

Early Warning Systems and Vulnerability: Summary

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Early warning systems (EWS) related to hydro meteorological hazards (and others) are designed and implemented in order to provide different population groups with lead time information that allows them to safeguard lives and goods and to make necessary adjustments in behavior and production patterns and types.

EWS requirements and characteristics will differ according to hazard type (hurricanes, floods, drought, landslides, tornados etc) and the predictability and normalcy of these. Here it is clearly necessary to distinguish between the types and objectives of EWS designed to attend:

- i. annual, seasonal, climate variability and the hazards it presents;
- ii. non annual cyclical variability with intermittent and dispersed extreme hazard manifestations (associated with the Niño and Niña for example) and,
- iii. the dynamics and permanent nature of changes in climate patterns due to Global Climate Change.

The concept behind and the construction of EWS in all three cases is fully justified and possible within certain limits, but each situation requires different approaches and faces different problems. However, although all three are different they are clearly related and must be considered on a holistic basis.

EWS are generally conceived as comprising four linked and concatenated stages or components, where the success in one stage is determined in part by the success in the previous stage. The components will have a different expression according to the type of hazard context dealt with (see above). These components relate to:

- observation, monitoring and analysis of physical hazards and hazard processes, including their spatial and temporal dimensions and potential impacts.
- The construction of spatially and socially dimensioned risk scenarios for hazard prone areas. Risk is the probability of damage and loss and is a result of the interaction of given hazard and vulnerability conditions. Vulnerability refers to the propensity of human groups and individuals to suffer harm from physical hazards due to the particular impact of economic, social, political, environmental, institutional, cultural, educational and organizational factors on their social and physical resilience and resistance levels and on their capacities, including the existence of social capital.
- Warning signals and procedures that lead to social responses, including, according to different needs and conditions, evacuation and safeguarding of goods and possessions, changes in production, living and housing conditions.
- Preparedness and response planning and implementation, including the design of emergency procedures, response mechanisms, rehabilitation and reconstruction, mitigation and adaptation procedures.

Early warning must be seen and conceived as an integral aspect of global and integrated risk management designed to face problems of disaster risk and adaptation and mitigation of climate change.

The significance and impact of vulnerability factors and patterns varies according to the component of EWS and the type of hazard problem dealt with (annual climate variability, periodic variability, climate change aspects). But, in all cases, there is little option for success with early warning and response if such vulnerability factors are not taken well into account. This is also true of the capabilities of different social groups. Vulnerability factors affect EWS success and successful EWS may significantly reduce short and long term population vulnerability in hazard prone areas.

Amongst the more important vulnerability considerations to be taken into account in success, component by component, we may consider the following:

Hazard monitoring and analysis:

- Lack of social participation in hazard monitoring and mapping.
- Inadequate spatial scales for depiction and understanding of hazard patterns and impacts.
- Lack of dynamism and permanent updating in hazard mapping and analysis.
- Fatalistic visions of hazard, risk and loss that deform understanding and acceptance of scientific explanation and recommendations as regards hazards.
- Possibilistic, as opposed to probabilistic understanding of hazard recurrence and potential impacts.

Risk scenarios:

- Over dependence on actuarial and quantitative scenarios and insufficient attention to subjective, qualitative aspects of risk and its social and spatial expressions.
- Inadequate spatial scales of resolution for depicting risk scenarios.
- Failure to consider vulnerability and thus reduce risk scenario to a simple hazard map.
- Failure to depict probable losses in sectors and population groups, areas etc taking into account differential vulnerability according to social group and geographical area.

Warning signals, signs or messages:

- The lack of adjustment to particular cultural, physical, idiomatic and other characteristics of the affected populations.
- Lack of social and spatial specificity.
- Failure in general to identify vulnerable groups and the vulnerability characteristics that may impair or lead to denial of signs and signals.

Preparedness, mitigation, response and reconstruction:

- Lack of social, spatial and cultural specificity in design of intervention measures.
- Lack of participation in analysis of situation and design of response and risk reduction measures.
- Dependency on short term early warning and response mechanisms as opposed to an integrated approach that promotes medium and long term prevention and mitigation based risk reduction measures.
- Over concentration on measures related to particular and often low recurrence events as opposed to the general risk scene in the affected areas.

EWS may significantly reduce medium and long term vulnerability and risk to the extent that they:

- Promote and support self learning and auto analysis in affected areas.
- Contribute to self sufficiency and social appropriation of observation, analysis, methods and techniques.
- Integrate with holistic risk reduction management and lead to more permanent awareness of risk and the need for wide ranging structural and non structural risk management measures.
- Serve as a learning and training mechanism that increase consciousness and capabilities at the local levels