exceeded, and a false sense of security. Integrating green infrastructure[3], such as bio-dikes and natural buffer zones, into flood risk management can minimize some of the challenges of grey infrastructure and can help to broaden the approach to risk mitigation in the state of Tabasco. Green infrastructure projects can also have a high return on investment, as they can provide co-benefits for the social welfare of the local community.

What is needed?

- Studies of where and how green infrastructure can be integrated with, or replace, grey infrastructure. This includes understanding how nature-based solutions can be successfully implemented (e.g. through community ownership).

- Investment in grey and green flood risk management infrastructure.

- Capacity and skills to build a system for flood risk management where grey and green infrastructure are integrated.

- Training for community members on the limitations of infrastructure and how they can prepare and protect themselves.

Expected results

- Financial support for flood risk management plans including grey and green infrastructure.

- Implementation of flood risk management plans.

- Increased citizen awareness of necessary actions to be taken before and during a flood in the event that protective infrastructure fails.

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3   Green infrastructure also has limitations, including having thresholds and providing a false sense of security; however, knowing the limitations in advance and integrating them into a holistic flood risk management approach can minimize these limitations.

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3 **Investing in social and human capital.** Governments, communities and other interested stakeholders should develop complementary risk reduction capacities, particularly the human and social capacities of communities. Developing the knowledge, education, skills and health of community members while strengthening social relationships and networks can help address flood risk along with long-term participatory projects focused on prevention. Opportunities to increase social and human capital include:

- Recognizing that building human and social capital in communities requires investment: disaster risk reduction budgets should be allocated to fund capacity building efforts at the community level.
- Establishing a broad network of community brigades and strengthening existing groups.

What is needed?

- Allocation of disaster risk reduction budgets to finance development efforts. Capacity building (knowledge, skills, etc.) at the community level.
- Training on how to create and strengthen brigades.
- Resources and training on evacuation, emergency shelters, and first aid for brigades.

Expected results

- Improved knowledge, education, skills and health of community members at risk of flooding.
- Strengthened social relationships and networks among community members, as well as building connections between the members of the community affected by the floods and external actors and support organizations to support the exchange of and access to ideas and resources.

4 **Investigate alternative housing models.** Experience has shown that the current design of housing in Tabasco is not flood resilient. To minimize both losses and damage to housing and community assets, it is recommended that alternative construction models be considered.

What is needed?

- The Government of Tabasco is already promoting a program in the El Zapote ranch in the municipality of Nacajuca, where 120 stilt houses are being built. Habitat for Humanity is also supporting a pilot project to build 20 elevated houses in the municipality of Jonuta. Using these projects as references, it is recommended to continue with this construction plan. Historically, the population of Tabasco used *tapancos* and embankments in and around their homes, and these models can also be considered.

- Include flood-resilient housing as a priority in land use planning.

Expected results

- Tabasco has flood-resilient housing and avoids loss of homes, belongings and community assets.

5 **Follow land management policies.** Disorganized urban sprawl resulting from irregular settlements in at-risk areas has contributed to flooding in Tabasco. Governments, communities, civil society and the private sector must be part of the participatory planning for the management of their land.

What is needed?

- Update information in municipal risk maps to identify flood risk areas.
- Provide training to the population on the use of risk maps.
- Participate in forums for citizen consultation on land use planning.

Expected results

- Consensus between different social actors for land use planning based on informed decisions.
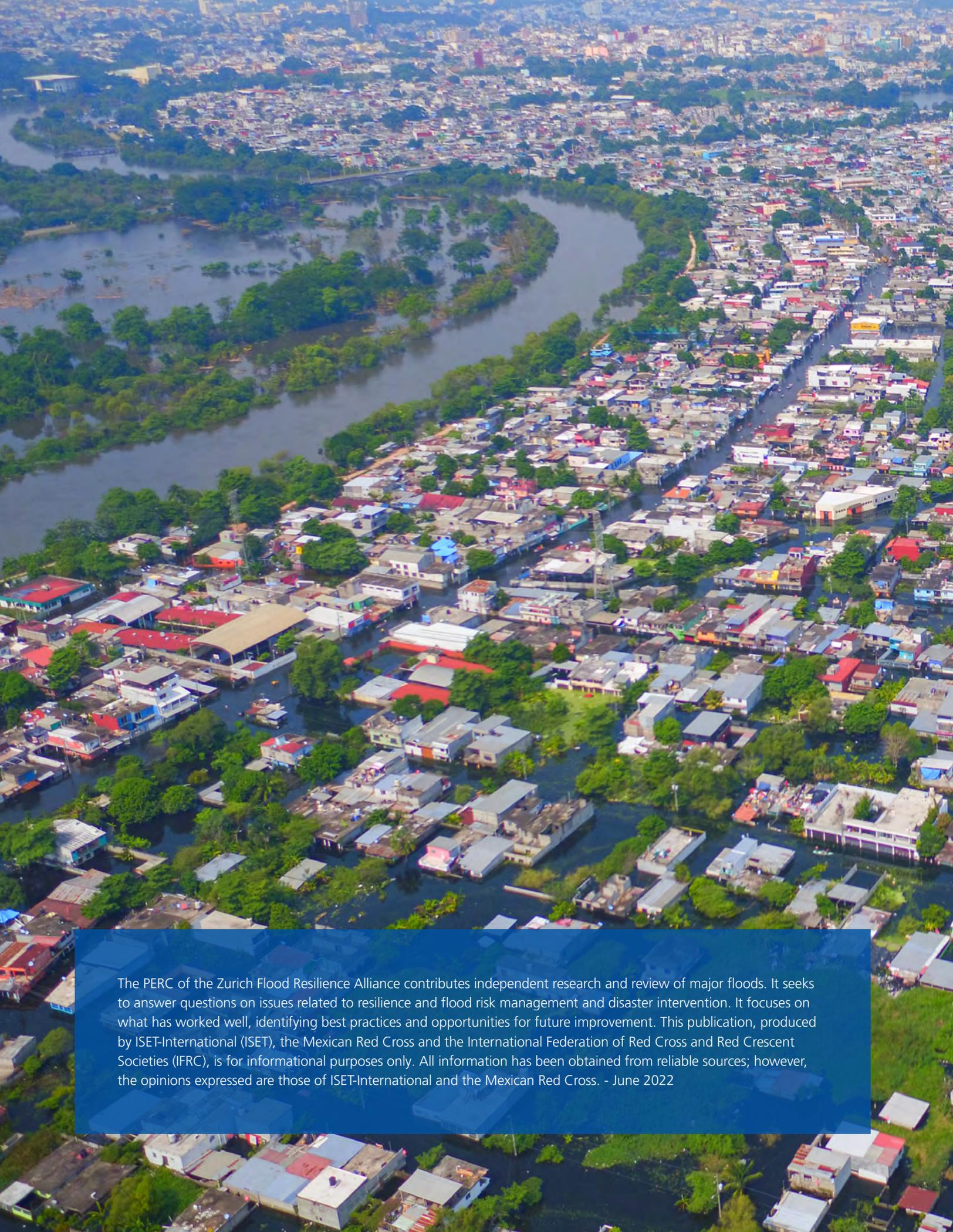- Increased awareness of the public on deciding where to live and/or adapting spaces for flood risk reduction.

6 **Create an approach to dam management with public participation.** Dams are fundamental for development since they generate part of the country's electric power; are sources of drinking water for agricultural, urban, and industrial uses; and contribute to flood control and flood reduction in some areas. However, their operation can be improved and alternatives sought for populations that suffer flooding when the dams release large amounts of water.

What is needed?

- Surveillance and monitoring of dam activity. Direct observation with regular visits, or a population trained in dam observation, can accomplish this task.

- Adequate communication and coordination among decision-makers on the operation of dams.

- Inform the public about dam management decisions so that they know what to do in case of flooding.

- Convene communities living in surrounding areas to learn about their perceptions of dams, and how they act with respect to the dams, with the goal of informing emergency plans.

Expected results

- A population that participates in the surveillance and monitoring of the situation of dams.

- Emergency plans for dams that are agreed upon between decision-makers and the public.

- Protocols for action in the event of intentional release of water or dam overflow.