Specific mitigation actions to reduce short and long-term drought risks

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Abstract. The dry areas of the Mediterranean face severe and growing challenges due to the rapidly growing demand for water resources. New resources of water are increasingly expensive to exploit, thus limiting the potential for expansion of new water supplies. In the region, the complexity in the water resources situation is not only due to water scarcity, but also to the severe and long-lasting drought conditions that more and more frequently occur in most of arid countries in the region. Climate change and its uncertainty, that have so far filled our thoughts, are nowadays well felt and clearly appearing in the Mediterranean with the sequences of higher temperature, extreme rainfall or drought. The causes of drought in the Mediterranean region are very complex; however, whatever the reasons may be for drought, its environmental and socio-economic impacts stem not only from the duration, severity, and spatial extent of the precipitation deficit, but also, to a large extent, from the environmental, social and economic vulnerability of affected regions. In the Mediterranean, water scarcity due to drought needs appropriate approaches that are to focus on identifying and ranking the priorities of relevant drought impacts. Carrying this process is fundamental to decide on the specific mitigation actions that can be taken to reduce short and long-term drought risks. Such actions will differ from one place to the other and have to be tailored to cope with the prevailing conditions by straightforward and practical tools for drought management and mitigation. This is the essence of this paper.

Keywords. Water scarcity – Drought – Impacts mitigation – Actions.

Actions spécifiques de mitigation pour réduire les risques de sécheresse à court et long terme

Résumé. *Les aires sèches de la Méditerranée se trouvent face à des défis graves et croissants à cause de la croissance rapide de la demande en eau. La mobilisation de nouvelles ressources hydriques devient de plus en plus coûteuse, ce qui limite les potentialités d'expansion des approvisionnements en eau. La complexité de l'état des ressources hydriques dans la région n'est pas liée seulement à la pénurie d'eau, mais aussi à des conditions de sécheresse graves et persistantes qui surviennent de plus en plus fréquemment dans la plupart des pays arides de la région. Le changement climatique et son caractère aléatoire, qui nous ont donné tant de soucis jusqu'à présent, se manifestent désormais d'une manière évidente en Méditerranée par une succession de hautes températures et d'événements de pluie ou de sécheresse extrêmes. Les causes de la sécheresse en Méditerranée sont très complexes ; toutefois, quelles que soient les raisons, ses impacts environnementaux et socio-économiques ne sont pas liés seulement à la durée, à la gravité, et à l'étendue du déficit de précipitations dans l'espace, mais aussi, en grande partie, à la vulnérabilité environnementale, sociale et économique des régions atteintes. En Méditerranée, la rareté de l'eau causée par la sécheresse nécessite d'approches appropriées qui doivent viser à identifier et classer les priorités des impacts relatifs à la sécheresse. Un tel processus devient fondamental pour choisir des actions de mitigation spécifiques qui puissent réduire les risques de sécheresse à court et long terme. Ces actions seront différentes d'un endroit à l'autre et doivent être adaptées aux conditions dominantes à travers des outils directs et pratiques pour la gestion et la mitigation de la sécheresse. C'est le thème central de ce travail.*

Mots-clés. *Rareté de l'eau – Sécheresse – Mitigation des impacts – Actions.*

I – Introduction

Drought is the most complex of all natural hazards as it affects more people than any other

hazard. Drought should not be viewed only as a physical phenomenon or natural event as it has subsequent negative impact on the economic, environment and the society. Drought is not univocally defined, and has many several definitions (Dracup *et al.*, 1980; Wilhite and Glantz, 1987; Tate and Gustard, 2000); in general terms, all clearly state that drought is accounted for as a deficit in precipitation with respect to normal values and to periods of variable length. The less predictable characteristics of droughts, with respect to their initiation and termination, as well as to their severity, make drought both a hazard and a disaster. A hazard because it is a natural accident of unpredictable occurrence, and a disaster because it corresponds to the failure of the precipitation regime, causing the disruption of the water supply. Globally, examining the effects of the recent drought in many areas demonstrates its wide reaching impacts on society and the environment. This is quite apparent through the widespread crop failures and livestock losses; increased disease, stress and other social problems; reduced hydropower generation and increased soil erosion and fire occurrence, forced mass migration to urban areas and other countries, and reduced security and the local and national levels (FAO/NDMC, 2008). Therefore, major emphasis should be placed on developing appropriate national drought plans that outline proactive strategies that can be implemented before, during and after drought in order to reduce drought impacts, and to decide on the specific mitigation actions that can be taken to reduce short and long terms drought risks.

II – Drought planning

Drought planning provides an opportunity for decision markers to identify sectors that are vulnerable to drought and investigate management options before a crisis occur and thereby decide on and implement the most appropriate and cost effective strategies available, in a strategic and systematic manner. Recent drought and increasing demands on available water along with unfavourable climate change resources in many countries around the world have brought greater awareness of the need to plane for future drought events. Indeed, nowadays, internationally there is an increasing number of resources have been developed around the world to assist countries in developing drought plants (Wilhite *et al.*, 2005; Iglesias *et al.*, 2007; UN/ISDR, 2007).

On the regional level having an appropriate plane to mitigate drought is essential, but, not sufficient to cope with the sequences opposed by drought from one country to other, hence vulnerability to drought is resulted from a variable series of complex, multiple and inter related causes. In the Mediterranean the complex reality originating from these diverse concepts, therefore, suggest that in addressing solutions to mitigate drought, a comprehensive and systemic approach is needed to understand the causes, effects and management mechanisms of drought crisis (Fig. 1). The pattern of country-level drought planning is quite complex and have to be based on specific climatologically, political, economical, environmental and demographic factors.

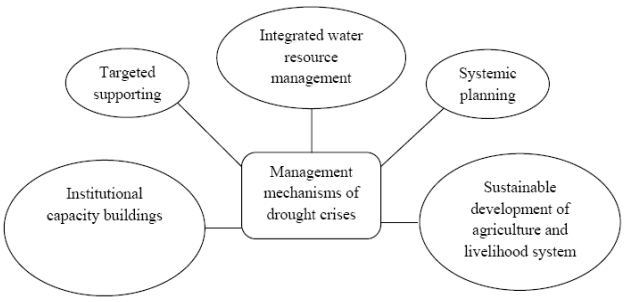

Fig. 1. Management mechanisms of drought crisis (from Hosseini *et al.*, 2009).

III – Drought country planning: how to develop?

National country plans should be viewed as a practical step by step process for identifying actions that can be taken before a drought occurs. Four fundamental steps have to be carefully followed (Hamdy, 2004). The first, the crucial one, begins with making sure that the right people are brought together and supplied with adequate data to make informed and equitable decisions during the process. The second is identifying high priority drought related impacts that are relevant to the user's location activity, whereas the third is to understand the underlying environmental, economic and social causes of impacts, then, the fourth is to utilize all of the previous information to identify feasible, cost effective and equitable actions that can be taken to address the identified causes. Beside others, several steps should be included such as the inventory data quantity, closing the institutional gap and human resources development. Following the step by step process, there are two main requirements for the success of such planning: adequate monitoring for water resources for drought mitigation and the institutional adjustment and legal framework for elaborating and implementing such plans.

IV – Water resources management planning and drought mitigation

1. The traditional approach

Such approach has been characterized as being of the reactive type, or emergency response or crisis management or unplanned response. Countries have often reached to drought by providing assistance, essentially on an *ad hoc* basis. This approach is not only extremely costly but also not effective in reaching equitably the needy areas and people. Activities in this approach are often fragmented between several institutions, with no limited coordination, with time this way of doing has become a de facto policy on crisis management with all its limitation and drawbacks (Bazza, 2001).

2. The proactive approach

A proactive approach consists of measures that are planned in advance, as a strategy to prepare for drought and to mitigate its effects. The planning process takes place before the onset of drought whereas its implementation is partitioned over a long period of time. A proactive planning approach to drought consists of two categories of measures, both planned in advance (Cancelliere *et al.*, 1998; Rossi, 2000):

(i) *Long-term actions*, oriented to reduce the vulnerability of water supply systems to drought.

(ii) *Short-term actions*, which try to face an incoming particular drought event within the existing framework of infrastructures and management policies. The overriding objectives of the long-term actions is adjustment to drought conditions, as a proactive and preparatory measure, such as the increase of water storage capacity, the adoption of water saving technology, the recharge of ground water, etc. These are supplemented by short term measures including relief programmers, crop insurance schemes, changes in land use, conjunctive water use of both surface and underground water, as well as use of non conventional water resources.

V – National drought mitigation policy

For drought prone nations, policies should be developed by placing greater emphasis on risk management rather than the crisis one. Simply it could be stated that a national drought policy should establish a clear set of principals or operating guidelines to govern the management of

drought and its impacts. Equally, the policy should be consistent and equitable for population groups, economic sectors and with the goals of sustainable development and reducing risk by developing better awareness and understanding of the drought hazard. The learned lesson clearly demonstrates that drought mitigation programmes cannot be effective, unless rural and nomadic communities have a voice in planning and implementation of schemes. The involvement of stakeholders in drought mitigation plans has transformed vulnerability into strength, hazard into productive resources and had improved capacities, as a result vulnerability to drought reduced (Unganai, 2004).

VI – Concluding remarks

(i) In the arid and semi arid countries of the Mediterranean to mitigate drought effectively, it is needed to develop and implement an integrated national drought policy. The policy should promote self-reliance as well as the concept of risk and crisis management, and should also incorporate incentives to develop a more proactive anticipatory approach to drought management.

(ii) National drought management must be drawn based on low (operational) level, situational conditions and participatory approaches and flexibility, in addition, encompass ecological, economical, social and cultural knowledge.

(iii) The drought management strategy should include: climate forecasting; design and implementation; common monitoring system; developing of new supplies and their allocation among different users at crisis time and above all adopting more efficient demand management system through introducing price incentive to encourage water saving, using more efficient irrigation systems, adopter-use and recycling treated waste water.

(iv) At last, experiences gained and lessons learned from previous drought response attempts in several countries, need to be documented, evaluated and shared with all levels involved in the process. Those are very helpful to provide a more coordinated drought response effort, beside a significant record of lessons learned in mitigating the effects of drought.

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