Chapter 6
Drought Characterisation in the Mediterranean

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Abstract  Drought identification and characterisation is a complicated task, because drought is a complex natural phenomenon difficult to detect. Several methodologies have been proposed for drought characterisation, based either on the consequences or on specially devised indices. This chapter focuses on the critical presentation of some of the most popular drought indices. Duration and spatial extent of drought are also dimensions that are analysed.

Introduction

Drought is a complex natural phenomenon, which, from a hydrological perspective, is characterised by a significant decrease of water availability during a significant period of time and over a large area.

Identification, quantification and monitoring of drought phenomena are difficult tasks, since these phenomena are very complex and cannot be detected directly at the time they occur.

Several methodologies have been proposed for drought assessment. The major categories of these methodologies are the following:

(a) Methodologies based on indications of consequences
(b) Methodologies based on indices, which are special combinations of meteorological, hydrological or other indicators.

The first category is more comprehensive for the analysis of historical droughts; however, it fails to identify and monitor drought episodes in real time. Therefore,
although this category of methodologies is generally useful, it cannot practically assist the decision makers to face developing drought events.

The second category of methodologies for drought assessment involves several drought indices. It is customary to characterise drought as meteorological, hydrological, agricultural, socio-economic etc. Although this type of categorisation has been widely accepted by the scientific community, the authors support the idea that drought is a unique natural phenomenon, the impact of which affects various sectors and systems. Therefore, what is different is not the type of drought but the sectors that are affected and used for its quantification.

Drought indices provide representations of historical droughts and therefore place current conditions in historical perspective. They are valuable for planning purposes as well as for providing decision makers with a representative value of negative deviation from normal conditions of water availability.

A key issue, when drought indices are used, is the establishment of the thresholds representing the boundaries of the severity classes. Unfortunately, these thresholds cannot be the same for all the cases studied, since they are dependent on the location and the system, which is analysed. Therefore, if a drought index is used for decisions during a drought episode, the thresholds should somehow be associated with the affected area and the affected system. To overcome this drawback, the drought index should be accompanied by a vulnerability and risk analysis based on the assessment of historical drought events and the recorded consequences.

In any case, drought indices are useful tools for planning and management especially in the arid and semi-arid zones. They can also be used as the basis for monitoring and early warning systems, provided they will be used with care.

A comprehensive characterisation of a drought event affecting a certain system, from a water resources management point of view, is comprised of the following determinants:

1. Temporal dimension including the onset and termination of drought (timing and duration of drought)
2. Severity dimension, measured by drought indices
3. Spatial dimension estimated by the territorial area affected by the drought event.

This chapter addresses all these dimensions. However, the emphasis is given on the severity issue and the drought indices, which are used for its estimation.

No special reference is made on the various satellite-derived indices, since they come from a very different background. They are based on the monitoring of vegetation changes and interpretation of the impacts of climatic events on the biosphere. Comprehensive reviews on satellite-derived drought indices may be found in other specialised publications (e.g. Justice et al., 1989, Franklin and Hiernaux, 1991, Vogt et al., 2000, Kühbauch and Rademacher, 2000, Tsiros et al., 2004).