Real-time early warning system could protect communities at risk from flooding

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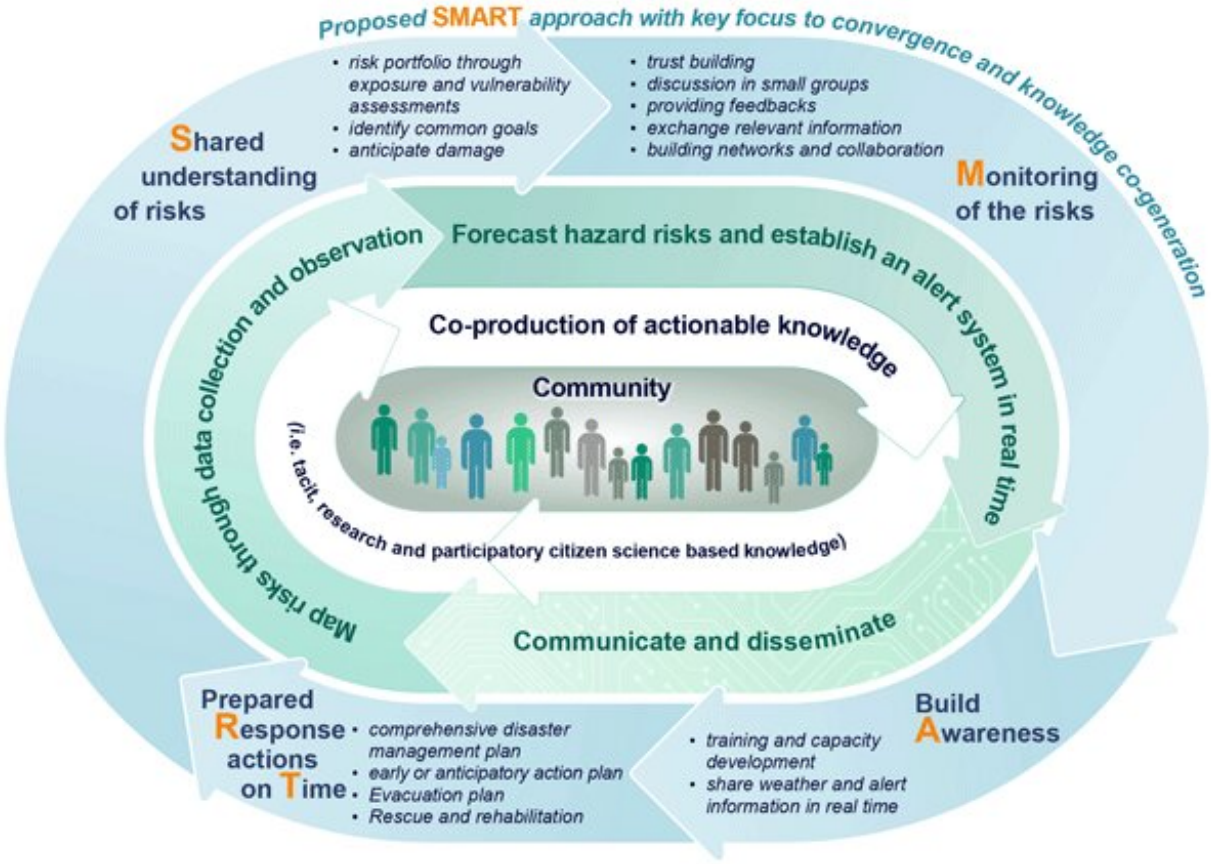

A SMART convergence research approach to ensure inclusiveness in designing monitoring and alert system to provide early warning information to minimize disaster risks. Credit: *Natural Hazards and Earth System Sciences* (2023). DOI: 10.5194/nhess-23-667-2023

Engaging communities in developing a real-time early warning system could help to reduce the often-devastating impact of flooding on people and property—particularly in mountainous regions where extreme water events are a "wicked" problem, a new study reveals

Flash floods are becoming more frequent and damaging to the lives and property of vulnerable people, but researchers believe that using a SMART approach (see image above) to engage with those living in such areas will help to better signal impending risk from flooding.

Scientists believe that combining meteorological data with information on how people live and work in such regions, will help disaster risk managers, hydrologists, and engineers design better ways of raising the alarm ahead of major floods.

Publishing their findings in *Natural Hazards and Earth System Sciences*, an international research team led by the University of Birmingham believes that integrating science, policy and local community-led approaches will help to create environmental decisions that better fit the local context.

Co-author Tahmina Yasmin, Postdoctoral Research Fellow at the University of Birmingham, commented, "A 'wicked' problem is a social or cultural challenge that's difficult or impossible to solve because of its complex, interconnected nature. We believe that integrating social science and meteorological data will help to identify unknown parts of the puzzle when designing an early warning system.

"Better engaging with communities and analyzing social factors identified by the community at risk—for example, illegal settlement beside riverbanks or slums—will help those driving policy to better understand the risks posed by these hydrometeorological extremes and plan flood response and mitigation which provides communities with

improved protection."

The researchers say that using a SMART approach helps policy makers to expose communities' vulnerability and risk, by using a set of fundamental principles:

- **S** = Shared understanding of risks ensuring every group of people in a community is represented and a wide range of data collection methods are used.
- **M** = Monitoring risks and establishing warning systems that build trust and exchange critical risk information—helping to maintain the forecasting system.
- **A** = Building **A**wareness through training and capacity development activities which embed understanding of real-time weather and flood alert information.
- **RT** = Indicating pre-planning **R**esponse actions on **T**ime with comprehensive disaster management and evacuation plans based on the alert produced by the EWS.

Co-author David Hannah, Professor of Hydrology and UNESCO Chair in Water Sciences at the University of Birmingham, commented, "Developing community trust in government agencies and tech-focused forecasting, whilst using community-led means of gathering information in data-scarce mountainous regions is critical in protecting vulnerable people.

"Using this SMART approach to engage communities in developing inclusive and purposeful early warning systems will undoubtedly help to develop capacity, adaptation, and resilience in the face of more extreme water extremes, such as floods and droughts, and increased uncertainty under global change."

More information: Tahmina Yasmin et al, Brief communication:

Inclusiveness in designing an early warning system for flood resilience, *Natural Hazards and Earth System Sciences* (2023). DOI: 10.5194/nhess-23-667-2023