Drought Management Strategies

Risk Management
Versus
Crises Management

Dr.S.Nairizi

ICID, Vice President

1. Introduction

Drought has claimed a numerous casualties and socio-economic negative impacts during the last decade world wide. Non-sustainable man made development and improper use of natural resource have increased the vulnerability of the concerned society societies to the extend that even a small abnormality in climatic conditions will create disaster in the region . It is customary to deal with such crises after its occurrence , which is usually in effective action, because response is untimely, poorly coordinated and poorly targeted . But ,on the other hand, risk management approach considered a proactive measures to mitigated the potential damage imposed by drought. This approach is briefly described in this paper as a frame work for action.

2. Principles of the Management of Risk

2.1 Definition of hazard and risk

2.1.1 Hazard

Is a physical event, phenomena or a substance with potential causes of harm.
Including losses of life, injuries, financial losses and social environmental negative impacts.

2.1.2 Vulnerability

Is a multitude of conditions and processes based on physical, social technological and management factors which reflects the sensitivity of a society upon a hazard.

2.1.3 Capability

Is the way by which people and institutes will react upon the occurrence of hazard or disaster and using their available resources efficiently and effectively.

2.1.4 Risk

Risk expresses the likelihood that the harm from a particular hazard is realized. It is the product of the extend of hazard and vulnerability relative to the capability of the society and community to control the damage.

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Capability}}$$

Risk , therefore, reflects both the likelihood that harm will occur and its severity.

2.2 Risk management versus crises management

2.2.1 Risk management

Is a proactive approach to mitigate the potential damage of a disaster prior and after its occurrence.
It involves :risk identifications , risk evaluation and risk control.

2.2.2 Crises management

Is a reactive approach to control and mitigate the negative impacts of a hazard or natural disaster after its occurrence.
It is usually in effective, because response is untimely, poorly coordinated, and poorly targeted to disaster stricken group or areas.

2.3 Risk management process

2.3.1 Risk identification

Risk identification is achieved through inspection and analysis of historical events. It may involve multiplicity of techniques and safety audits and analysis.

2.3.2 Risk evaluation

Risk evaluation may be based on economic, social; or legal consideration. In this respect, vulnerability and potential impact assessment of all division of systems should be considered

2.3.3 Risk control

Risk control strategies may be classified into four main areas:

- ***Risk avoidance***
  Risk avoidance involves a conscious decision on the part the organization to avoid completely a particular risk by discontinuing the operation producing the risk and it presupposes that the risk has been identified and evaluated.

- ***Risk retention***
  The risk is retained in the organization or region where any consequent loss can be covered by company , organization or local government. Risk retention can be with or without knowledge of organization.

- ***Risk transfer***

  Risk transfer refers to the legal assignment of the costs of certain potential losses from one party to another. The most common way of effecting such transfer is by insurance.

- ***Risk reduction***

  The principles of risk reduction rely on the reduction of risk within the organization by the implementation of a loss control program or effective remedial action.

2.3.4 Program implementation

Relating these alternative risk control strategies to the general decision framework for implementation.

2.3.5 Continuous monitoring

All the above steps should be continuously monitored in order to be sure about the stage of preparedness for any hazard occurrence.

3. Drought Management Strategies

3.1 Definitions

3.1.1 Dryness , Aridity

Is expressing the situation restricted to low water scarcity in a region, and is a permanent feature of climate within a geological , social and environmental framework.

3.1.2 Drought

Is a normal , recurring feature of climate; it occurs in virtually all climatic regions, It is the consequence of a natural reduction in the

amount of precipitation received over an extended period of time, relative to the normal status of water demand, originated by living macro and micro organism.

3.1.3 Drought and other natural hazards

Drought differs from other natural hazards as below:

- Drought is a creeping phenomenon, the onset and end of drought is difficult to determine
- There is no precise and universally accepted definition of drought
- Drought impacts are non structural and are spread over a larger geographical area than the other natural hazards.
- Several types of drought exist, meteorological, agricultural, hydrological droughts. Factors or parameters that define them are different
- Drought severity is dependent not only on the duration , intensity and spatial extent of a specific drought episode, but also on the demands made by human activities and vegetation
- Drought has both a natural and social components , that is drought hazard, vulnerability and capability.

3.2 Drought analysis

The reason and circumstances which are leading to a drought disaster are generally related to climatic and hydrologic factors, human made effects and soil conditions. Making a priority list among them depending on the their local or regional importance.

3.2.1 climatic conditions and hydrologic factors

Among the recorded meteorological data the most important ones which express and characterize drought are precipitation, temperature humidity and soil moisture conditions.

3.2.2 Human made effects

Non sustainable agricultural and water resources development including improper use of land, bad choice of plants, soil cultivation methods, improper crop rotation, badly managed agro technology, too dens crop stand , in adequate fertilization and over exploitation of water resources are the major factors for increasing vulnerability of a region to drought.

High rate of population grow the and improper industrial development exacerbate the situation.

3.2.3 Soil conditions

Soil type, particularly the physical structure, the soil water capacity, the soil moisture content in the root zone and soil moisture balance can be important factor in drought development.

3.3 Drought Impacts

3.3.1 Direct harmful impacts

perhaps the main harmful effects of drought are impacts on agriculture. The majority of studies in most countries have been done to assess and demonstrate the damage caused by drought on plant production , on forestry and animal husbandry. Trees under drought stress will often be affected by insects and fungus, as secondary pests and diseases.
Besides the agricultural impacts, drought has direct harmful effects on water management too. Surface and groundwater are effected under drought conditions, their quantity as well as their quality.
One of the most dangerous and harmful effects of drought is exerted on the environment. This is usually ignored , whereas it needs greater attention. Due prevention of natural resources, is the only effective measure in these cases.

3.3.2 Indirect harmful impacts

The following harmful impacts can be imposed on the society as a result of drought consequences.

- Decrease in production of basic raw material has a negative influence on trade conditions.
- Increasing imports and overbalance of export plans.
- Speeds up inflation , financial problems of farmers and related producers.
- Impacts on public health , unemployment and , mass immigration and negative impacts on tourism.

3.3.3 Beneficial impacts

Drought may also have beneficial effects. Some of these impacts can be summarized as bellow:

- Improvement efficiency in water use and water quality control .
- Reduction population growth by less immigration to areas which are prone to drought .
- Controlling overproduction in agriculture and contribution to more sustainable development .
- Mosquito reduction .

3.4 Drought management process

Process of drought management can be categorized in 7 action programs.

3.4.1 Assessment and forecast of drought events

Climate forecasting

- ✓ Detail analysis of climatic parameters
- ✓ Development of appropriate drought intensity indices
- ✓ Drawing a regional or continental drought sensitivity map
- ✓ Establishing a monitoring system to assess the harmful effect , of drought

Design and Implementation of common monitoring system

- ✓Establishing a continuous service of drought – forecast to help farmers, water management experts and other stakeholders
- ✓Use of all different audio – visual media for disseminating knowledge

3.4.2 Prevention methods

Supply-oriented methods

- ✓Development of new supplies.
- ✓More efficient use of existing water recourses.
- ✓Use of non-conventional water resources.

Demand-oriented methods

- ✓Reducing water losses.
- ✓Modification of water demand at farm level .
- ✓Using low water consumption systems in industry and urban development .
- ✓Development of cropping pattern for less water consumption
- ✓Development of non-structural approaches for reduction of water demand .
- ✓Developing appropriate regulations and guidelines

3.4.3 Instruments of damage reduction

Agricultural Impacts

- ✓Optimum choice of land use
- ✓ Reasonable selection of crop varieties
- ✓ Soil physical properties and fertility improvement
- ✓ Crop yield insurance and damage compensation

Environmental impacts

- ✓Environmental impact assessment and introducing remedial actions
- ✓ Groundwater quality and quantity monitoring and action plan
- ✓ Wild life preservation program under drought conditions

Economical and social impacts

- ✓ Drought impact assessment on different societies and groups
- ✓ Elaboration of government and local authority capacities for drought mitigation including, investment, available funds and subsidies
- ✓ Diversification of trade activities and investment out side of the affected region
- ✓ Improvement of insurance systems and relief funds

3.4.4 Toleration and risk assessment

- Risk assessment to determine the branches of the economy and society damaged by drought
- Priority lists are set up for the toleration of damages and deficiencies
- Toleration of drought damages needs a nationwide good information, written and electronic media can greatly help this activity

3.4.5 Organization and coordination

- Establishing National Drought Commission consisting of government, regional authority and related NGOs .
- Involving different specialists in formulation of the national drought strategies.
- Task allocation in an action program for all parties involved should be defined.
- Their duties are categorized in three subcommittees:
  - Monitoring
  - Impact and vulnerability assessment
  - Mitigation and responses

3.4.6 International cooperation

- The influences of drought from neighboring territories should be taken into consideration .
- Cooperation with international agencies and work bodies such as us, ICID , IADWS, ERWTD .

3.4.7 Research , development and education

- Researches should be encouraged on drought ecology, drought technology, drought, management , drought economy and drought sociology
- Elaboration of a national drought strategy
- Educational and training programs concentrating on greater level of general understanding , public awareness of drought and water conservation and the methods of mitigating impacts.

4. Conclusion

There are 4 challenges before us for improving drought management (Dr.Sivakumar 2002)

First drought must be accepted as a natural hazard within the natural hazard community of scientists and policy makers. Because of its slow-onset characteristics and lack of structural impacts, it is often disregarded.

Second challenge is to build awareness of drought as a normal part of climate. It is often considered to be a rare and random event-thus the lack of emphasis on preparedness and mitigation. Improved understanding of the different types of drought and the need for multiple definitions and climatic/water supply indicators that are appropriate to various sectors, applications, and regions is a critical part of this awareness-building process.

Third challenge is to erase misunderstandings about drought and society's capacity to mitigate its effects. As with other natural hazards, drought has both a physical and social component. It is the social factors, in combination with our exposure, that determines risk to society. Some of the social factors that determine our vulnerability are level of development, population growth and its changing distribution, demographic characteristics, demands on water and other natural resources, government policies (sustainable versus no sustainable resource management) , technological changes, social behavior, and trends is environmental awareness and concerns.

Fourth challenge is to convince policy and other decision makers that investments in mitigation are more cost effective than post-impact assistance or relief program. Movement from crisis to risk management will certainly require a paradigm shift. The victims of drought have become accustomed to government assistance programs. In many instances, these misguided and misdirected government programs and policies have promoted the non-sustainable use of natural resources. Drought response in the form of emergency assistance programs only reinforces poor or non-sustainable actions and decreases self-reliance.

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