

Research Report

Environment Commission

Innovation and early warning systems



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Introduction

1000 BC, an entire island into the ocean and became a myth: Atlantis. Specialists assume that this happened because of a volcanic eruption and a following tsunami. This example shows the vulnerability of the human population to natural disasters. Nowadays, it's hard to picture such scenario, even though it still occurs. The more economically developed countries have built up early warning systems to monitor the environment and to be able to evacuate the people in the case a disaster happens. But what seems so normal to us in the developed countries, is unimaginable in developing countries. There has been much process and innovations about this topic, but the many approaches we have today can be still improved. Only with innovation the development of early warning systems is possible, but exactly this innovation is lacking in some nations.

Definition of Key Terms

Innovation

Innovation is as well a *new concept* or product as the *commercialisation* of it. It creates a new approach and view on the idea behind it. The field of innovation is large in our world, as people find more and more solutions to older problems, but in this research report the term innovation will be limited on the environment and especially on the way innovation can improve early warning systems.

Agricultural Meteorology Program (AgMP)

The Agricultural Meteorology Program (AgMP) is one of the first programs being able to estimate the approximate duration of droughts. Usual programs were only able to tell when they are in the middle of it, but the AgMP works so efficient and quick that it can estimate the



end of a drought 2 weeks after it started. This effectiveness is reached by defining three different types of droughts. The AgMP is an example of a program being supported by many innovations and therefore being able to work efficient and precise.

International Framework of Action for the International Decade for Natural Disaster Reduction (IDNDR)

On the 22nd December 1989, the General Assembly declared the 1990s to be the International Decade for Natural Disaster Reduction (IDNDR) and doing this the International Framework of Action for IDNDR got adopted as well.

The Framework of Action sets the main goals for the decade and defines what disaster reduction means. In the IDNDR, the loss of lives, the property damages should be reduced as well as the social and economic disruption a natural disaster causes. The Framework plans to *develop guidelines* and strategies which the nations can adapt.

The Yokohoma Strategy and the Plan of Action for a Safer World

The Yokohoma Strategy and the Plan of Action got adapted on the 27th May 1994 in Yokohoma, Japan. The main aspects of the Strategy are the *disaster prevention and preparedness*. With appropriate education and the share of innovated technology, every nation should implement their own natural *disaster management plan* about the reactions when a natural disaster occurs. The Plan of Action focuses especially on the least developing countries, small islands and land-locked state, as they seem to be the most vulnerable due to their inadequate equipment.

International IDNDR Conference on Early Warning and Disaster Reduction

The International IDNDR Conference on Early Warning and Disaster Reduction took place from the 7th to the 11th September 1998 in Potsdam, Germany. The major issue of the conference was the *evaluation* of the IDNDR and *recommendations* for the following century. Early warning systems are the easiest step towards the protection of lives and property. The approach towards the disaster reduction contains global, national and regional levels and the development of capacities and multi-sectoral cooperation is essential to increase the protection of the population.

Platform for the Promotion of Early Warning (PPEW)

The Platform for the Promotion of Early Warning (PPEW) is a part of the International Strategy for Disaster Reduction (ISDR). The platform started working in 2004 and developed since then four main components of early warning: the *risk knowledge, warning service,*



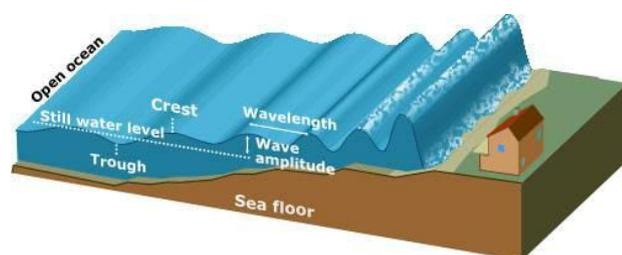
communication and the *possibility to respond* to a natural disaster. The systematic integration of warning systems into the policies of international organisations and nations and the collection of information are important parts of the work of the PPEW.

General Overview

In this section, some possible natural disasters are explained and the combined early warning systems to warn the people. The problem with the innovations in general is evaluated as well, in order to cover every aspect of this topic.

Tsunamis

The origin of tsunamis is an under water earthquake and this event creates a surge. On water these tsunami waves are not so dangerous, but when hitting the land, the wave collapses and can build up to 100 meters. Early warning, before the tsunami hits the land is essential because when seeing the wave hitting the shores, it's already to late to rescue the population. It's hard establishing a system warning for tsunamis as they look like normal waves on the open ocean. There are buoys in the oceans measuring the height of every wave but the heights of tsunami waves and normal waves are identical. When a normal wave passes a part of an ocean, only the highest level of water are being moved, due to the wind, etc., but the water below isn't involved. With a tsunami it's quite different. Every level of water, high *and* low, is involved and move, but there are less ways to recognize that.



Conventional systems took the magnitude of the earthquake and calculated from it the magnitude of the tsunami. But these systems are quite imprecise as large earthquakes are not always creating very destructive tsunamis. The earthquake in Japan this spring caused a highly destructive tsunami while an earthquake with quite the same magnitude in 2005 near to Nias, Indonesia, created a relatively small tsunami.

A system measuring the ocean floor movements is still in development but this could possibly be an innovation for early warning systems working more precise and being able to quickly warn the affected populations.



Volcanic eruptions

It seems very unclear why people live near or on volcanoes, always with the danger that their complete livelihood could get destroyed, but next to all the danger the volcano holds several chances as well. The soil around volcanoes is very eutrophic, *because* of the regular eruptions and many farmers use this advantage.

The early warning systems indicating volcanic activities have very high standards and innovations to predict an eruption have long tradition, because of the simple method behind it and the amount of people living relatively close to this danger.

An eruption arrives when the pressure inside the volcano gets too high and then the weakest part explodes. Shortly before the eruption occurs, the volcano expands, because of the high pressure inside and this movement can be measured with instruments on both sides of the volcano. So the population can be warned and evacuated.

Long-term threats

Next to the short-term disasters, there are also long-term disasters needing a longer time to develop, take shape and influence our lives.

A tsunami can be devastating, but the aftermaths are centred at one region. It's different when having a long-term environmental problem that could possibly lead to a natural disaster, e.g. the decreasing bee population. There is *little research* being done on this and so there is *nearly no scientific knowledge* about it.

The DEWA, the Division on Early Warning and Assessment of the United Nations Environment Program (UNEP), tries to collect and assess the information about these environmental threats.

As the threats seem to be not so acute and there's little evidence about their influences, mostly developing countries are under the impression that financial support for the research is not really necessary. So the innovations being done on this topic are very little and their number needs to be improved in order to prevent those natural disasters from happening.

Innovation

In general, innovation is a problem but also a chance in our world. Since the industrialisation, the western nations made great innovations and inventions and doing this improved the lives of many people. As already exemplified, the environmental field around the early warning systems was and still is an area where a lot of innovations are being



made on as there are still imprecise systems.

So far this is all a chance for us to protect our lives, but the problem with innovation concerned early warning systems is the fact that there are big differences between nations. More developing countries, especially Europe and North America, have the know-how and the money to innovate new early warning system approaches and they also used it, but only in some areas. Tsunamis are more likely to happen in the Pacific or the Indian Ocean so Europe doesn't invest so much money in innovating new warning systems in order to warn the population faster about a possible tsunami. The point is simply that the countries suffering from most of the natural disasters, e.g. tsunamis are developing ones and therefore they don't have the resources to invest into research and innovation development.

Major Parties Involved

Division of Early Warning and Assessment (DEWA)

The Division of Early Warning and Assessment (DEWA) is a division of the United Nations Environment Program (UNEP). The UNEP and with it the DEWA has its origin in the resolution passed by the General Assembly on the 15th December 1972.

The work of the DEWA has nothing to do with the "normal" natural disasters, e.g. tsunamis or earthquakes. They focus on the *long-term disasters*, e.g. the lack of bees and the impact on that on the environment. There are some speculative threats without real scientific evidence and the DEWA also deals with them and tries to confirm them with already existing knowledge.

Humanitarian Early Warning System (HEWS)

The Humanitarian Early Warning System (HEWS) is a part of the Inter-Agency Standing Committee (IASC). The IASC is a platform for *data collection* and doing this a basis for *decision-making*. HEWS, being created in September 2004, is a special system for the forecast of natural hazards on the global level. They bring together information from multiple institutions, e.g. the FAO (Food and Agricultural Organization), UNDP (United Nations Development Program), WFP (World Food Program) and WHO (World Health Organization). The systematic warning from e.g. earthquakes, tsunamis, volcanoes and floods are accessible and *understandable for everybody*.



Timeline of Key Events

Date	Event
December 15, 1972	The UNEP and with it the DEWA was founded.
December 22, 1989	A UN General Assembly resolution declared the 1990s to be the decade for natural disaster reduction and adapted the International Framework of Action for the IDNDR.
1990 – 1999	The INDNR takes place.
May 27, 1994	The Yokohama Strategy and Plan of Action for a Safer World got adopted.
September 11, 1998	The International IDNDR Conference on Early Warning for Disaster Reduction ended in Potsdam, Germany.
September 2004	The HEWS got created.
2004	The PPEW started working.

Previous Attempts to Resolve the Issue

There had been several attempts to solve the issue and everyone tackles a different aspects of the topic.

The DEWA works especially on *long-term threats* having sometimes very little scientific evidence. The work is very hard to evaluate as long-term threats need, obviously, a longer time to develop and show and therefore it's hard to judge the DEWA on their effectiveness.

The IDNDR and the combined Framework of Action had as a goal to *raise awareness* among the population but also among the nation's governments. It's hard to really prevent natural disasters but it's so much easier to prepare for it and this preparedness is exactly where many countries lack.

The Yokohama Strategy tackled the lack of education in the communities suffering more often from natural disasters, e.g. communities living close to active volcanoes. As a result of the IDNDR, the importance of early warning systems got strengthened. If the population gets warned before a tsunami hits their coast or before the volcano erupts, the people have time to rescue themselves and in some cases, even their



belongings. The following agreements work very close together and complete each other. The International IDNDR conference insists on the early warning systems being an *important measure* to minimise the natural disaster reduction. The PPEW works very actively for the *implementation of early warning systems* into the policies of the nations, so that the nations are being warned if a natural disaster occurs. But not only can the nations get warned with the early warning systems, civilians can as well. HEWS publishes systematic warnings on their website, providing easy and understandable information for everybody.

Possible Solutions

The solutions and approaches already being made are very sufficient, but some problems aren't being tackled yet and so there is no real improvement.

Most of the previous attempts where to prevent or prepare for "short-term" threats, e.g. volcanic eruptions and earthquakes, so the long-term threats where let out most of the time. There is very little evidence on the topic, because it doesn't seem so acute, but the DEWA tries very hard to change this and they should be supported in their efforts.

Another problem is the lack of real innovations on this topic. What the previous attempts where doing is the combination of existing knowledge, the data collection and the cooperation, but what could also help are new innovations, new ways to *prevent* natural disasters rather than preparing for them. But all the necessary research for that is not gratis, so the financial support from the countries, especially the developed countries, is needed.

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