

**Drought Management Centre for Southeastern Europe (DMCSEE)  
Within the context of the UNCCD**

*A draft project proposal for an integrated sub regional program to coordinate and facilitate the development, assessment, and application of drought risk management tools and policies in South-Eastern Europe with the goal of improving drought preparedness and reducing drought impacts and leading toward the establishment of a permanent DMCSEE*

Draft project proposal from  
the UNCCD focal points, the national designated researcher on drought and the head of the NMHS  
of 11 countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Hungary, Moldova,  
Romania, Slovenia, the Former Yugoslav Republic of Macedonia and Turkey), UNCCD secretariat  
and WMO

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## Executive summary

Drought is a normal part of climate in virtually all regions of the world. South Eastern Europe is no exception; in past decades the drought-related damages have had large impact on the economy and welfare. Therefore the need to establish a Drought Center for SE Europe to alleviate the problems caused by drought in the area became evident at the end of the past century. The idea was further elaborated by International Commission on Irrigation and Drainage (ICID) and UN Convention to Combat Desertification (UNCCD). The UNCCD national focal points and national permanent representatives with the World Meteorological Organization have agreed upon the core tasks of the Drought Management Center for South Eastern Europe (DMCSEE) and the proposed project document.

The mission of the proposed DMCSEE is to coordinate and facilitate the development, assessment, and application of drought risk management tools and policies in South-Eastern Europe with the goal of improving drought preparedness and reducing drought impacts. Therefore DMCSEE will focus its work on monitoring and assessing drought and assessing risks and vulnerability connected to drought. The agreed core tasks of the DMCSEE were grouped into project objectives. For each objective a rough estimation of needed financial resources is given at the end of the document (chapter 9). 8 project objectives (described in more detail in chapter 8) are summarized below:

**1.To assess the data available for effective drought monitoring and early warning system.** There exists little knowledge regarding the current institutional capacity of DMCSEE member countries in the areas of drought monitoring and early warning, risk assessment, mitigation, and preparedness. As a first step, the DMCSEE will conduct an assessment of institutional capacity, including Meta data available. Further tasks are to ensure data homogeneity and quality control and to design appropriate data base.

**2.To evaluate and select the most effective and reliable indices and indicators for drought assessment.** A common methodology for drought assessment will be adopted based on existing experiences and depending on the availability of data. An assessment of historical drought events and their impacts, in particular social and economic, is part of this objective.

**3.To conduct a drought risk assessment. Identification of stakeholders/users and their needs is essential first step of this objective.** Drought risk assessment will be conducted for the region using established methodology. The goal of this objective is to identify the principal economic, environmental, and social impacts associated with drought. The next step is to analyze these results, select the most important impacts to be mitigated, and identify appropriate mitigation measures. Analysis of drought vulnerability will be conducted for the region. The drought risk and drought vulnerability maps are one of the most important initial tasks of the DMCSEE. Knowing vulnerability and risk, DMCSEE will be able to advice on improved drought management and policy.

**4.To identify the specific training needs.** It is critically important as the first step in this process to determine the scientific, operational and institutional capacity that exists at the national and sub-regional level. The DMCSEE will seek to compile this information from interactions with national meteorological and hydrological services. and many other organizations within the region and will provide leadership for the identification of specialized seminars, workshops, and conferences to build institutional capacity in member countries on a risk-based approach for drought management. Scientific exchange will be an integral part of the development of the DMCSEE.

**5.To develop and implement a data and information delivery system on drought management.** A principal role for the DMCSEE is the development of data and information delivery system to end users and stakeholders. The most immediate task is the development of a web site that provides end

users with access to all DMCSEE products and those products available from member countries, as well as links to the principal drought-related web sites that exist at the regional and international levels. The web site will also contain information on mission and program activities of the DMCSEE, including training opportunities, meetings, and research activities.

Other dissemination channels will also be employed for providing information to end users in Southeastern Europe. These would include both print and electronic media such as newspapers, television, and radio.

**6.To develop a comprehensive network of experts and institutions to assist the DMCSEE.** To establish close cooperation in the field of drought management Memorandums of Understanding should be developed with a wide range of experts and institutions within Europe and internationally to promote and enhance the development of the DMCSEE in monitoring and forecasting, mitigation, and preparedness. These would include national and international technical organization in the field of meteorology and environmental monitoring and national meteorological and hydrological services.

**7.To ensure communication and user feedback.** DMCSEE will develop an accessible strategy to communicate with end users in a way that is understandable and not too technical. Special external competencies will be needed to prepare document and notes that use non-technical vocabulary, clear guidance and simple recommendation. The language issue should also be taken into account.

**8.To establish the permanent DMCSEE and ensure its sustainable functioning and operations.** Elaboration of future legal status of DMCSEE, its internal rules and procedures and aspects of international accountability, responsibility and evaluation will be performed with the assistance of specialized consultancy. Based on the results of the first year of the project, a review of the possibilities of contribution (technical, in kind, financial, expertise and human resources) of each member country will be conducted by the host country through consultation. A template of yearly working programme for the DMCSEE to be used after the end of the project will be proposed.

## 1. Introduction

Drought is a normal part of climate in virtually all regions of the world. The sub-region of South-Eastern Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, The Former Yugoslav Republic of Macedonia, Greece, Hungary, Republic of Moldova, Romania, Slovenia, and Turkey, as well as Montenegro and Serbia) is no exception. The sub-region has a long history of droughts and these events will continue to occur in the future, possibly with increasing impacts, because of increasing climate variability (i.e., resulting in an increased frequency of extreme climatic extremes such as droughts and floods), changes in climate state in association with increasing concentrations of Greenhouse Gases (GHGs), and increasing societal vulnerability to extended periods of water shortage because of increasing population, urbanization, environmental degradation, and many other factors. Redistribution of precipitation during the year and the increasing precipitation intensity could increase the drought frequency. In consequence, floods and drought can occur in the same year over the same area. According to the 4. assessment report of the IPCC these tendencies can strengthen in the future.

Drought is an insidious natural hazard that results from a deficiency of precipitation from expected or “normal” that, when this deficiency is extended over a season or longer period of time, is insufficient to meet the demands of human activities and the environment. Drought is a temporary aberration, unlike aridity, which is a permanent feature of the climate. Seasonal aridity (i.e., a well-defined dry season) also needs to be distinguished from drought.

Globally, the last decade has been characterized by an increasing frequency of extreme weather and climate events, including droughts and water scarcity. Europe is no exception. Water scarcity and droughts hit the south and south-eastern part of Europe frequently in past two decades. From the early 80s to the mid 90s Bulgaria (as well as other regions in SE of Balkan peninsula) experienced an increasingly severe long lasting drought, culminating in record breaking proportions in 1993 and 1994. Severe drought took place in the region also during the summer of 1998. The precipitation deficit in the Balkans was high. During July 1998, for example, a heat wave in southeast Europe resulted in the highest temperatures on record in early July in Turkey, Greece, and Romania, claiming at least 12 lives across the region and the dry conditions favored the outbreak of fires. In 2000 drought persisted from spring to summer in the region, resulting in cereal yields far below normal, especially the spring and summer crops. Romania suffered most, followed by the regions comprising the Former Yugoslav Republic of Macedonia, Hungary, and Bulgaria. Crops withered from high temperatures and drought. Romania suffered their worst drought in decades and their cereal crop was reduced significantly in 2000, well beyond the decline already evident in the previous decade. The Hungarian plain recorded temperatures of above 30°C for two weeks and soils lost the moisture reserves. Additionally, the primary growing regions of Croatia, Montenegro, and Serbia had similar problems with diminishing yields. In Slovenia, the dry weather caused large agricultural losses and the river discharges were nearly at their lowest levels in 30 years. During 2001, prolonged dry conditions are reported from southern Romania and Bulgaria affecting the establishment of winter grain. In the Former Yugoslav Republic of Macedonia, dry weather during 2001 reduced the cereal harvest to levels below 2000. One of the worst years was 2003 with extremely high impacts all of Europe, including the south-eastern sub-region.

Over 20th century and during its last decade, SE Europe experienced considerable warming. Projected changes in climate would exacerbate water quantity and quality problems in many water scarce areas in the sub-region. The observed and projected impacts of climate change suggest an average increase in the observed annual mean temperature and decreased precipitation over Southern Europe. Heat waves in the summer as well as intense precipitation events will become more frequent throughout Europe. These climate change scenarios will likely result in an increased drought risk in central and southern Europe.

The above-mentioned extreme climate events have had a major impact on the economy and welfare in many European countries, in particular in the south and south-eastern part of Europe. Water scarcity and droughts from one site and heavy floods from others have induced serious consequences not only to agriculture, but also on the environment and society in general. To cope with the situation, several meetings were held in 2003 at the European and sub-regional level that highlighted the need to strengthen regional cooperation on water and land management. One of the specific outcomes of these meetings was the expressed need for a Balkan Drought Monitoring Centre. A request was made to the UNCCD Secretariat to organize a technical workshop on drought preparedness. On other site, the water directors within the context of the Water Framework Directive of the EU countries established a Water Scarcity Drafting Group, with the task of preparing a technical document on drought management with the goals of serving as a base document for political decisions on water scarcity and drought management within EU.

## **2. Historical Background of the Drought Management Centre for South-Eastern Europe**

In the past few decades it has become more evident that all countries in South Eastern Europe are affected by drought. A Balkan Drought Workshop co-organized in 1998 by the Agricultural Research Institute Serbia (of the former Yugoslavia) and the ICID European Regional Work Team on Drought (ERWDRO) finalized the ICID Guide on National Drought Strategies and adopted a Declaration that expressed the need to establish a Balkan Drought Center to alleviate the problems caused by drought in the area. This idea was fully promoted by the countries involved but because of political events and changes in the Balkans this initiative remained for several years in the form of a proposal.

At the UNCCD Regional Meeting for strengthening cooperation in the field of land resources management in Central and Eastern Europe held in Minsk, Belarus, in 2003, participants expressed the need to establish a Balkan Drought Monitoring Center, and requested the UNCCD Secretariat to organize a workshop to discuss this issue. A Technical workshop on drought preparedness in the Balkans within the context of the UNCCD was then organized in Poiana/Brasov, Romania, in 2004 by the UNCCD secretariat in cooperation with the World Meteorological Organization (WMO). This workshop gathered together, for the first time, the UNCCD National Focal Points, the national scientific researchers and experts involved in drought issues, national meteorologists, relevant international organizations and programmes involved within the region and/or in drought. The countries, participating at the workshop (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Hungary, Republic of Moldova, Romania, The Former Yugoslav Republic of Macedonia) established a contact group which prepared, through wide consultations, draft Terms of reference of "Sub regional drought management Centre" in the context of the UNCCD. The TOR was also based on the results of a questionnaire circulated by the UNCCD secretariat among the national focal

points and experts of the interested countries to solicit their opinion about several aspects of the Centre. The questionnaire was returned from nine countries (Albania, Bosnia and Herzegovina, Bulgaria, the FYR of Macedonia, Greece, Hungary, Republic of Moldova, Romania, and Turkey).

Further to the request of the Workshop, the UNCCD Secretariat in cooperation with WMO organized in Sofia, Bulgaria, in April 2006 the second Technical workshop on the establishment of a sub-regional centre relating to drought in South-eastern Europe in the context of the UNCCD. As was the case of the first workshop, the UNCCD focal points, national experts on drought preparedness and representatives of National Meteorological and Hydrological Services (NMHSs) were brought together. After intensive discussion on a working paper, the participating 10 country Parties (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Republic of Moldova, Romania, Slovenia, the Former Yugoslav Republic of Macedonia and Turkey), as well as an observer (Serbia and Montenegro) agreed on the establishment of a centre to be called Drought Management Centre for South-eastern Europe (DMCSEE) in the context of the UNCCD and adopted a “framework for the preparation of a project proposal on the establishment of the DMCSEE in the context of the UNCCD”. This framework contains a comprehensive and wide-ranging package of core aims, functions and tasks, which the centre should provide.

Four countries (Hungary, Romania, Slovenia, Turkey) sent their official proposals to UNCCD and WMO to for hosting the DMCSEE. At a meeting organized on 26 September by WMO, in Geneva, with the UNCCD secretariat, decision was made by secret voting of the SEE countries that Slovenia will host the DMCSEE in the context of the UNCCD.

At a meeting hosted by WMO in November 2006 in Geneva, WMO, Slovenia and UNCCD secretariat, had exchange of views on the follow-up actions for the establishment of this Centre. Nine participants from Slovenia, the UNCCD Secretariat and the WMO Secretariat attended the meeting. The basic details of the future centre were discussed together with the structure of the project proposal on the establishment of the DMCSEE within the context of the UNCCD. It was acknowledged that WMO experience in organizing such centers in East and West Africa is welcome, as well as experience of the National Drought Mitigation Center, USA. After a mission to Slovenia, a WMO consultant prepared zero draft project proposal and presented it at meeting held in WMO headquarter in Geneva, in January 2007 where Slovenian, WMO and UNCCD secretariat representatives participated. A draft project proposal was sent by Slovenia to the three channels (UNCCD focal points, national designated researchers and heads of NMHS) of the eleven member countries for comments. A DMCSEE project kickoff meeting within the context of the UNCCD was organized by Slovenia in Ljubljana, Slovenia on the 17-19 April 2007 with the participation of nine countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Slovenia, the Former Yugoslav Republic of Macedonia and Turkey), as well as two observer countries (Montenegro and Serbia), UNCCD secretariat and WMO to discuss and prepare a revised draft proposal to be circulated at WMO congress in May 2007. [For facilitation the process, a core contact group is composed of the UNCCD focal points, the national designated researcher on drought and the head of the NMHS) of the 11 countries, UNCCD secretariat and WMO representatives. Two NMHS representatives are observers to the working group.]

### **3. Drought as a Hazard: The Context for Improving Drought Management**

Drought differs from other natural hazards in a variety of ways. Drought is a slow-onset natural hazard that is often referred to as a creeping phenomenon. It is an accumulated departure of precipitation from normal or expected (i.e., a long-term mean or average). This accumulated precipitation deficit may accumulate on different time scales - rather abruptly (e.g. during one month), or it may take months before the deficiency begins to show up in reduced stream flows, reservoir levels, or increased depth to the ground water table. Because of its creeping nature, the effects of drought are often slow to appear, lagging precipitation deficits by weeks or months. Because precipitation deficits usually first appear as deficits in soil water, agriculture is often the first sector to be affected.

It is often difficult to know when a drought begins. Likewise, it is also difficult to determine when a drought is over and on what criteria this determination should be made. Is an end to drought signalled by a return to normal precipitation and, if so, over what period of time does normal or above-normal precipitation need to be sustained for the drought to be declared officially over? Since drought represents an accumulated precipitation deficit over an extended period of time, does the precipitation deficit need to be erased for the event to end? Do reservoirs and ground water levels need to return to normal or average conditions? Impacts linger for a considerable period of time following the return of normal precipitation, so is the end of drought signalled by meteorological or climatological factors, or by the diminishing negative impact on human activities and the environment?

Another factor that distinguishes drought from other natural hazards is the absence of a precise and universally accepted definition. There are hundreds of definitions, adding to the confusion about whether or not a drought exists and its degree of severity. Definitions of drought should be region and application or impact specific. Droughts are regional in extent and, as previously stated, each region has specific climatic characteristics. Droughts that occur in the North American Great Plains will differ from those that occur in North-east Brazil, southern Africa, Western Europe, eastern Australia, or the North China Plain. The amount, seasonality, and form of precipitation differ widely between each of these locations.

Temperature, wind, and relative humidity are also important factors to include in characterizing drought from one location to another. Definitions also need to be application specific because drought impacts will vary between sectors. Drought means something different to a water manager, agricultural producer, hydroelectric power plant operator, forester and wildlife biologist. Even within sectors, there are many different perspectives of drought because impacts may differ markedly. For example, the impacts of drought on crop yield may differ greatly for maize, wheat, soy beans, and sorghum because they are planted at different times during the growing season and have different water requirements and different sensitivities at various growth stages to water and temperature stress. Generally speaking, drought impacts are non-structural and spread over a larger geographical area than are damages that result from other natural hazards such as floods, erosion and earthquakes. This, combined with drought's creeping nature, makes it particularly challenging to quantify impacts and even more challenging to provide disaster relief for drought than for other natural hazards. These characteristics of drought have hindered development of accurate, reliable, and timely estimates of severity and impacts (i.e., drought early warning systems) and, ultimately, the formulation of drought preparedness plans. Similarly, it is difficult for

disaster officials that are tasked with the assignment of responding to drought to deal with the large spatial coverage usually associated with its occurrence.

Droughts differ from one another in three essential characteristics: intensity, duration, and spatial coverage. Intensity refers to the degree of the precipitation shortfall and/or the severity of impacts associated with the shortfall. It is generally measured by the departure of some climatic parameter (e.g., precipitation), indicator (e.g., reservoir levels) or index (e.g., Standardized Precipitation Index) from normal and is closely linked to duration in the determination of impact. Another distinguishing feature of drought is its duration. Droughts usually require a minimum of two to three months to become established but then can continue for months or years. The magnitude of drought impacts is closely related to the timing of the onset of the precipitation shortage, its intensity, and the duration of the event. Droughts also differ in terms of their spatial characteristics. The areas affected by severe drought evolve gradually, and regions of maximum intensity (i.e., epicenter) shift from season to season or from year to year. Drought is regional in nature, transcending political and natural boundaries.

The interplay between drought and human activities raises a serious question with regards to any attempt to define it in a meaningful way. Conceptually, the definition provided previously assumes that the demands of human activities are in balance or harmony with the availability of water supplies during periods of normal or mean precipitation. If development demands exceed the supply of water available, the result can be that demand exceeds supply even in years of normal precipitation. This can result in a situation of human-induced drought that is apart from the drought types previously discussed. This is sometimes referred to as a 'water shortage drought'. When this situation exists, development can only be sustained through mining of groundwater and/or the transfer of water into the region from other watersheds. This practice is not sustainable in the long term?

Drought by itself is not a disaster. Whether it becomes a disaster depends on its impact on local people, economies, and the environment and their ability to cope with and recover from it. Therefore, the key to understanding drought is to understand both its natural and social dimensions. The goal of drought risk management is to increase the coping capacity of society, leading to greater resilience and reduced need for government or donor interventions in the form of disaster assistance. A critical component of that strategy is a comprehensive drought monitoring system that can provide early warning of drought's onset and end, determine its severity, and deliver that information to a broad group of clientele or end users in many climate- and water-sensitive sectors in a timely manner. With this information, the impacts of drought can be reduced or avoided in many cases. Other components of drought risk management are mitigation and preparedness.



#### 4. Justification for the DMCSEE

Available meteorological, hydrological and agricultural data shows that droughts are a part of the climate cycle in the region. The severe droughts which occurred during the last decades in Bulgaria had significant damages on different sectors, especially agriculture. All climate change scenarios created for Bulgaria project significant decrease in precipitation especially during the summer season, which could lead to an increase of drought occurrence, frequency and impacts. All this proves the necessity of a national and/or regional drought centre especially for drought monitoring and early warning.

Hungary receives more than 90% of surface water from abroad which makes the country very sensitive to the variability of precipitation. Drought events are more frequent recently, despite the growing number of floods. Drought damages are among the most disastrous ones. Direct damage was approximately 400 million € in the agriculture in 2003 alone.

Drought frequently causes many problems in agriculture, forestry and water management in FYR Macedonia. Some analyses show a 50 – 60 percent decrease in crop production in non – irrigated areas as a result of drought, especially in eastern parts of the country. Forest drying and decrease of forest growth are current phenomena observed in the forestry sector.

Drought has a directly harmful effect on water management. Long – term water shortages directly influence water resources of catchments areas disturbing the water balance conditions. The drought periods are characterized with discharges under the annual averages at almost every river in the country. In addition, drought causes lowering of the water level of natural lakes and artificial reservoirs. Beside the impact on the quantity, drought has an impact on the quality of water resources.

Also Turkey is exposed to drought hazard affects rather frequently. Since Turkey is on Mediterranean macroclimate region in subtropical zone, great rainfall variations can be seen between the years. This causes regional and widespread droughts in various intensities. Thus, drought is one of the main problem for Turkey. Therefore Turkey also, attach importance to national efforts in drought monitoring and mitigation and in cooperation with the neighbour countries on drought monitoring and early warning studies.

Drought is a regional phenomenon with diverse and complex impacts at the local level. Therefore, mitigation and response actions must also be locally based in order to be appropriate. Since similarities regarding drought issue can be found among the countries of South-Eastern Europe, there is a need for national monitoring and preparedness programs that addressed the issues specific to that sub-region. There is also a need for a sub-regional strategy to share information and lessons learned.

Drought is a slow-onset, insidious hazard that may have a long duration and produce devastating effects on many sectors of the economy, as well as on the environment. Under conditions of climate change, the frequency, severity, and duration of drought may increase in the sub-region in the future. Therefore, it is imperative for the countries in the sub-region to provide reliable and timely information to national decision makers.

Drought monitoring and assessment are key ingredients in drought mitigation and preparedness policies. Given increased societal vulnerability to drought in the sub-region, there is an urgent need to improve drought and flood early warning systems. National and sub-regional assessment and monitoring capacities have not been provided with the additional resources necessary to provide more accurate forecasts and assessments to aid in the early identification of drought events and the provision of appropriate coping strategies.

The formation of a DMCSEE will help to build the institutional capacity to provide this information to end users in a timely manner.

Improved drought predictions and better drought monitoring must be linked to delivery systems that provide informational products to end users in formats appropriate to specific applications. Using the information provided by delivery systems developed by the DMCSEE, mitigation and response mechanisms can be developed that are tailored to local applications.

DMCSEE member countries will work together to more effectively integrate and coordinate the collection, analysis, and exchange of relevant data and information for the purpose of mitigating the effects of drought in the sub-region.

Within their respective capabilities, DMCSEE member countries will promote technical and scientific cooperation in the fields of drought mitigation through appropriate national, sub-regional or regional institutions. The members should also promote, finance and/or facilitate the financing of the transfer, acquisition, adaptation and development of environmentally sound, economically viable and socially acceptable technologies relevant to mitigating the effects of drought, with a view to contributing to the achievement of sustainable development in affected areas. DMCSEE will contribute to the Action Programmes of the UNCCD and participate in the performance of the WMO RAVI Strategic and Action plan and to the current and future European Union activities related to drought management in Europe.

There is a need to strengthen existing institutions responsible for education and training in drought monitoring, mitigation, and preparedness with the goal of harmonizing programs and organizing exchanges between countries.

## **5. DMCSEE Goals**

The aims and objectives of the DMCSEE were agreed to by South Eastern countries at the meeting in Sofia, Bulgaria, in April 2006. These aims and objectives of the Centre are here restated for the purpose of this proposal as “goals”. These goals are as follows:

- (a) To serve as an operational centre for South-Eastern Europe for drought preparedness, monitoring and management.
- (b) To create and coordinate a sub-regional network of National Meteorological and Hydrological Services (NMHSs) and other relevant institutions.
- (c) To coordinate and provide the operational guidelines that will assist the NMHSs and other relevant institutions in the sub-region to interpret and apply drought-related products.
- (d) To prepare drought monitoring and forecast products and make them available on a near real-time basis to relevant institutions in participating countries.
- (e) To promote and strengthen the technical and scientific capacity for drought preparedness, monitoring and management in participating countries.
- (f) To facilitate the exchange of knowledge, experience and best practices on drought issues.
- (g) To enhance synergies among NMHSs, national UNCCD coordinating bodies, other international organizations and the scientific community on drought issues.

- (h) To enhance the implementation of the UNCCD in the context of drought preparedness, monitoring and management, in particular in working out a national drought strategy.
- (i) To collaborate actively with international research frameworks and programmes, to ensure the full participation of the South-Eastern European countries in such frameworks and programmes.

The core functions adopted for the DMCSEE to achieve the above stated goals are:

- (a) Encouraging effective national drought preparedness, monitoring and management in the participating countries.
- (b) Enhancing the early warning capacity for drought in the sub-region.
- (c) Developing and promoting the use of common methodologies and standards for drought preparedness, monitoring and management.
- (d) Organizing appropriate training and capacity-building activities.
- (e) Providing advisory services, guidelines and technical support on drought preparedness, monitoring and management.
- (f) Collecting and disseminating drought information.
- (g) Serving as a sub-regional information, documentation and reference centre on drought preparedness, monitoring and management.
- (h) Promoting the development and transfer of technologies to cope with droughts.
- (i) Promoting an integrated risk-base drought policy approach to drought preparedness, monitoring and management.
- (j) Raising awareness of the target audience about the importance of effective drought preparedness, monitoring and management strategies in the sub-region.
- (k) Collaborating actively with international research frameworks and programmes, to ensure full participation of the South-Eastern European countries in such frameworks and programmes.

## 6. DMCSEE Mission Statement

The proposed mission statement for the DMCSEE is:

***To coordinate and facilitate the development, assessment, and application of drought risk management tools and policies in South-Eastern Europe with the goal of improving drought preparedness and reducing drought impacts***

## 7. DMCSEE project Consortium of Partners

It is proposed to create a consortium of partners in DMCSEE (Table 1) which will be composed of the core members: National Meteorological and Hydrological Services (NMHSs), the institution/ministries of the national focal points for the UNCCD and the institution of the researchers on drought working in universities from each of the South-Eastern Europe member countries and of the core UN institutions: the WMO and the UNCCD Secretariat, as well as other key partners: regional or sub-regional institutions, UN agencies addressing the drought issues and other interested technical organizations addressing drought issues in the context of the UNCCD.

**Table 1. Proposed DMCSEE project Consortium of partners**

<b>Country/Organization</b>	<b>Consortium partner</b>
<b>Hosting country</b>	<b>Slovenia</b>
<b>Core Member Countries (in alphabetical order for each country)</b>	
Albania	Hydrometeorological Institute Ministry of Environment, Forestry and Water Administration
Bosnia and Herzegovina	Agricultural Faculty in Sarajevo Agricultural Faculty, University of Banja Luka Federal Meteorological Institute and meteorological departments in the entities
Bulgaria	Forest research Institute Ministry of Environment and Water National Institute of Meteorology and Hydrology
Croatia	Faculty of Agriculture, University of Zagreb Meteorological and Hydrological Service Ministry of Environmental Protection, Physical Planning and Construction
Greece	Agricultural University of Athens Hellenic National Meteorological Service
Hungary	Faculty of Horticultural Sciences, Budapest Corvinus University Hungarian Meteorological Service Ministry of Environment and Water
Republic of Moldova	State Hydrometeorological Service
Romania	Forest Research and Management Planning Institute Ministry of Agriculture, Forests and Rural Development National Meteorological Administration
Slovenia	Biotechnical Faculty, University of Ljubljana Environmental Agency of the Republic of Slovenia
FYROM	Agricultural Institute, Skopje Hydrometeorological Service Ministry of Environment and Physical Planning
Turkey	Ministry of Environment and Forestry Turkish State Hydraulic Works Turkish State Meteorological Service

Montenegro (observer)	Biotechnical institute Hydrometeorological Institute of Montenegro Ministry of Tourism and Environmental Protection
Serbia (observer)	Agricultural Faculty, University of Belgrade Ministry of Science and Environmental Protection Republic Hydrometeorological Service of Serbia

### **Core UN organizations**

United Nations Convention to  
Combat Desertification (UNCCD)  
World Meteorological Organization

### **Other potential partners**

UN ISDR  
JRC, FAO, UNEP, etc....

## **8. DMCSEE project Objectives**

The core tasks of the DMCSEE were previously identified at the Sofia workshop. The challenge was to group these core tasks under various objectives and establish priorities (i.e., short vs. long term) to be carried out under the currently proposed project. This project should serve as a bridge until the permanent center is established while launching activities involving the country members. The seven specific objectives have been identified and a detailed description of these objectives along with specific activities and expected outputs are:

### ***8.1 Objective 1: To assess the data available within the sub-region to support development of an effective drought monitoring and early warning system.***

Specific activities associated with this objective are:

8.1.1 Meta data assessment. There exists little knowledge regarding the current institutional capacity of DMCSEE member countries in the areas of drought monitoring and early warning, risk assessment, mitigation, and preparedness. As a first step, the DMCSEE will conduct an assessment of institutional capacity, including Meta data available to support drought monitoring, preparedness, and risk assessment functions at the national and sub-regional level. This assessment requires meteorological, agricultural, hydrological, socio-economic and other related data. Meta data on existing datasets available through NMHSs and other sources will be compiled through a survey and discussions with appropriate personnel/organizations in each of the member countries. It is critical to determine the density of meteorological and hydrological networks, parameters on which data is collected, length of record, percentage of missing data, and reporting procedures (i.e., manual vs. automated, timeliness of data availability for analysis). It is proposed that this Meta data on the observational networks in the sub-region will be completed before the end of the first

year. The initial output of the Meta data assessment will be a list of available meteorological and hydrological stations available within the sub-region for use in the development of an assessment tool of drought conditions, as will be discussed in Objective 2. In the longer term, it will be necessary to compile information available in digital form on the agriculture, land use, soils, and socio-economic data available for inclusion in GIS data layers for risk and vulnerability analysis.

8.1.2 Data homogeneity and network enhancement. The accuracy, homogeneity and spatial coverage of the monitored meteorological and hydrological parameters and indicators will be improved, as necessary, for effective drought preparedness, monitoring and management. Appropriate accuracy and spatial coverage should be assured by NMHSs. Where the station density and record length do not correspond to the WMO standards, the DMCSEE will help to build capacity in the sub-region by assisting those countries seek support for enhancing those networks - mainly through linking with existing projects and initiatives. It is foreseen that in limited extent some major gaps in vulnerable areas will be eliminated with investments in the scope of this project. The outcome of this activity will be an improved capacity to more accurately assess drought conditions for all portions of the sub-region.

8.1.3 Database design. Databases will be designed in accordance with the experiences and standards of WMO and UNCCD experience and requirements and promote their application using, among others, GIS and remote sensing technologies. The experiences of other regional and national drought centres will rely on in the design and structure of databases for the sub-region.

8.1.4 QA/QC systems. Common QA/QC systems (quality assurance and quality control) will be established for collecting, processing and validating data. Assistance on QA (e.g., examples of best practices, advice on measurement equipment modernization, calibration traceability to standard instruments etc.) will be provided by the WMO Regional Instrument Center in Slovenia. QC procedures should be established by NMHSs following WMO recommendations.

8.2. Objective 2: To evaluate and select the most effective and reliable indices and indicators for drought assessment and adopt common methodologies at the sub-regional scale.

Specific activities associated with this objective are:

8.2.1 Methodology for drought assessment. A common methodology will be adopted for drought assessment and evaluation. It is proposed initially to use the Standardized Precipitation Index (SPI), calculated at multiple time scales, because of its widespread use and minimal data requirements. Only precipitation data is required for the calculation of SPI values, however, a minimum data record length of 30 years is required. Through the analysis to be completed in objective 1a, a standard length of record will be chosen for the calculation of the SPI at the sub-regional scale. It is foreseen that the SPI will be calculated at the national level and transferred to the DMCSEE for compilation into a sub-regional drought assessment map. The sub-regional SPI map at various timescales will be prepared monthly. For the immediate term, it is proposed that each NMHS will calculate the SPI according to the specifications determined by the DMCSEE and to then transfer these calculations to the DMCSEE for compilation into a sub-regional map product. The SPI software is available at

no cost to the NMHSs and will be provided by the DMCSEE, if it is not currently available at the national level. Since there are several versions of the SPI available, it will be important to ascertain that all NMHSs are using the same software. Beside the SPI, the Palfai Aridity Index (PAI) will be considered as monitoring tool. PAI was developed for the Carpathian Basin and there are good experiences from the side of stakeholders in agriculture and water management. Other existing indicators will be considered at later stage. A sub-regional drought assessment map will be delivered to member countries by the DMCSEE and other end users on a routine basis. The official use of the products is decision of the countries.

In the longer term, other drought indices and indicators may be applied in periodic drought assessments, depending on the availability of data to support these assessments. For example, it would also be useful to compile information on soil moisture, reservoir levels, stream flow, ground water levels, snow pack, and vegetation conditions in order to evaluate drought severity and spatial extent using a more integrated, multi-indicator approach (e.g., U.S. Drought Monitor). If data on some of these additional drought indicators has limited availability among the countries, these data may be used initially for assessments for that portion of the sub-region where these data are available to assist decision makers in evaluating drought severity and possible response and mitigation measures. The preparation of seasonal forecasts or drought outlooks may also be feasible in the longer term. Remote sensing information will also be used for assessing drought conditions as another component of a sub-regional monitoring system.

New versions of both the SPI and the Palmer Drought Severity Index (PDSI) are available freely from the authors on request. The new SPI program calculates index values on a weekly timescale, which adds flexibility to drought assessments, especially for the agriculture sector. The new version of the PDSI represents an improvement over the original version and should be studied by the DMC for application within the sub-region.

**8.2.2 Climate monitoring and modeling.** Climate monitoring and modelling activities for diagnostic analysis and forecasting in Southeastern Europe will be enhanced by the DMCSEE in close collaboration with the member countries and other researchers at universities and NMHSs outside the sub-region. The goal is to initiate regional and international cooperation in climate monitoring and modeling activities in order to stimulate the application of the latest technologies in Southeastern Europe.

**8.2.3 Historical assessment of drought.** An assessment of historical drought events and their impacts, in particular social and economic will be conducted for the sub-region. This assessment could be carried out through case studies at the national and sub-regional level through sub-contracting process. A survey of previous national and sub-regional studies will be compiled as part of this historical assessment.

**8.3. Objective 3: To conduct a drought risk assessment, including the identification of the principal stakeholders, with the goal of developing appropriate drought mitigation strategies and policies in the sub-region.**

Specific activities associated with this objective are:

8.3.1 Identification of stakeholders/users and their needs. As a first step in the risk assessment process, a critical need is to identify the principal stakeholders and users (e.g., institutions, organizations) at the sub-regional and national level and to involve them at the outset in all drought management activities to be initiated through the DMCSEE and its members. The DMCSEE could employ existing institutional mapping techniques, for example the one used by the MEDROPLAN project (Mediterranean Drought Planning project) funded by the European Commission under the leadership of CIHEAM in Zaragoza, Spain.

8.3.2 Drought risk assessment. A drought risk assessment will be conducted for Southeastern Europe. Each country in the sub-region will be asked to complete a risk assessment analysis/checklist using a common risk assessment methodology. Complete instructions for this assessment will be provided by the DMCSEE in consultation with external experts (for example, NDMC). This risk assessment consists of completing a risk assessment exercise (checklist) in close collaboration with stakeholders in each of the countries or carried out under the auspices of National Committees that in some countries comprises a wide range of stakeholders at national level. The goal of this exercise is to identify the principal economic, environmental, and social impacts associated with drought. Following the completion of this exercise, the next step will be to analyze these results, select the most important impacts to be mitigated, and identify appropriate mitigation measures. Ministries and organizations to be charged with implementing these mitigation measures will also be identified. It is anticipated that following the completion of the first stage in this risk assessment process (i.e., completion of the checklist), a sub-regional workshop will be organized to discuss the results and subsequent procedures for implementing further actions. The outcome of this risk assessment process will help the DMCSEE tailor its drought assessments to those sectors and population groups most at risk to drought in Southeastern Europe.

8.3.3 GIS drought vulnerability study. A multi-variable analysis of drought vulnerability will be conducted for that portion of the sub-region where adequate data are available. For example, GIS techniques will be applied to assess vulnerability to agricultural drought using appropriate digital data layers for climate, soil water holding capacity and soil in general, land use, and other factors. These drought risk and drought vulnerability maps are one of the most important initial tasks of the DMCSEE. They will be useful to policy makers in the preparation of drought mitigation and response strategies in each of the countries. Where necessary digital data are not available, the DMCSEE will promote the development of these datasets. An assessment of these vulnerability maps and related digital data layers should be compiled during the first year of the DMCSEE.

8.3.4 Identification of drought response/mitigation measures and implementation. To compile existing response and mitigation measures in the sub-region and recommend new response and mitigation measures for consideration by DMCSEE member countries. The majority of measures available for drought management are response (reactive) measures and provide assistance in the post-drought period. These response measures do not reduce risk—in fact, they reward individuals and organizations for the lack of planning. The DMCSEE's mission is to improve drought management through the better monitoring, mitigation, and preparedness. This activity will first compile currently available response and mitigation and then, through the completion of the risk assessment process, identify new mitigation measures that could be customized for application in the sub-region.



8.3.5 Impact assessment methodologies. Methodologies to improve the analysis of the economic, environmental, and social impacts of drought in multiple sectors (e.g., water management, agriculture, energy) must be identified and/or developed for the SEE. This expertise does not exist in the NMHSs so other institutions should be identified to assist with this process. Tools, such as the web-based drought impact reporter could be used to compile and archive impact information and is currently developing economic impact methodologies.

8.3.6 Drought policy recommendations. Under article 10 of the provision of the UNCCD, affected SEE countries are requested to prepare National Action Programmes (NAPs) to, among others, identify the factors contributing to and practical measures necessary to combating desertification and land degradation, and mitigate the effects of drought. In this framework, NAPs should enhance national climatological, meteorological and hydrological capabilities and the means to provide a drought early warning system. This includes strengthening drought preparedness and management at local, national, sub- regional and regional levels and incorporating long-term strategies to mitigate the effects of drought, in line with national policies for sustainable development. Therefore the DMCSEE should provide national institutions and relevant concerned actors in member countries with recommendations for drought related policies and legislation to facilitate the implement of the NAPs, in particular on national drought strategies and contingency plans. The same would apply later on at sub-regional level.

*8.4. Objective 4: To identify the specific training needs and exchange of expertise necessary at national level and the DMCSEE to build scientific, operational and institutional capacity for drought management and coordinate the implementation of these activities.*

Specific activities associated with this objective are:

8.4.1 Assessment of existing operational, scientific and institutional capacity. It is critically important as the first step in this process to determine the scientific, operational and institutional capacity that exists at the national and sub-regional level. The DMCSEE will seek to compile this information from interactions with NMHSs and many other organizations within the region. In time, the DMCSEE will develop a roster of experts that can assist the Centre and member countries drought management activities.

8.4.2. Identification of training needs – including training of trainers in drought management. The DMCSEE will provide leadership for the identification of specialized seminars, workshops, and conferences (including DSS tools) to build institutional capacity in member countries on a risk-based approach for drought management. An immediate need is to organize a training workshop on drought monitoring methodologies, appropriate assessment tools, drought contingency planning and delivery mechanisms. This workshop could be co-sponsored by WMO and would be held within the first 6 months following the launching of the DMCSEE. Participants should include technical staff of the NMHSs, university faculty, and key end users. Experts from outside the sub-region (e.g., Europe, U.S.) would also be invited to attend. The goal of this workshop would be to improve the national capacities in drought monitoring and assessment by introducing them to the state-of-the-art technologies in use in other countries. Possible post-graduate specialized training of DMCSEE staff at other

institutions (e.g., NDMC/University of Nebraska-Lincoln) should be considered as part of the long-term investment in the success of the Centre's program.

There are also longer term training needs in drought management, risk and impact assessment, mitigation, planning, and policy. The DMCSEE will coordinate the organization of all training activities for the sub-region. Training activities must also be conducted for end users to help them understand drought management tools and to solicit their input on tools and methodology development from the outset. The development of decision-support tools must be viewed as an end-to-end-to end process, incorporating user needs, expectations, and feedback at all stages.

8.4.3 Specific training and exchange of expertise. Scientific exchange must be an integral part of the development of the DMCSEE. Scientists/technicians from the DMCSEE must spend time at the NMHSs and other relevant national institutions in agriculture, environment, forestry, water, etc providing on-site training and learning the specific data and institutional constraints that exist in member countries. Experts from the NMHSs, other relevant national operational services and collaborating universities and other institutions should also participate in on-site training of DMCSEE staff on a broad range of drought management tools and methodologies.

8.4.4 On-line training (e-learning) and development of modules and manuals. The DMCSEE will also promote e-learning and distant learning courses, designed training modules and develop on-line training exercises modules, manuals, and brochures. These materials could be prepared by DMCSEE staff or delegated to national institutions in member countries or to other institutions with appropriate expertise.

8.5. Objective 5: To develop and implement a comprehensive, timely, and effective data and information delivery system on drought management that incorporates stakeholder/end user needs.

Specific activities associated with this objective are:

8.5.1 Web page development and maintenance and identification of delivery channels. A principal role for the DMCSEE is the development of a data and information delivery system to end users and stakeholders. The most immediate task is the development of a web site that provides end users with access to all DMCSEE products and those products available from member countries, as well as links to the principal drought-related web sites that exist at the regional and international levels (e.g., NDMC, Australian Bureau of Resource Sciences). This web site will also contain information on mission and program activities of the DMCSEE, including training opportunities, meetings, and research activities.

Other dissemination channels also must be employed for providing information to end users in Southeastern Europe since low access to modern communication means occur in rural areas (this should be subject of development at national level). These would include both print and electronic media such as newspapers, television, and radio. The information could be shared between consortium members in the way to learn from each other. Local agricultural advisory services and/or local authorities could also be used to deliver information to farmers following appropriate training on the use of products and advisories.

The DMCSEE should use examples of good practices being used by other institutions to disseminate information to end users (e.g., GLOBE program).

8.5.2 Awareness campaigns. Awareness campaigns should be developed to raise public awareness of drought issues and the importance of water conserving strategies for many sectors. These campaigns should target both adults and youth. The development of these campaigns could be coordinated through the action programmes of the DMCSEE but they would need to be implemented at the national and/or local levels. Funding for these programs could be obtained from national governments and donors.

8.6. Objective 6: To develop a comprehensive network of experts and institutions to assist the DMCSEE in the performance of its mandate to improve drought management in the sub-region.

Specific activity associated with this objective is:

8.6.1. Development of Memorandums of Understanding (MoUs). MoUs should be developed with a wide range of experts and institutions within Europe and internationally to promote and enhance the development of the DMCSEE in the fields of monitoring and forecasting, mitigation, and preparedness. These would include e.g., technical organizations such as EUMETSAT, ECMWF, JRC, and NMHSs in Europe and the NDMC and Waternet, among others as well as operational organizations of the management of drought such as UNISDR, FAO, etc. DMCSEE will also participate in the future work of WMO RAVI regional Climate Centre as well as in the work of the Committee on Science and Technology (CST) of the UNCCD. Intensive collaboration with other European countries participating in existing projects should be initiated. Focus should be put to the Mediterranean region and its existing drought mitigation cooperation. Initiative to develop pan-European drought management centre will also be followed.

8.7. Objective 7: Communication and User Feedback

DMCSEE should develop an accessible strategy to communicate with end users in a way that is understandable and not too technical. Special external competencies will be needed to prepare documents and notes that use non-technical vocabulary, clear guidance and simple recommendations. The language issue should also be taken into account.

Appropriate way to secure two-way communication is organization of workshops to solicit the input of end users on decision support tools and other products developed by the DMCSEE. Apart from workshops, web base should be used for communication and user feedback to ensure continuous information flow.

8.8 Objective 8: Establishment of the permanent DMCSEE and its sustainable functioning and operations

8.8.1 Elaboration of its legal status

A draft international agreement of the permanent DMCSEE will be drawn out under the leadership of the hosting country. Consultancy on international legal issues will be required.

### 8.8.2 Elaboration of internal rules and procedures of the permanent DMCSEE

With the assistance of specialized consultancy and meetings with the member countries, rules and procedure will be established.

### 8.8.3 Financial sustainability of the permanent DMCSEE

Based on the results of the first year of the project, a review of the possibilities of contribution (technical, in kind, financial, expertise and human resources) of each member country will be conducted by the host country through consultation. A template of yearly working programme for the DMCSEE will be also established to be used after the end of the project. Other specialized external consultant will be required to make proposal related to international accountability, responsibility, evaluation, etc.). A proposal for the permanent DMCSEE should be established for sustainable co-funding for the subsequent years.

### 8.8.4 Establishment of partnership and launching of the permanent center

Memorandum of understanding should be established as soon as the legal status of the Permanent center is official, between the Centre as entity and potential partners (WMO, UNCCD, UNSDR, FAO, etc) on the more long term basis.

## **9. Budget Estimate of the project**

The provisional 5-year budget estimation necessary to carry out the proposed activities of the current project proposal is provided here. Final figures will be obtained after discussion with all partners while preparing implementation arrangements for the project.

### Project management

In order to be able to run the project some man power as well as equipment and infrastructure investments (and/or hiring) should be planned. The project coordination and assistance is approximated to 24 man/months for each project year. Needed office space will be given or hired by EARS.

Rough estimate of needed financial resources for project management: 220.000 € for each year of the project.

### Data assessment

Meta data assessment will require cca. 6 man/months of work for processing. Additional cca 13 man/months (1 per county) of consultant work will be required to complete data on data assessment. Data homogeneity, network enhancement and QC/QA will require cca. 12 man/months every year throughout the project duration; some infrastructure investments are envisaged in case they will be necessary. Establishment of data base and its maintenance will require investment in equipment and cca. 2 man/months every year of the project.

Rough estimate of needed financial resources for data assessment: 150.000 € for each year of the project.

### Drought assessment

Development of regional maps of drought indices based on meta data - estimated workload 6 man/months in the center + 13 man/months of consultant work in the countries. Studies evaluating available remote sensing data and in-situ data (based on compiled meta data inventory) containing also proposed calculation procedures will be executed; it is estimated that they will require workload in equivalence of 12 man/months each year after the first year. Implementation in the center will require cca. 2 man/months each year in the center. Historical assessment should be carried out in the 2nd year. Total estimation of workload depends on already available information. Rough estimate is 60 man/months.

Rough estimate of needed financial resources for drought assessment: 120.000 € for each year of the project.

### Risk assessment

Implementation of existing procedures for institution mapping will take approx. 12 man/months in the first and second year. Additional 12 man/months in the first and second year will be needed for drought risk assessment. GIS drought vulnerability study and mapping procedures (cca. 12 man/months) should be executed in the 3. year. Creation of vulnerability maps should be performed in the center (2 man/months 3., 4. and 5. year). Preparation of response/mitigation measures will take 6 man/months for each country (= 78 man/months). Common report should be prepared in the 4. year (6 man/months) in the center. Preparation of impact assessment methodologies will require approx. 6 man/months per country (= 78 man/months) and 6 man/months in the center in the second and third year (planned in the 2. year). Policy recommendations will be a continuous process and will require approx. 3 man/months each year in the center.

Rough estimate of needed financial resources for risk assessment: 180.000 € for each year of the project.

### Training and capacity building

Identification of training needs and organization of workshops - preliminary 1 workshop each year. It will require workload for organization and preparation (12 man/months each year) and organization and travel costs for participants. Science exchange and e-learning modules will require cca. 12 man/months of workload each year.

Rough estimate of needed financial resources for training: 180.000 € for each year of the project.

### Data and information delivery systems, user communication and feedback

Web page development and maintenance will be the task of personnel appointed to the center by EARS. The web system will be continuously upgraded; creation of initial version will require work equivalent to 6 man/months, maintenance and upgrading will require further 3 man/months each year. Awareness campaigns will present opportunities for all involved

institutions and financiers to present their view of the problem and to present to stakeholders and to the public potential benefits of the drought management. 3 man/months of the workload is envisaged for the center personnel and 3 man/months for external experts every year. Workshops with end users and preparation of user documentation requires additional resources.

Rough estimate of needed financial resources for data delivery and user feedback : 200.000 € for each year of the project.

### Preparation of permanent DMCSEE

National and international consultancies are needed for studies and proposals on legal status, rules and procedures, modalities of functioning, scenarios and models of financial sustainability, modalities regarding international accountability and responsibility, governance, evaluation etc. for the permanent centre.

Funds are required to organize a yearly meeting of the UNCCD focal points, the national designated researcher on drought and the head of the NMHS of the 11 countries as well as a launching meeting of the permanent DMCSEE to be followed by a transition period.

Rough estimate of needed financial resources for preparation of permanent centre: 200.000 €

***Total rough estimation of budget for project in duration of 5 years: 5,350,000 €.***  
***Foreseen contribution of Slovenia: 1,000,000 €.***

### **Provisional list of abbreviations**

CST	Committee on Sciences and Technology of the UNCCD
DMCSEE	Drought Management Centre for South Eastern Europe
FYROM	The Former Yugoslav Republic of Macedonia
IPCC	Intergovernmental Panel on Climate Change (see <a href="http://www.ipcc.ch">www.ipcc.ch</a> )
ISDR	International Strategy for Disaster Reduction (see <a href="http://www.unisdr.org">www.unisdr.org</a> )
JRC	Joint Research Centre; for its water and drought related activities see <a href="http://efas.jrc.it">efas.jrc.it</a>
MEDROPLAN	Mediterranean Drought Preparedness and Mitigation Plan (see <a href="http://www.iamz.ciheam.org/medroplan">www.iamz.ciheam.org/medroplan</a> )
NDMC	National Drought Mitigation Centre (see <a href="http://www.drought.unl.edu">www.drought.unl.edu</a> )
NMHS	National Meteorological and Hydrological Service
RAVI	Regional Association No. VI (Europe in the WMO nomenclature)
UNCCD	United Nations Convention to Combat Desertification (see <a href="http://www.unccd.int">www.unccd.int</a> )
WMO	World Meteorological Organization (see <a href="http://www.wmo.int">www.wmo.int</a> )

### **Estimated Project Timetable**

The estimated project timetable identifies the starting and ending points for each of the subtasks identified as part of the Core Tasks. Many of the DMCSEE project 's activities

will be ongoing from the point of initiation until the end of the project period specified in this project proposal (i.e., 2011).

Objectives and Specific Activities	Years				
	Year 1	Year 2	Year 3	Year 4	Year 5
<b>1. Data assessment</b>					
1.1 Meta data assessment	3-----9				
1.2 Data homogeneity and network enhancement	5-----	-----	-----	-----	-----
1.3 Database design	5-----	-----	---3		
1.4 QA/QC systems	-----	-----	-----	-----	-----
<b>2. Drought assessment</b>					
2.1 Methodology for drought assessment	-----	-----	-----	-----	-----
2.2 Climate monitoring and modelling		-----	-----	-----	-----
2.3 Historical assessment of drought	6-----	-----12			
<b>3. Risk assessment</b>					
3.1 Identification of stakeholders/users	4-----	-----12			
3.2 Drought risk assessment	4-----	-----12			
3.3 GIS drought vulnerability study			1-----	-----	-----
3.4 Identification of response/mitigation measures and implementation		6-----	-----	-----	-----
3.5 Impact assessment methodologies	9----	-----	-----12		
3.6 Drought policy recommendations		1-----	-----	-----	-----
<b>4. Training and capacity building</b>					
4.1 Assessment of scientific/institutional capacity	-----	-----	-----		
4.2 Identify training needs/train trainers	4-----	-----	-----	-----	-----
4.3 Scientific exchange	9----	-----	-----	-----	-----
4.4 On-line training (e-learning)/development of modules, manuals, etc.		1-----	-----	-----	-----
<b>5. Data and Information Delivery Systems</b>					
5.1 Web page development/maintenance and identification of delivery channels	6-----	-----	-----	-----	-----
5.2 Awareness campaigns		1-----	-----	-----	-----
5.3 Reporting to UNCCD	1 6	1 6	1 6	1 6	1 6
<b>6. Networking</b>					
6.1 Development of MoUs	6-----	-----	-----	-----	-----
6.2 Network with UNCCD national focal pts.	4-----	-----	-----	-----	-----
<b>7. Communication and User Feedback</b>					
<b>8. Establishment of the permanent DMCSEE</b>		1-----	-----	-----	-----