Integrated drought management: moving from managing disasters to managing risk in the Mediterranean region

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Introduction

In recent years, concern has grown worldwide that droughts are and will continue to increase in frequency, severity, and duration given changing climatic conditions and documented increases in extreme climate events. This concern is of particular importance to the Mediterranean region, since climate model projections show pronounced warming and decreased precipitation in the coming decades in the region. This narrowing of the gap between water supply and demand will result in a dramatic increase in the drought impacts. Although agriculture is typically the first and most drought-affected sector, many other sectors, including energy production, tourism and recreation, transportation, urban water supply, public health, and the environment, have experienced significant impacts and these will increase at an accelerating rate as a result of further warming and growing competition for finite water resources.

Historically, drought response by governments and other organizations throughout the world have been reactive—poorly coordinated, ineffective, and untimely. This ‘crisis management’ approach is associated with the provision of post-drought relief or assistance to those most affected in response to a drought event. I have typically illustrated this post-impact response by the ‘hydro-illogical cycle’ (Fig. 1). In the early stages of drought development, the initial awareness of drought conditions is followed by concern and panic as drought conditions intensify. When normal rainfall eventually returns, the government’s plan to develop a proactive drought management strategy to be better prepared for the next drought often is discarded, i.e., a return to the apathy stage of the cycle. Associated with the crisis management approach is the lack of recognition that drought is a normal part of the climate. To prepare for

drought’s inevitable recurrence, drought-prone countries should develop a national drought policy and associated preparedness and mitigation plans aimed at risk reduction. This step will require a greater investment in drought planning and preparedness, but the cost of action is far less than the cost of inaction.

Research has demonstrated that the crisis management approach to drought management increases vulnerability to future drought episodes by reducing self-reliance and increasing dependence on governments and donor organizations (Wilhite and Pulwarty 2018a). Crisis management also reinforces the continuation of past water, agricultural, and other management practices that have helped to create these vulnerabilities. As Albert Einstein once said, “We can not solve our problems with the same level of thinking that created them”. Therefore, it is imperative for all drought-prone nations, including those in the Mediterranean region, to adopt a new paradigm for drought management that is based on risk reduction.

Until recently, despite the ineffectiveness of past drought response efforts, no concerted effort has been made at the global level to initiate a dialogue on the formulation and adoption of national drought management policies that provide a framework for proactive, risk-based drought management. Without a coordinated national drought policy that includes comprehensive monitoring, early warning and information delivery systems, vulnerability, and impact assessments, the identification and adoption of appropriate local-level mitigation and response measures aimed at risk reduction, nations will continue to respond to drought, as they have in the past.

A primary stimulus for this changing paradigm for drought management is a direct outcome of the High-level Meeting on National Drought Policy (HMNDP) held in Geneva, Switzerland, in March 2013 (HMNDP 2013). The principal sponsors of this meeting were the World Meteorological Organization (WMO), the Secretariat of the United Nations Convention to Combat Desertification (UNCCD),

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Fig. 1 Hydro-illogical cycle, the traditional crisis management approach. (Source: Donald Wilhite, University of Nebraska-Lincoln)

and the Food and Agriculture Organization of the United Nations (FAO), in collaboration with a number of other partners. The goal of HMNDP was to provide practical insight into useful, science-based actions to address key drought issues and to identify various strategies that would lead nations to cope more effectively with drought and, therefore, reduce societal impacts. The organizers and key participants of this meeting encouraged national governments to adopt policies that engender cooperation and coordination at all levels of their administration to increase their capacity to cope with extended periods of water shortage resulting from drought. The ultimate goal of this effort is to create more drought resilient societies and ensure food security and the sustainability of natural resource systems at the domestic level. Wilhite and Pulwarty (2018b) highlighted the principles associated with this paradigm shift and provide many case studies of its application in countries and regions.

One of the many outcomes of the HMNDP was the launching of the Integrated Drought Management Programme (IDMP) in 2013 by the World Meteorological Organization and the Global Water Partnership (GWP) (<http://www.droughtmanagement.info/>). The IDMP's objective is to support stakeholders at all levels by providing policy and management guidance and by sharing scientific information, knowledge and best practices for integrated drought management (IDM). IDM mitigates drought risk and builds drought resilience by addressing multiple components of drought management, including disaster risk reduction, climate adaptation strategies, and national water policies.

The IDMP emphasizes the following tenets:

1. Shift focus [of drought management] from reactive to proactive.
2. Foster horizontal integration by collaborating with partners from diverse sectors.
3. Facilitate vertical integration on global, regional, national and local levels.
4. Improve knowledge base with better access to information.
5. Promote projects that demonstrate innovation.
6. Build countries' capacity to implement integrated approaches.

Following on the recommendations of the HMNDP, the IDMP adopted the three-pillar approach to drought management based on the ten-step planning process (WMO and IDMP 2014). These pillars are illustrated in Fig. 2.

As illustrated in Fig. 2, to create a successful drought policy aimed at risk reduction, it is vital for that policy to emphasize a comprehensive monitoring and early warning system, vulnerability, and impact assessment and mitigation and response, i.e., the three pillars.

Some of the drivers of and barriers to drought risk management are:

Drivers to drought risk management:

- Increased financial burden of drought relief costs and their ineffectiveness.
- Impact and vulnerability trends in economic, social and environmental sectors.
- Increased water-related conflicts and scarcity.
- Increased awareness of efficiency of drought risk management, i.e., risk reduction.
- Evidence on co-benefits of mitigation actions and preparedness.
- Climate change and increased incidence of extreme events.

Barriers to drought risk management:

- Path dependency, size of up-front costs for multi-year droughts.
- Information failure on the occurrences, impacts, costs/benefits of drought risk management.
- Market failure (credit constraints).
- Economic rationality of ex-ante action (uncertainty and irreversibility).
- Negative externalities of preparedness plans.
- Inertia of government policies and programs hinder institutional and programmatic changes.
- Government silos, i.e., leads to minimal flow of information, coordination and cooperation between ministries.

Fig. 2 Three-pillar approach to drought management. (Source: Integrated Drought Management Programme, World Meteorological Organization and Global Water Partnership)

- Lack of political will.

The three pillars of integrated drought management

Drought, like all natural hazards, has both a natural and social dimension. In most cases, the social dimension is the factor that turns a hazard into a disaster. The risk associated with drought for any region is a product of both the region's exposure to the event (i.e., probability of occurrence at various severity levels) and the vulnerability of society to the event. The natural event (i.e., meteorological drought) is a result of the occurrence of persistent large-scale disruptions in the global circulation pattern of the atmosphere. Exposure to drought varies spatially and there is little, if anything, that can be done to alter drought occurrence. Vulnerability, on the other hand, is determined largely by social factors. Natural disasters are a consequence of the interactions between the weather and climate extremes and the vulnerability of human and natural systems to such extremes.

Vulnerability is 'determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards' (UNISDR 2017). Vulnerability is dynamic because of societal changes that occur over time that may increase or decrease vulnerability. For example, vulnerability drivers include factors such as population changes, population shifts (regional and rural to urban), demographic characteristics, technology, government policies, environmental awareness and degradation, water use trends, and social behavior. Vulnerability assessments provide a framework for identifying the social, economic, and environmental causes of drought impacts, i.e., who and what is at risk and why. It bridges the gap between

impact assessment and policy formulation by directing policy attention to the underlying or root causes of vulnerability rather than to its result, the negative impacts, which follow triggering events such as drought. Drought impacts cut across many sectors and across normal divisions of government authority, reinforcing the need for cooperation and coordination between government ministries and NGOs.

National Drought Policy: moving towards integrated drought management

The challenges that nations face in the development of a risk-based national drought management policy are complex. The process requires political will at the highest level possible and a coordinated approach within and between levels of government and with the diversity of stakeholders that must be engaged in the policy development process. A national drought policy could be a stand-alone policy. Alternatively, it could contribute to or be a part of a national policy for disaster risk reduction or climate change adaptation with holistic and multi-hazard approaches centered on the principles of risk management. Regardless of the path chosen, the policy would provide a framework for shifting the paradigm from one traditionally focused on reactive crisis management to one that focuses on a proactive risk-based approach. This approach will increase the coping capacity of the country, reduce recovery times, and increase resilience to future drought episodes, i.e., the goal of IDM.

To facilitate the development of national drought policies, the IDMP published *National Drought Management Policy Guidelines: A Template for Action* (WMO and GWP) in 2014 that is based on the ten-step planning process developed by Wilhite (Wilhite 1991; Wilhite et al. 2000). These guidelines provide a template for the development of a

national drought policy based on the principles of drought risk management and following the three-pillar approach. The ten-step process is generic, i.e., nations are encouraged to adapt this process to their national needs and institutional capacity, as exemplified in central and eastern Europe (GWP CEE 2015) as well as Brazil, Mexico, and Morocco (WMO and GWP 2014; Wilhite and Pulwarty 2018b).

The formulation of a national drought policy, while providing the framework for a paradigm shift, is only the first step in vulnerability reduction. The development of a national drought policy must include development and implementation of preparedness and mitigation plans at the sub-national level, an outcome of the three-pillar approach. These plans will be the instruments for implementing a national drought policy.

If proactive risk management is socially optimal, compared to reactive crisis management, why has the shift from crisis management to risk management been so slow? This question is raised repeatedly in drought management and policy workshops and in discussions with policy makers. In consultation with practitioners and experts from a wide range of organizations, some pointers have emerged through focused discussions between the IDMP, the World Bank, and other experts (WMO and GWP 2017; Venton et al. 2019). They include that the economic argument and assessments can support an integrated approach to drought management, but numbers alone will not lead to action by creating the political will to change the paradigm. The context matters, in which the economic argument must connect to the political economy, including the governance context and what drives political, will to create change. In addition, focusing on actions that have socio-economic co-benefits beyond drought management is important in support of the argument for proactive and integrated drought management.

A national drought policy should establish a clear set of principles or operating guidelines to govern the management of drought and its impacts. It should be consistent, equitable for all regions, population groups and economic sectors, and consistent with the goals of sustainable development. By following the three-pillar approach, the policy is directed toward reducing risk by developing better awareness and understanding of the drought hazard and the underlying causes of societal vulnerability along with developing a greater understanding of how being proactive and adopting a wide range of mitigation and response measures can increase societal resilience. Risk management promotes many proactive actions that have been discussed previously.

Drought policy objectives

The objectives associated with a national drought policy will vary from nation to nation but, in principle, will likely reflect some common themes. These objectives would likely:

- Encourage vulnerable economic sectors and population groups to adopt self-reliant measures that promote risk management.
- Promote sustainable use of the agricultural and natural resource base.
- Facilitate early recovery from drought through actions that reinforce the philosophy of risk management.

Drought planning refers to actions taken by individual citizens, industry, government, and others before drought occurs with the purpose of reducing or mitigating impacts and conflicts arising from drought. It can take the following forms: response planning or mitigation planning. The three-pillar approach emphasizes mitigation planning that leads to risk reduction. It is important to note that planning must occur on multiple government levels from national to sub-national, and the objectives of these policies at the local, state, or regional levels must reflect the goals of national drought policies. Stakeholder engagement is critical at all levels.

The ten steps recommended for the development of a national drought policy (WMO and GWP 2014) are:

Step 1: appoint a national drought management policy commission.

Step 2: state or define the goals and objectives of a risk-based national drought management policy.

Step 3: seek stakeholder participation; define and resolve conflicts between key water use sectors, considering also transboundary implications.

Step 4: inventory data and financial resources available and identify groups at risk.

Step 5: prepare/write the key tenets of a national drought management policy and preparedness plans, which would include the following elements: monitoring, early warning and prediction; vulnerability and impact assessment; and mitigation and response.

Step 6: identify research needs and fill institutional gaps.

Step 7: integrate science and policy aspects of drought management.

Step 8: publicize the national drought management policy and preparedness plans and build public awareness and consensus.

Step 9: develop educational programs for all age and stakeholder groups.

Step 10: evaluate and revise national drought management policy and supporting preparedness plans.

In brief, Steps 1–4 of the ten-step process focuses on making sure the right people and agencies/ministries are brought together, have a clear understanding of the process, know what the drought preparedness plan must accomplish, and are given adequate data to make fair and equitable decisions when formulating and writing the actual drought mitigation plan. Step 5 describes the process of developing an

organizational structure or framework for completion of the tasks necessary for the preparedness plan, essentially emphasizing the three pillars of drought management referred to previously. The development of the plan is a process, rather than a discrete event that produces a static document. A vulnerability assessment, completed in conjunction with this step, provides a vulnerability profile for key economic sectors, population groups, regions, and communities. Steps 6 and 7 detail the need for ongoing research and coordination between scientists, ministries and policy makers. Steps 8 and 9 stress the importance of promoting and testing the plan before drought occurs. Finally, Step 10 emphasizes revising the plan to keep it current and making an evaluation of the plan's effectiveness following each drought event. Although the steps are sequential, many of these tasks are addressed simultaneously under the leadership of a drought commission or task force and its complement of committees and working groups.

Summary

Clearly, there is an urgent need to change the paradigm for drought management in all drought-prone nations from one primarily focused on managing the disaster to one focused on managing risk. Convincing policy makers and natural resource managers to adopt a more proactive approach to drought management has been, to date, a challenging task. However, the growing acceptance of the philosophy of disaster risk reduction and the momentum of recent international efforts suggests that the time is now to adopt this new paradigm.

The growing emphasis on and adoption of the concept of national drought policies and the three-pillar approach to drought is fundamental to this change in the approach to drought management. The three pillars exemplify the importance of developing a comprehensive and effective drought monitoring and early warning system (pillar 1) to provide reliable and timely information to managers and other decision makers and linking the information derived from this system to vulnerability and impact assessments (pillar 2) and the adoption of appropriate mitigation and response actions (pillar 3). It would be expedient for all drought-prone nations to explore this new paradigm for drought risk management.

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