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Proactive Planning against Droughts

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Abstract

The paper presents a methodological framework based on the proactive planning approach for combating droughts and the associated water shortages. Three interrelated procedures tailored for each affected system are proposed: (a) the drought severity assessment; (b) the system vulnerability appraisal; and (c) the evaluation of drought risk. This scheme is assisted by the DPSIR methodology for the detailed estimation of drought risk of each affected system. The proposed methodological framework is put into practice through the preparedness and contingency plans against droughts. Further in this paper several technocratic and institutional aspects of these plans are discussed and brief guidelines for devising them are presented. Finally, the involvement of stakeholders and the public is examined in a decentralised decision system for the effective implementation of these plans in real world drought episodes.

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Keywords: drought assessment; proactive planning; drought risk; DPSIR; preparedness plan; contingency plan; public participation

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1. Introduction

Droughts are complex hazardous phenomena affecting most parts of the world. Recent studies revealed that more frequent and more intense droughts are anticipated in Europe and other parts of the world during the coming few decades [1].

It is known that droughts, unlike other natural hazards (such as floods or earthquakes) do not occur abruptly. They affect large areas for a considerable period of time. In some cases, persisting droughts last for several years. It is therefore possible to devise and implement in advance drought management plans at both preparedness and contingency modes [2].

The aim of this paper is to present and promote a methodological framework for combating droughts and the resulting water shortages in a proactive way.

The proposed methodology is based on the systemic risk approach which combines the drought severity assessment and the evaluation of drought risk in relation to the vulnerability to drought of the elements of each affected system.

The paper is structured in three parts: (a) clarification of concepts related to drought assessment; (b) presentation of the vulnerability - risk evaluation approach; and (c) presentation of the key elements for devising the preparedness and contingency plans to combat droughts and water shortages. The proposed methodology is assisted by the DPSIR method (Driver-Pressure-State-Impact-Response) mainly for the estimation of impacts of droughts (system risk) of each affected system.

Finally, some related social, institutional and legislative aspects, and the involvement of stakeholders and the public, are discussed for the effective implementation of these plans in a decentralised decision making system.

2. Basic notions

Some key concepts, used for the cases in which water is not sufficient, will be now defined and briefly discussed. It must be accepted that the severity of deficient water availability lies on its impacts. Therefore, from numerous definitions of the terms used, the ‘operational’ rather than the ‘conceptual’ drought definitions are adopted in this study.

The general term describing the stress conditions due to lack or deficiency of water is defined as water scarcity. Water scarcity may be caused by either natural or human induced causes, or may result from the interaction of both. Table 1 presents the various types of water scarcity, their occurrence regime and their main causes.

Table 1. Types and causes of water scarcity.

Regime	Causes	
	Natural	Human Induced and Natural
Permanent	Aridity	Desertification
Temporary	Drought	Water Shortage

As known, Aridity is a natural imbalance in the water availability, characterising the climatic conditions of a region. In contrast, Drought is a natural but temporary imbalance of water availability caused mainly by low precipitation, which in turn results in lower water resources availability.

Desertification and Water Shortage are mainly caused by human induced causes (or both human induced and natural) and they represent permanent and temporary imbalance in water availability, respectively. Desertification is widely known as the process of land degradation and deterioration of its productivity, including the damage caused to the ecosystems, whereas water shortage is the deficit of water supply to meet the demands, and is mainly caused by inappropriate or misuse of water resources, or man-made changes. However, it is very common that water shortages are caused or initiated by intense drought episodes.

It is important to note that water scarcity is not only a quantitative concept but it affects and interacts with quality matters to a great extent. It has been observed that in most of the cases limited water availability means deterioration of water quality [3].

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