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Proactive Management of Water Systems to Face Drought and Water Scarcity in Islands and Coastal Areas of the Mediterranean (PRODIM)

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Abstract. Most of the islands and coastal zones of the Mediterranean suffer from droughts and water shortages which cause heavy impacts on economies, societies and the environment at local or regional scales. PRODIM project (Interreg IIIB – Archimed) aimed at producing rational, comprehensive, easy to use and applicable methods for assessing drought severity. Models of preparedness plans were devised, ready to be customised according to local or regional natural and socio-economic conditions. Guidelines for facing water shortages and road maps for effective participation of stakeholders, administration officers, institutions and the public in decision making, were formulated. Simplification of the multiple character of droughts (severity, areal extent, duration, etc.) led to a uni-dimensional approach, which can be easily understood and implemented by people of different backgrounds and disciplines. The methodology was applied and refined through case studies carried out in Greece, Italy, Cyprus and Malta.

Keywords. Water scarcity – Drought – Proactive management – Mediterranean islands – Coastal areas.

Gestion proactive des réseaux hydrographiques afin d'affronter la sécheresse et la pénurie d'eau dans les îles et les zones côtières de la Méditerranée

Résumé. *La plupart des îles et des zones côtières de la Méditerranée subissent la sécheresse et la pénurie d'eau qui provoquent des impacts abondants aux économies, aux sociétés et à l'environnement à l'échelle locale et régionale. Le projet PRODIM (Interreg IIIB – Archimed) visait à produire des méthodes rationnelles, compréhensives, maniables et applicables afin d'évaluer la sévérité de la sécheresse. Des modèles et des plans de préparation ont été conçus, prêts à être personnalisés selon les conditions socio-économiques et naturelles, locales et régionales. Un guide afin d'affronter la pénurie d'eau et des cartes routières pour la participation effective au décisionnel des parties prenantes, officiers administratifs, institutions et le public, ont été formulés. La simplification du caractère multiple des sécheresses (sévérité, étendue superficielle, durée, etc.) a mené à une approche uni-dimensionnelle, qui peut être facilement comprise et mise en place par des personnes de différents milieux et disciplines. La méthodologie a été appliquée et raffinée à travers des études de cas qui ont été menées en Grèce, Italie, Chypre et Malte.*

Mots-clés. *Pénurie d'eau – Sécheresse – Gestion proactive – Îles méditerranéennes – Zones côtières.*

I – Introduction

Initiated by precipitation deficit combined with other predisposing factors, drought, a temporary decrease in water availability over a significant period of time affecting a large area was considered an interesting natural phenomenon within the climate variability of an area during the past decades. Nowadays however, it is realised that drought is probably one of the most complex natural hazards affecting more people than any other hazard for long periods of time. Drought may lead to severe long-term environmental, economic and health impacts on the population and may even result to food shortages and mass displacements of population.

It has been noted that droughts have dramatically increased in number and intensity in the European countries over the last three decades increasing the number of affected people by almost 20%. Some of the most vulnerable areas regarding drought and water shortages are the coastal zones of the Mediterranean.

The European Union has already taken initiatives to face drought and mitigate its consequences mainly in the field of research and development. Among them, several projects were implemented in order to clarify the different components of drought, develop early warning and monitoring systems and propose solutions to face its impacts. One of the projects, in the framework of Interreg IIIB – Archimed, particularly focusing on the islands and coastal zones of the Mediterranean was the project PRODIM "Proactive Management of Water Systems to Face Drought and Water Scarcity in Islands and Coastal Areas of the Mediterranean".

II – Overview and objectives

PRODIM aimed at devising a rational methodological framework for facing drought and water shortage in islands and coastal areas of the Mediterranean. It was coordinated by the Centre for the Assessment of Natural Hazards and Proactive Planning of the National Technical University of Athens. Eleven partners, in total, from Greece, Italy, Cyprus and Malta participated in the activities of the project contributing with their experiences of past drought episodes and case studies in selected areas. The partners of the project were:

(i) National Technical University of Athens – Centre for the Assessment of Natural Hazards and Proactive Planning.

(ii) Prefecture of Cyclades.

(iii) Eastern Crete Development Organisation.

(iv) University of Thessaly – Laboratory of Agrometeorology.

(v) Cyprus Meteorological Service.

(vi) Malta Resources Authority.

(vii) Prefecture of Laconia.

(viii) Catania University – Department of Civil and Environmental Engineering.

(ix) University of Calabria – Department of Soil Defence.

(x) Regional Agency for Environment Protection of Basilicata.

(xi) Sicilian Region – Regional Agency for the Wastes and the Waters.

The objectives of the project were realised through the following phases:

(i) Past research results of European and International projects were analysed and integrated into a comprehensive methodology for identification and characterisation of drought and water shortages in selected drought prone areas of the Mediterranean.

(ii) A Knowledge Based System was built for estimating impacts of water shortages on the economy, society and the environment in the areas under study. The system integrated accumulated experience and knowledge from a large number of EU projects. Both conventional and satellite data were used for assisting drought and water shortage indices to identify and characterise these episodes. Further a variety of technical measures (structural and non structural) were evaluated for mitigating water shortage risk.

(iii) Guidelines were devised for preparing Strategic Water Shortage Preparedness Plans. The major aim of these plans was to assist each region to improve its institutional capacity and

lower its vulnerability towards water shortage risk. The plans were based on the knowledge gained in the Knowledge Based System. Rational methodologies for decision making were proposed following multicriteria approaches. The preparedness process incorporated stakeholders' participation. Roles, responsibilities and courses of actions during and beyond the critical periods of the evolution of droughts were allocated to all the principal actors. The emphasis was given to the long term improvement of water availability-demand balance and the subsequent socioeconomic impacts. Public opinion was taken into account through questionnaires filled by all interested stakeholders.

(iv) Finally, attempts to apply the guidelines formulated in the project were made through case studies for constructing Water Shortage Preparedness Plans in various water systems in selected Mediterranean areas resulting in important conclusions for the refinement of such plans.

The main Work Packages of the project were:

WP1: Analysis of requirements.

WP2: Identification of drought and water scarcity prone areas.

WP3: Preparation of a Knowledge Based System for impact assessment.

WP4: Preparation of Strategic Water Shortage Preparedness Plan.

WP5: Preparation of Emergency Plan.

WP6: Dissemination of results.

WP7: Support framework for coping with drought and water shortage risk.

WP8: Enhanced dissemination.

The management organisation of PRODIM worked throughout the development of all the Work Packages, creating a very effective network for the practical implementation of the goals of the project. The Steering Committee was comprised of five members representing each country plus the Project Manager. Apart from the Steering Committee which was formed for solving everyday's problems another body, the Council of Partners, had the responsibility for taking major decisions on the project development.

A significant number of scientists, engineers and administrators participated in the workshops and the seminars of the project. Also, a number of employees from the administration of the countries participating in the project were involved in disseminating the results of the project.

The project's outputs and deliverables included: detailed reports, software packages, guidelines, case/pilot studies which are valuable in achieving sustainable water resources management in Mediterranean islands and coastal areas. The results of the project support the fulfilment of WFD goals such as protection and improvement of water resources and aquatic ecosystems. Special documents were devised for producing knowledge to enhance legislation on drought risk and water scarcity problems, which is still lacking in the European legislative system.

III – Project's achievements

1. Promotion of innovative procedures

The project promoted a number of innovative procedures and practices, the most important of which are:

(i) Proactive planning for combating drought and water scarcity.

(ii) Simplified methodologies for characterisation of drought severity.

(iii) Approach based on water shortage risk.

(iv) Decentralised – regional – organisational structures.

(v) Involvement of stakeholders in decision making.

2. Development of Transnational Partnership and network

PRODIM dealt with a problem that concerns the entire Mediterranean region. Therefore the efficient transnational cooperation achieved during the project may play a key role in the implementation of methodologies of the project in the Mediterranean countries.

The partners' active participation enhanced the effectiveness, quality and acceptance of drought preparedness approach while improving the trust in the scientific expertise – considering that the relevant awareness is not restricted only to the scientific community, the public officials and decision makers. Common methodologies and tools were created strengthening the transnational character of the partnership.

The partnership has already initiated procedures for further cooperation in the area of water shortage management within the framework of MED Programme. The ultimate objective is to sustain the partnership through further initiatives in the future.

3. Exchange of know-how

Since the partners of the project were both from universities/research institutions and regional administrative organisations, an effective exchange of views between administrators and scientists was implemented. This exchange of experiences and views was realised mainly through the first two work packages dealing with the "Analysis of Requirements" and the "Identification of Drought and Water Scarcity Prone Areas". A very effective blend of ideas was also achieved in the dissemination of the results of the project in which the guidelines of the project, together with existing legal and administrative systems were considered for producing viable methodologies and solutions. In the "Dissemination of Results" activity several corrections of the proposed methodologies towards more practical applications were achieved. Exchange of ideas, know-how and practices was also achieved through questionnaires which were filled by a large number of interested people who were engaged in the management of water resources.

4. Pilot actions and studies

Pilot case studies were analysed for preparing water shortage preparedness plans in a number of water systems in selected areas in the countries involved. Pilot studies were based on both existing procedures together with the new ideas of the project. Emphasis was given to the long term strategic management plans in drought and water shortage prone areas. General studies and produced reports are mainly dealing with the construction of the knowledge based system for the identification and characterisation of drought and water shortages episodes, together with the methodologies for assessing and selecting measures for facing drought and water shortage events. Further, emphasis was given also in producing guidelines for the preparation of the strategic water shortage preparedness plans in which emergency plans were included.

5. Dissemination activities

Information regarding the project, its activities and its achievements was uploaded in the website devoted to the project. For the continuation of the dissemination of this information the

major activities and findings of the project were also uploaded in the website of the Lead Partner (CANaH-NTUA). Specialised workshops in all the countries which participated in the project took place, targeting to interested key personnel who are involved in Water Shortage Management. Finally, several papers based on the results of the project were presented in International and National Conferences and published in Scientific Journals. At the end of the project the International Symposium "Water Shortage Management" was held in Athens and a special issue of the Scientific Journal "European Water" was devoted to the project.

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