GWES

Groundwater for Emergency Situations - Project of IHP VI

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Resolution of the International Conference on Freshwater (Bonn, 2001)

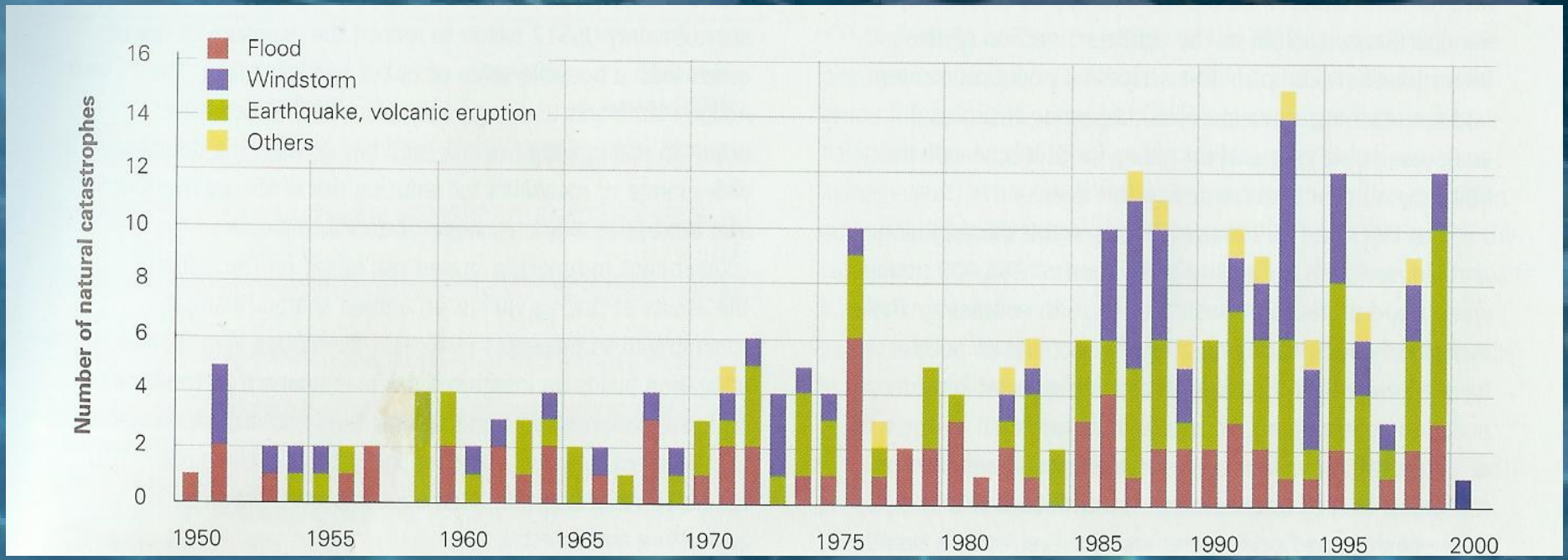
The world is experiencing a dramatic increase of suffering from the effects of disasters, ranging from extreme droughts to huge floods, caused by the poor management of water and land and possibly by climate change. Human society and particularly the poor are becoming more vulnerable to such disasters.

Types and distribution of water-related natural disasters

Floods represented 50% of disasters in the period 1990 – 2001 worldwide.
Asia fased 35% of all water related natural disasters during the same period, Africa 29%, The Americas 20%, Europe 13%, and Oceania 3%.
Global economic losses from registered natural catastrophes were estimated at around USD 30 billon in 1990, rising to USD 70 billion in 1999. Similar trends are seen in figures related to the number of people affected by natural disasters over the last two decades: 147 milion per year (1981-1990) to 211 milion per year (1991-2000).

Increasing trends in mayor natural catastrophes, 1950-2000

(Water for People-Water for Life, 2003)



Groundwater, the hidden part of the hydrological cycle

- Groundwater has to be seen within the broader context of the hydrological cycle and aquifers as a significant hydrological component of watesheds and river basins
- Groundwater should be integrated within the context of broader economy and social dimensions, particular that related to its use and related consequences
- In nature groundwater is a key element in many geological and hydrochemical processes, geotechnical factor conditioning soil and rock behaviour and a component which sustains spring discharge,river basin flow and lakes and wetlands

International Hydrological Programme-Phase VI - Theme 2

GWES project:

Identification and management of strategic *groundwater* bodies to be used *for* *emergency situations* as a result of extreme hydrological and geological events and in case of conflicts

The aim of the GWES project

- to consider in advance natural (floods, droughts, earthquakes,volcanic activities, land slides) and man induced (pollution, depletion) catastrophic events that could adversely influence human health and life, and
- to determine in advance low vulnerable resistant groundwater resources which could temporarily replace demaged drinking water supply systems.

Objectives of the GWES project

- to develop effective methodologies for determining strategic groundwater resources of low vulnerability to sudden catastrophic climatic and geological events,
- to introduce effective , geological,hydrogeological, geophysical, isotope-hydrological and other suitable techniques into the identification and investigation of such resources,
- to set up an inventory of groundwater bodies resistant to natural and human impacts in selected pilot regions and present relevant case studies,
- to publish a guide for identification,investigation, development and risk management of strategic groundwater bodies used for emergency situations

GWES - Activity Modul, Product, Timetable

- International working group composed by UNESCO, IAEA and IAH representatives and experts from different regions of the world
- International seminars and workshops in cooperation with UNESCO Regional Offices – OAS, ESCAP, OSS, SADC
- Cooperation with UNESCO – IHP International Centers and IGRAC – International Groundwater Assesment Center
- GWES Framework Document and Methodological Guidelines based on case studies
- GWES project duration: from 2004 to 2008

Contents of GWES Framework Document

- Groundwater as an emergency resource.
- Groundwater origin, occurrence and movement.
- Groundwater risk management in emergency situations.
- Identification, investigation and evaluation of groundwater resources for emergency situations: establishing a conceptual model of the studied area, geology, hyrogeology, hydrochemistry, geophysics, isotope hydrology, remote sensing and mathematical modelling.
- Requirements for institutional and technical capacities.
- Participatory process in the mitigation of natural and man made disasters.
- Case studies

Groundwater, a renewable and finite natural resource and strategic source of drinking water for emergency situations

It is difficult to organize a replecement drinking water suppy when regular water systems are compromised, demaged or even destroyed by natural or man-made disasters. They restoration may take several months or even years. Transporting water in tankers to the affected regions or importing large quantities of botttled water to prevent epidemics–such measures take time, they are expensive and only temporally solutions.

GWES policy and strategy

Safe groundwater resources protected by physical environment and with a long residence time and the necessary inrastructure for their exploitation would eliminate the dependence of population on vulnerable water supply systems and make rescue activities more effective. Such groundwater resources have to be investigated and set aside as a substitute for affected drinking water supplies thereby eliminating or reducing the impact of their failure following catastrophic events.

Development of such water policy and strategy for human sucurity- both long term and short term-is therefore needed to decrease vulnerability of population threatened by extreme events particularly in flood plaines, coastal areas, mountain slopes regions and arid zones.

Sustainable Integrated Water Resources Management (IWRM) water resources management

Groundwater resources are mostly renewable. However, they are only renewable within limits; the extent to which increasing demands can be met is finite (Water for People-Water for Life, 2003). Due to the increasing extraction and pollution impact, groundwater resources in many parts of the world, specifically shallow vulnerable aquifers with limited storage capacity, tend to be depleted or polluted.

Sustainable IWRM management is therefore advocated in order to counteract human impact.

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Risk management of groundwater resources

- Sustainable water resources policy and management cannot be adhered to an emergency situations where human lives are at stake and drinking water supply systems are collapsing. In such cases, sustainbility becomes a secondary consideration and groundwater from deep confined aquifers with a long residence time or even non-renewable groundwater should be developed and tested for providing adequate yields.
- Such an emergency supply should never be seen as a substitute for a regular resource.
- They should be earmarked for, and exploited only temporary, until the regular water supply can be restored and reactivated in both quantity and quality.

Hydrogeological investigation and mapping for emergency situations

- Risk management during an emergency finds groundwater supply initiatives poorly prepared to prospect for and develop alternative emergency resources – even where groundwater is readily accessible locally. Such an effort can be successful only if it is based on the results of a hydrogeological investigation, monitoring and mapping of groundwater resources, often employing supportive techniques - particularly geophysics, isotope hydrology and remote sensing.
- The key to selecting a strategy for resuscitating regular water supplies during or following catastrophic events is the knowledge of regional hydrogeological circumstances.

Governmental water policy in emergency situations

- Governmental and municipal authorities, civil defence and the army should know, where groundwater resources resistant to natural and human induced disasters are available in the areas repeatedly affected by, and prone to, natural hazards.
- A timely investigation and community participation are essential in developing the emergency water infrastructure that will function successfully in case of catastrophic events.

Concluding remarks

„Out of sight, out of mind“ is a common attitude, as well as „if there was a one-hundred year flood, we may be safe for the next 99 years“.

A flood or other climatic or geological catastrophic event should be seen rather as a warning that should stimulate the public and the governmental authorities alike to prepare water supply systems for exceptional circumstances.

In such situations deep, resistant groundwater resources uneffected by natural and man-made calamites are the most reliable source of drinking water. Such groundwater resources have to be identified, investigated, safeguarded and developed as they serve as a strategic resource of drinking water in case of catastrophic events.

Other UNESCO key groundwater projects implemented within IHP VI

ISARM – Internationally Shared Aquifer Resources Management (in co-operation with FAO, IAH, UN/ ECE and ESCWA)

IGRAC – International GW Resources Assessment Centre

WHYMAP – World Hydrogeological Map

Guidelines for the sustainable management of fossil aquifers

Groundwater resources sustaiability indicators

Development of methodologies for risk assessment of wastewater re-use

Guidelines for delineation of protection zones around public groundwater supplies and management policy (in co-operation with UN/ECE and IAH)