

UNDERSTANDING DROUGHT. FROM SCIENCE TO PUBLIC OPINION

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ABSTRACT

Drought was debated by many valuable researchers (as Wilhite, Palfay etc.) but it was never defined in manner acceptable for all situations and by all scientists. We know about drought that it is a creeping protracted phenomenon. It is not a distinctive event and in most of the cases without recognizable beginning and end. When we discuss about drought we should have in mind 2 key terms: “demand” and “supply”. Using these words, we can create the simplest definition of drought: Drought is a situation when water supply is insufficient to meet the demand. But this is a universal agreed definition? Why is it so difficult to define it? What do common people think about drought? Which is their image on drought?

First of all, drought is very difficult to be defined because is a very complex phenomenon with many impacts with different intensities. According to some authors drought presents regional aspects being impossible in this way to offer a general definition. However, there are some fairly general accepts according to which droughts originate from a deficiency of precipitation and result in a water shortage for some activity or for a specific target group.

At a very general level of discussion, drought is a temporary recurrent phenomenon characterized by a reduction of rainfall in a given area having in this way a regional aspect.

The fact that drought is a recurrent phenomenon means that drought is a component of the climate cycle and thus we are talking about a normal phenomenon and not an extraordinary event.

Droughts are regional in nature and unlike other water hazards their impacts don't have precise borders. Regional characteristics of a drought, like covered area, total water deficit or return time, are very important in determining the phenomenon's severity and thereafter for setting a regional drought management plan. There are some major challenges when we discuss about regional drought research, challenges which stressed the importance to develop a comprehensive understanding of the climatology of drought and to determine the features of these events at regional level.

In this paper will be presented the results of a study focused on what common people, not specialized in drought, are thinking, what they have in mind, when they heard the word “drought”. The paper will try to answer at some of these questions or, at least, to focus some possible answers on a specific direction.

Keywords: drought, water, demand, supply, public opinion, water scarcity, phenomenon

1. Introduction

For a pertinent analysis of water scarcity phenomenon we must start with a clear classification of those, studying the causes which are leading to these phenomenon but also the temporal scale to which they are reported.

L. Pereira *et al* (2002) define water scarcity as being that situation when the available water resources from a country (or region) decrease below 1000m³/person/year. In this paper we will consider a quantity of 2000m³/person/year the limit from which we can discuss about water scarcity. For values below 1000m³/person/year we face a hydric stress while the values below

500m³/person/year are indicating a water crisis. Each region has the right to establish its own limits in defining different events.

Unfortunately, we can still identify a relative high number of researchers which make serious mistakes by mixing different events. A very often error is confusing drought with aridity. While drought is a phenomenon without a precise definition but analyzed from conceptual and operation point of view, aridity is a climate characteristic being defined as a function which includes at least 4 main variables: temperatures, precipitations, vegetation cover and evaporation. Drought, aridity, water scarcity, water shortage are all referring to the lack of water and succeed to generate very interesting debates among the experts.

2. Understanding drought – the scientific approach

Drought was defined in many ways and by many researchers. Due to drought's complexity, the existing currently used definitions were formulated according to the domain they addressed. There is a relative wide acknowledgment according to which droughts have the origin in precipitations deficit and which results from a water deficit for a specific activity or for a target group. According to Dracup (1980), drought definition should include references to at least 4 elements: The nature of considered water deficit; considered period; temporal truncation level; regional aspects. It is this last element that makes almost impossible to find a universally accepted definition for drought. Palmer, in 1965, brings into question the definition of some key terms to drought. Thus, he defines drought as a meteorological phenomenon characterized by a prolonged and abnormal deficiency of moisture, respectively, to a more specific, as a time up to several months or even years, during which the supply of moisture at a specified climatological time fall below expectations. At a very general level of discussion, drought is a temporary recurrent phenomenon characterized by a reduction of rainfall in a given area.

The fact that drought is a recurrent phenomenon means that drought is a component of the climate cycle and thus we are talking about a normal phenomenon and not an extraordinary event. Rossi (2000) also defines drought as a recurring event. He defines drought as a recurrent natural phenomenon associated with a lack of available water resources in a large geographical area and extended over a significant period of time. The severity and intensity of drought can "push" this phenomenon, because of its impact, out of the "normal" events area. How can we define the "normal"? This term is very common in climatology being made permanent references to deviations from normal. It is very important in analyzing a phenomenon (drought or any other) to work with data sets of relevant size in order to have accuracy. It is indicated instead of using the term "normal" to use "averages", this combination being much closer to the truth.

According to Takeuchi (1974), drought is a situation which can be met each time when forecasted water quantities planned to be used can't be provided due to different reasons. In 1982, McMahon and Arenas considered drought as being a period of dry weather long enough to cause hydrological imbalances and carries connotations of humidity deficit regarding water use by people. Warwick R.A. (1975) defined drought as being a condition of humidity deficit enough to have adverse effects on vegetation, animals and humans on a considerable area.

A definition in very general terms of drought phenomenon is given by Beran and Rodier (1985): The main characteristic of a drought is a decrease in water resources availability in a given period and in a given area. World Meteorological Organization (1986) defined drought as being a prolonged and extended deficiency of precipitations with the mention that drought is a regional phenomenon and its characteristics differ from one climate regime to another. In 1996, Schneider defined drought as an extended period – a season, a year or more years – with precipitation reduced in relation to multi-annual statistics for the respective area. Chang and Wallace (1987) have emphasized the distinction between a heat wave and drought, noting that the typical temporal scale associated with a heat wave is on the order of weeks while droughts can persist for several years. The combination of a heat wave and drought has socio-economic outcomes.

In 2007, IPCC defined drought as being a prolonged absence of precipitations or a large deficit of those, a deficit of precipitations which leads to water scarcity for an activity or for a group or a

period of time abnormally dry through the lack of precipitations and long enough to cause a serious hydrological imbalance. According to UNCCD, drought is a natural phenomenon which appears when precipitations presents values below normal leading to hydrological imbalances which affect in a negative way the lands production systems. Because the average values of precipitations presents spatial variations, drought definition must be reported to the studied area characteristics. Heim (2002) defines drought as being a recurrent phenomenon which affects natural ecosystems as well as other economic and social sectors. L. Pereira *et al.*, in 2002, defined drought as being a temporary natural imbalance of available water resources due to a persistent period with precipitations volumes below normal, with uncertain frequency, length and severity, phenomenon which can't be or hardly be forecasted and which results in a diminishing of available water resources and of ecosystems capacity of support.

Wilhite (1987) states that there are two ways to define drought: from conceptual and from operation point of view. Conceptual definitions are limited to identifying the limits of this concept being formulated in general terms. Operational definitions go into depth of the problem because by their content are trying to reach at least the following aims: to identify the beginning of drought, the severity and the moment of drought cease in order to estimate the potential impact of drought, to analyze the frequency, to determine the probability of drought occurrence, the intensity, duration and spatial characteristics.

Drought was classified by many authors (Subrahmanyam, 1967; Wilhite, 1987; Tate and Gustard, 2000; Maliva and Missimer 2012) but several types of drought were unanimous agreed: meteorological drought, hydrological drought and agricultural drought. Beside these were also classified: socio-economic drought, atmospheric drought, climatological drought, water management drought, agro-meteorological drought, hydrogeological drought, operational drought and ecological drought. If in the case of researchers we can emphasize some direction in drought study, analyze and definition, the study of this phenomenon basing on common people opinions is a challenge.

3. Understanding drought – public opinion

In 2013 I had conducted a study on public opinion on drought. The study was based on the answers received for 1 question: which are the 5 images/ 5 words which came first in your mine when you hear the word “drought”? 490 persons from Europe answered at this question by mail, phone, private discussions etc. Only few variables were considered in analyzing the data but the results succeed to draw an image on public opinion regarding drought. The results of this study were linked with my previous observation gathered in the last years on the reaction of common people without specialist knowledge in the field. I noticed that the effect of drought means for these hot long periods (up to several months), without effective rainfall for agriculture and on hydrology. Therefore, in the popular conception, drought is not a phenomenon clearly defined but its effects and/or results on day by day life. The answers were grouped and classified in 7 categories: social, economic, physiological, psychological, physical, climatic and others. In the table 1 are presented some of the answers received from participants at this study:

Table 1: Public opinions/ images on drought

1 st word/ image	suffering	desert	lack of water	cracked earth and dry	dry	Desert
2 nd word/ image	desert	destroyed agriculture	dryland	dead animals	lack of rain	Agriculture
3 rd word/ image	thirst	water	dirt	dirt	famine	Camel
4 th word/ image	sultry-hot	thirst	desert	extreme heat unbearable	plant death	Thirst
5 th word/ image	mosquito	dead plants	desolation	malnourished and sick men	dust	Disaster

Analyzing the whole answers, it was very interesting to observe that more than 50% from the first options were answers from the physical field (deserts, Africa, drylands etc.). Regarding the second set of answers, the majority is divided between economic (dead animals, agriculture, destroyed agriculture) and climatic (lack of rain, water scarcity). Even the economic field has a significant position in the second set of images, per total has a less important position having a 10.2% weight at equality with social field (emigration, food prices, poverty – elements which are drought effects on medium and long term). Drought was perceived as a danger (psychological category) only by 12.24% participants occupying in this way the 4th position. The top is led by physical category followed by physiological category (thirst, heat extreme heat) and climatic category (water, lack of water, dryness, water scarcity). In the next figure are presented the weights of all 7 categories.

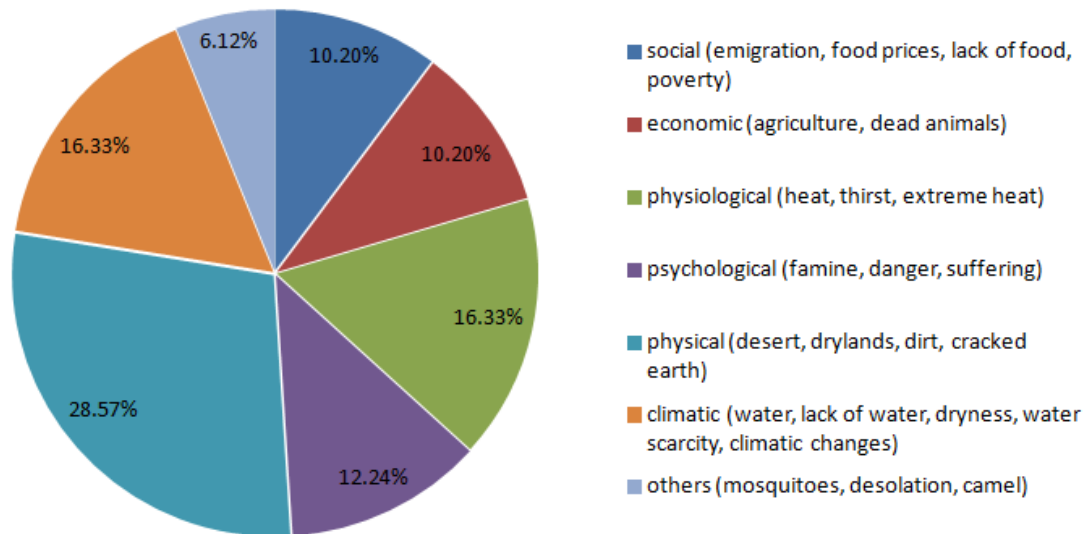


Figure 1: Public opinions on drought classified in 7 categories

4. Conclusions

Even there is a „flood” of information regarding different aspects of regional drought management, still persists a scarce of coherent and integrated package of reliable scientific and practical information for interested stakeholders, mostly from socioeconomic field, drought scientific definition and management still being a „hot” problem in many regions.

From public perspective, drought is a phenomenon with effects which creates a water scarce landscape, having physiological consequences and an economic impact. This perception of drought is highly influenced mainly by mass-media where the lack of rain for a short/medium period of time gains catastrophic dimensions.

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