Early Warning Systems

A Resilient Future: Science and Technology for Disaster Risk Reduction

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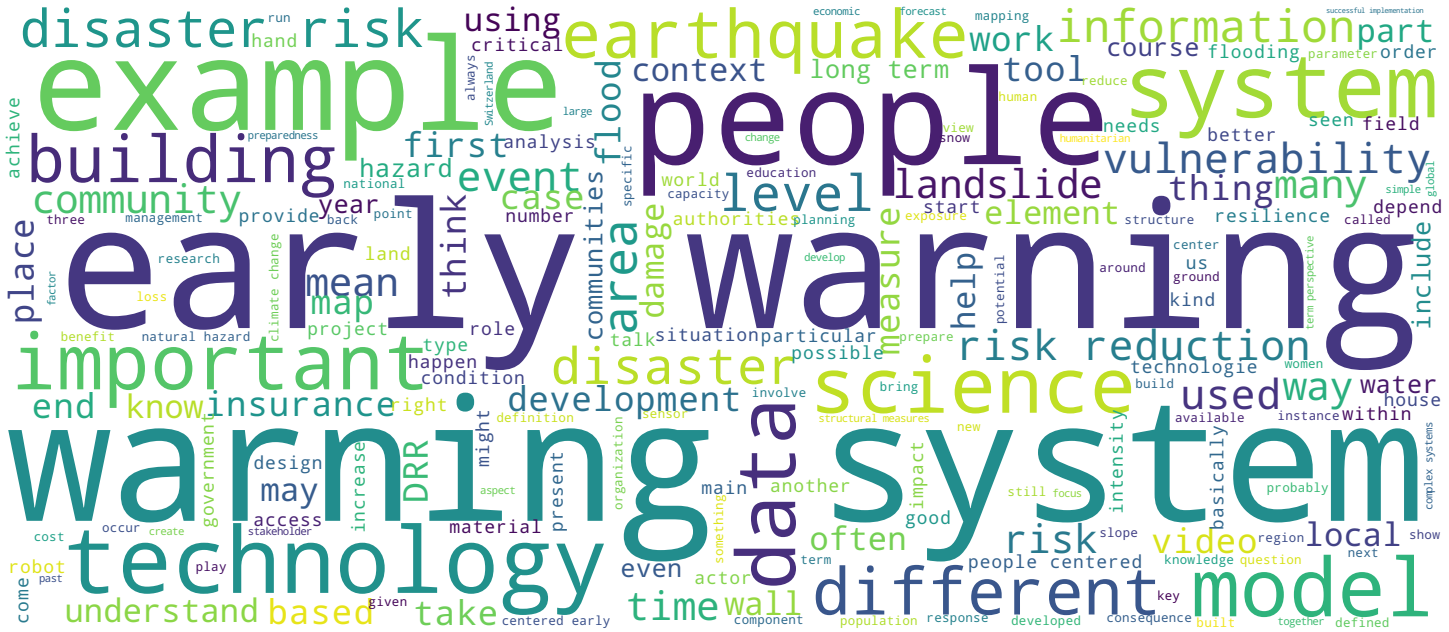

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Outline

- Definitions
- People-centered EWS
- Interview with Dr. Holger Frey
- A few remaining challenges
- Main points

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Hello! In this video, we will be discussing the topic of early warning systems. After some definitions, we will address the need for people-centered early warning systems. Doctor Holger Frey from the University of Zurich will share his views on early warning systems in terms of what [their] role, complexity and crucial elements [are]. Finally, some of the remaining challenges regarding improvement of early warning systems will be addressed.

Notes

Summary

0m 04s

Early warning system: Definition

"The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss."

(UNISDR, 2009)

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An early warning system can be defined as the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Notes

Summary

0m 34s

Early warning system: Definition

- People-centered: understood, accessible, timely, and tied to response actions

  (Jacks et al., 2010; UNISDR, 2016)

- End-to-end: from the hazard assessment to the response

  (UNISDR, 2009)

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Following the 2004 Indian Ocean tsunami and after the third International Conference on Early Warning that took place in 2006, early warning systems are considered effective if they are people-centered. This means that people should be able to easily understand and access them in a timely manner. Very importantly, early warning systems also need to be tied to specific response actions. Early warning systems should be end to end, that is to say, encompassing a complete process starting at the hazard assessment and finishing at the community response.

Notes

Summary

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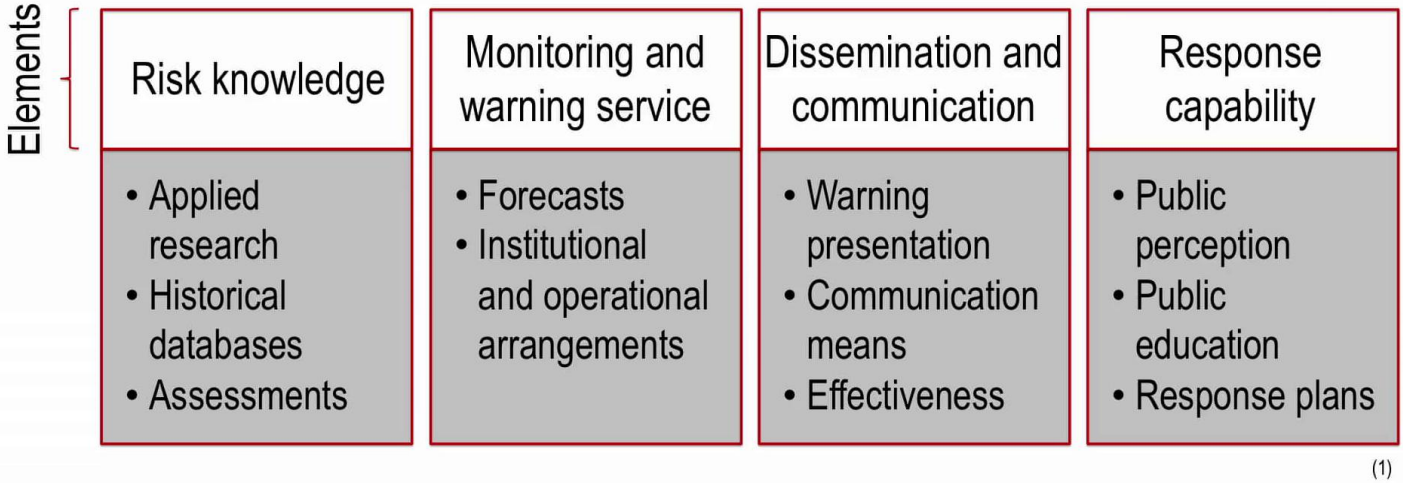
People-centered EWS



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People-centered early warning systems are composed of four elements: risk knowledge, monitoring and warning service, dissemination and communication, and response capability. Risk knowledge can be built, for example, by conducting applied research, compiling historical databases, and performing risk assessments. Timely early warning systems are based on forecasts. Those require observational data and monitoring, modeling, and situational awareness. Additionally, effective early warning systems are those that are embedded in the risk management plan, specifying the institutional and operational arrangements. The dissemination and communication elements of a people-centered early warning system refer to the way the warnings are issued, presented and communicated. The effectiveness also depends on the content of the message and the consideration of the target audience characteristics and needs. Finally, the response capability of a community depends on the risk perception and education of the people as well as existence of response plans.

Notes

Summary

1m 37s

Technologies for EWS

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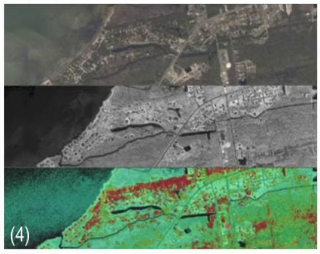
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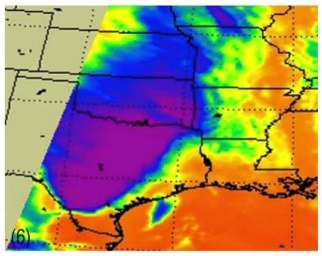
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Many technologies can be used in early warning systems. These can be based, for example, on sensors, satellite data and GIS, crowd-sourcing and models. Mobile technology allows us to warn people through text messages and alarm appliances can allow people and systems to take actions to protect life and property from destruction.

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Summary

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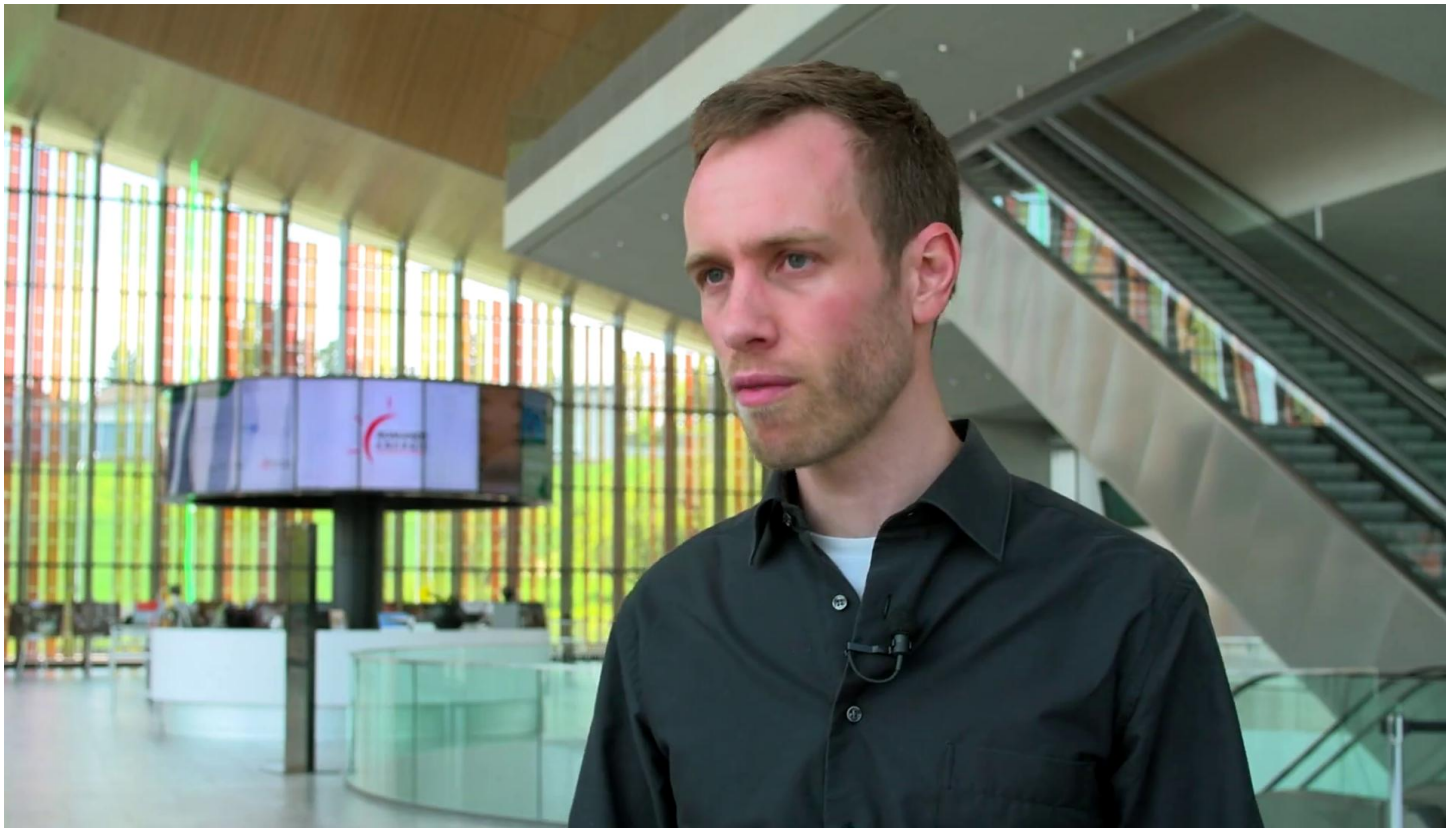

Even a few minutes of warning can enable protective actions, such as moving to safe locations, automated systems that ensure elevator doors to remain open, and power infrastructures to be protected. With advanced warning, emergency personnel can start to prepare and prioritize the response decisions. Moreover, communication sciences, social sciences, or management sciences can help us to enhance the effectiveness of early warning systems. And now you will hear Dr. Holger Frey presenting his view on early warning systems. Dr. Frey is a research associate at the department of Geography at University of Zürich in Switzerland. One of his research focuses is on early warning systems for different mass movement processes in mountain regions in the Andes, Himalayas, and central Asia. I see early warning system as a very good opportunity, actually, to complement existing hazard risk reduction or disaster risk reduction measures.

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Summary

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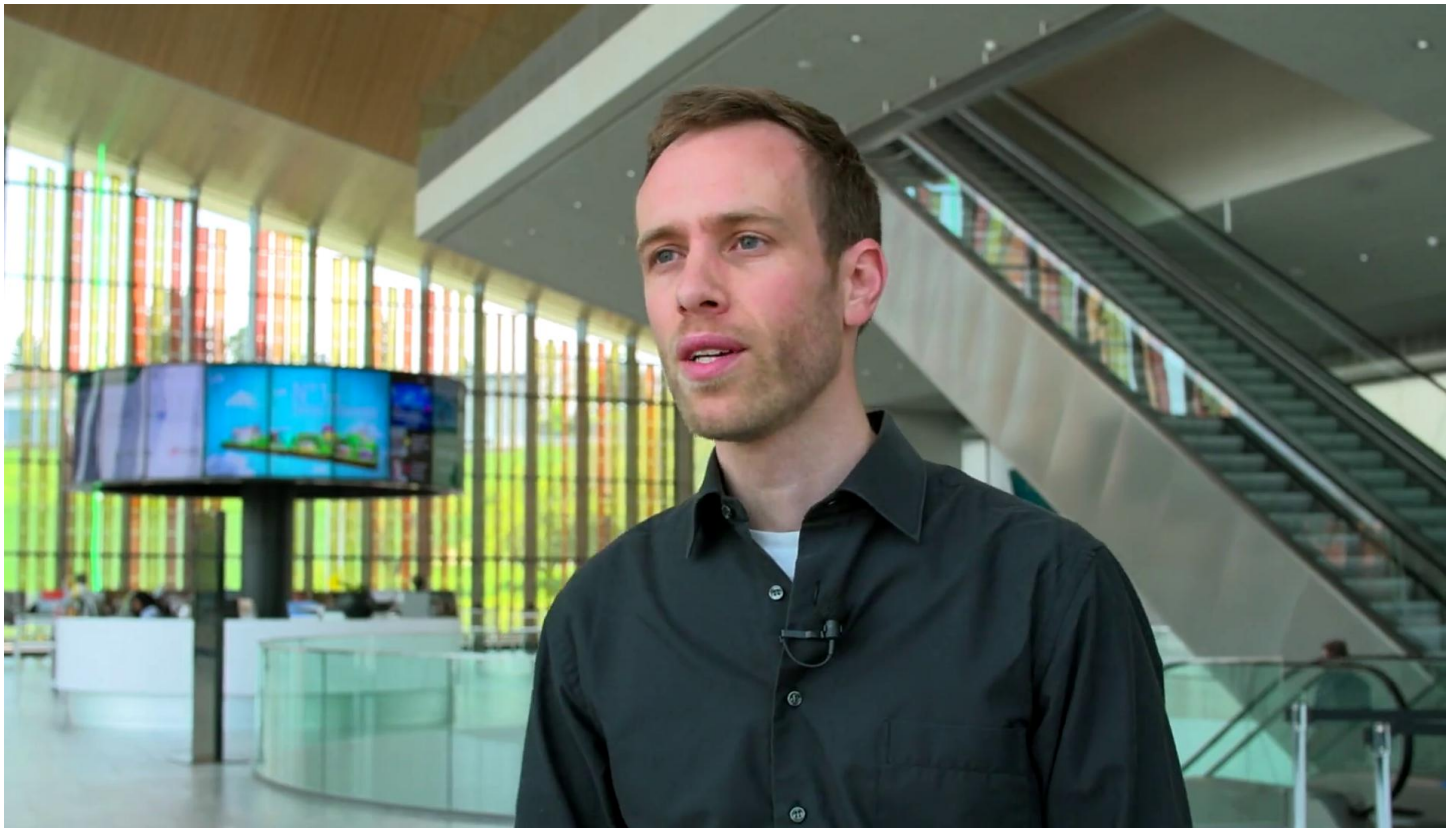

In the past, at least in the field of high mountain hazards, we had a lot of efforts going towards the physical mitigations, *structural measures, bridges or walls that were built,* and early warning system is really a different kind of system that tries to lower the exposure and the vulnerability of the exposed population. Early warning system consists of such a wide variety of different systems. The most simple system is a person standing somewhere and observing something with a communication device in his hands, and on the other end of the spectrum we have really global early warning system for instance, considering tsunamis, really involving different countries, different continents, these are really complex systems. Early warning systems are highly complex systems because they involve not only technical components but also institutional, legal and social aspects. So if we talk about early warning systems, very often, we only think about the technical devices, but actually, it's very important for successful implementation to also consider the institutional context, the legal framework of the place where it is implemented and also the social aspects, the social components are very critical to finally achieve a positive and effective response in the end.

Notes

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4m 20s

And because it's so interdisciplinary, that makes early warning systems very complex systems. A fundamental aspect of every early warning system, basically a prerequirement for having a successful implementation is a detailed understanding of the process, a detailed understanding of the hazard situation, of the risk, of the vulnerability, so really a good process understanding. And this is where we need science and models to understand the system and also to be able to design, in the end, successful early warning systems. On the technological side, every early warning system includes measurement sensor that measure any particular value, parameter of the environment. This depends of the type of the system and typically this involves not only one sensor but a bunch of sensor also to have a redundancy that are placed somewhere, distributed wherever it is appropriate to measure environmental parameters. Then we have communication technology. This means we need communication networks. This can be independent, autonomous radio communication, can be satellite communication, can be public communicaiton networks, as our cell phones, internet, whatever this depends as well on the system.

Notes

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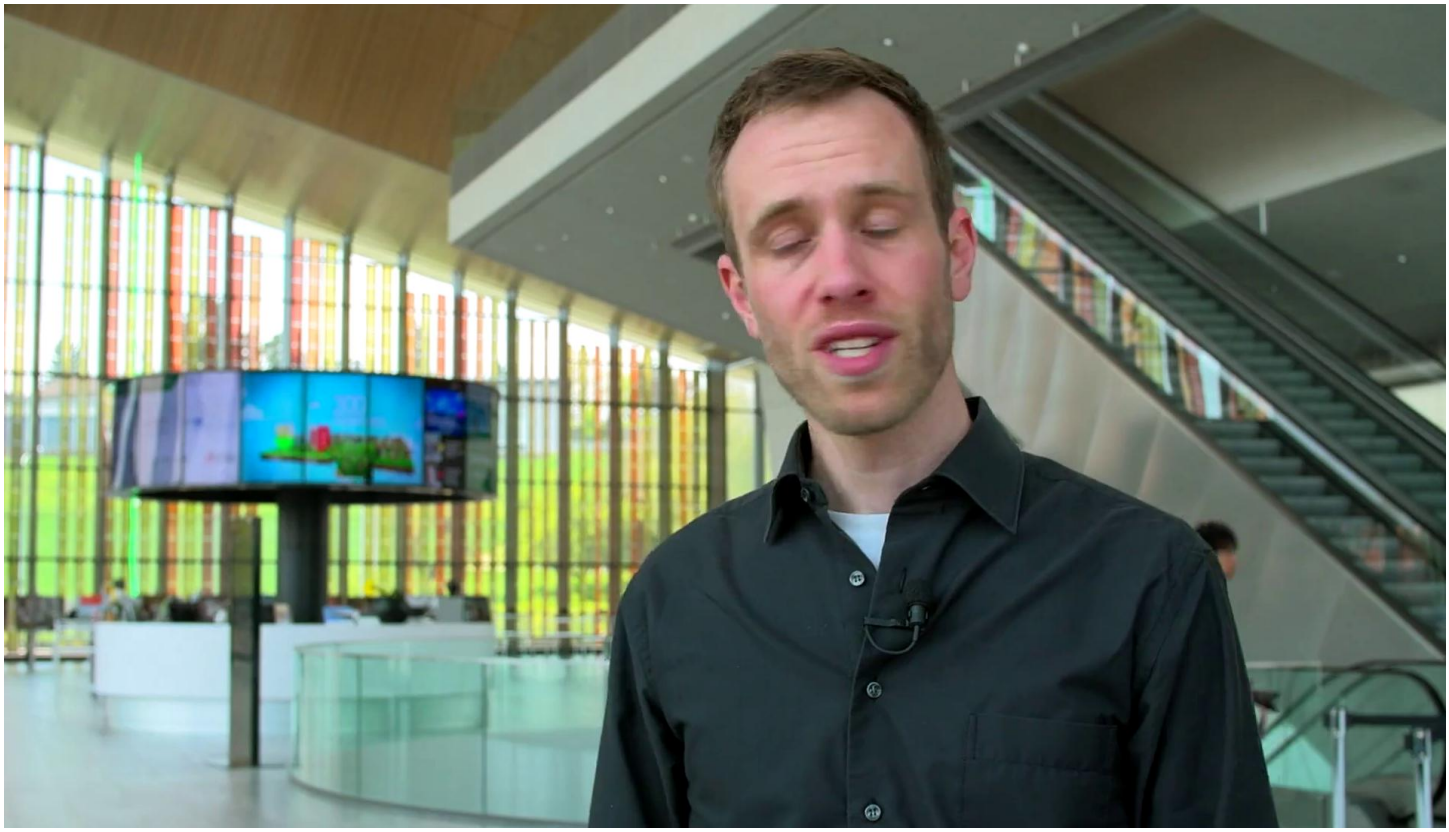

Then every early warning system has a center, a data center, where all the information is collected, stored, maybe processed, made available to the stakeholders, to the authorities, to the actors and finally this also the place where normally alerts or alarms are emitted or decisions are taken. And in the end, most of the systems also involve an alert or an alarm network system. This could be sirens, this could be mass communication devices, mobile phones, radio, TV, whatever, this depends on the system, but a certain network to communicate, or disseminate the alerts or alarms. And what is crucial and applies to all these components, these hardware technical components, is the energy supply because very critical for early warning system is that we have at any moment, under any circumstances sufficient energy to run the system, actually. And this is also must be true on the conditions of a blackout, on the conditions of long-term bad weather situations where we don't have much energy available for solar radiation. These are crucial for a successful implementation. Considering the variety of early warning systems that are available, it's probably not possible to give an average number of years that an early warning system can operate.

Notes

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6m 41s

Actually, it is also not even the need for each early warning system to have a long-term perspective, consider situations like a landslide or rockfall situation, where it's probably important that for an imminent case to have an early warning system but few weeks, few months later the event happens, and afterwards, the early warning system is not needed anymore, So, there are situations where it's not really an aim or a requirement of the system to be long-term. On the other hand, there are of course systems which really need to have a long-term perspective and to achieve a long-term perspective, it's important to first have sustainable financing, also regarding the maintenance of the system, second to also really work with the system, so the authorities need to constantly use the system, to train and also to know what to do in case of an event. And third one is very important is also to regularly check whether the system is still adequate, whether the hazard situation has changed, whether the vulnerability, exposure situation has changed, and if all these reconditions are considered, early warning systems can consist for many years.

Notes

Summary

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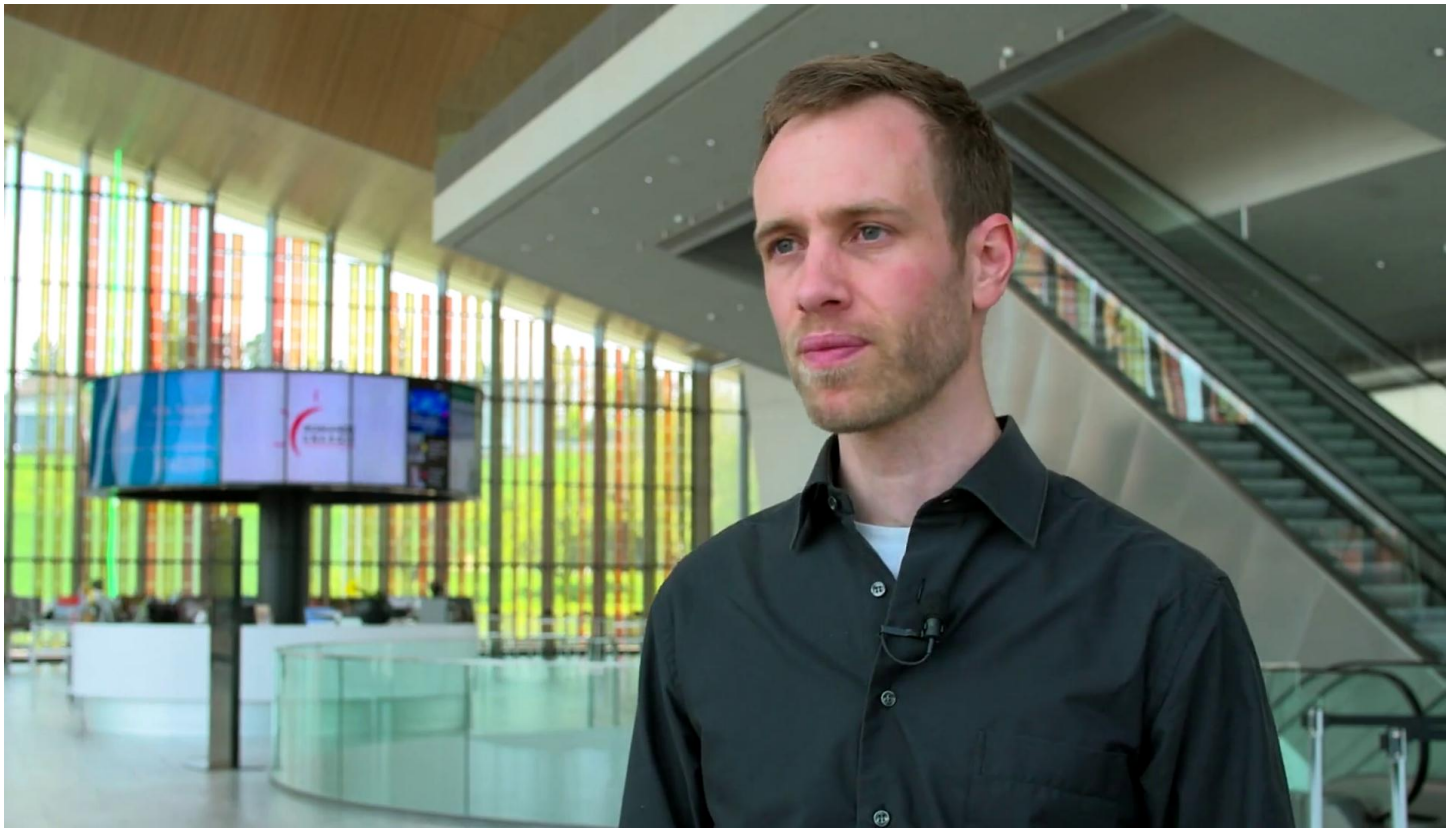

In my view, very critical and probably most critical component is to achieve an effective response by the population. And to achieve such an effective, positive and good response really involves strong involvement, strong collaboration with the potentially affected population. So it's not sufficient to only collaborate with the authorities, this is required as well, the institutional side, but really, we need to get in touch with the local population, the local communities. Especially in many contexts, we are working in contexts where local population has low confidence to the authorities, low confidence to the government and this is where we really need to inform them, work with them, train them to achieve a positive repsonse, also that they see the benefit of the early warning system for themself and this is really critical and very demanding and critical aspect of early warning.

Notes

Summary

9m 01s

Main points

- Effective EWS are people-centered
- EWS are complex and interdisciplinary
- Improving the response of the communities should be done through their engagement
- Science and technology can contribute to improving EWS, and in particular multi-hazard EWS

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Indeed, improving this last mile of early warning systems was identified by the DRR community as one of the major gaps to focus on. You will see in the next video an initiative aiming to close that gap. In addition to improving the four elements of people-centered early warning systems, the use of science and technology should help to take into account the interrelated effects of disasters that occur simultaneously or accumulate over time through multi-hazards early warning systems. In ths video, we have seen that early warning systems should be people-centered and that they are complex and interdisciplinary. Improving the response of communities through their early involvement is key. Science and technology has an important role to play to improve early warning systems and, in particular, to develop multi-hazards early warning systems.

Notes

Summary

9m 55s

References

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Notes

Summary

10m 50s

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Notes

Summary

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