INTEGRATING CLIMATE SERVICES TO SUPPORT REAL-TIME ADAPTATION PLANNING IN WATER RESOURCES MANAGEMENT

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RESUMO

The challenge of the adaptation to climate-related risks is demanded for increasingly closer time horizons. Information on potential impacts modelled from near-term climate forecast is important to support adaptation planning and operation to deal with the main related natural disasters. The project CRISI-ADAPT II aims to monitor the adaptation planning through a real-time implementation and validation according to near and seasonal range forecast of climate-related natural hazards. One of the main outcomes of the project is the co-design of climate services based on a GIS platform that integrates two interconnected modules: the Climate Risk Information Tool (CRIT) and the Monitoring Extreme Events Tool (MEET). These tools are developed together with the direct participation of the problem owners (sectors affected by climate impacts). Manage tools, impact models and climate data, available from several European projects, are integrated in CRIT/MEET to support the adaptation and risk reduction activities planned by city governments, modellers, investors and traders related to all sectors potentially affected by climatic impacts. A total of four Demonstrations are taking place in three countries (Spain, Malta and Cyprus) focus on four strategic sectors: (1) flooding/emergency response, (2) water management for agriculture, (3) energy planning and (4) port infrastructures/operations. Additionally, eight Receiving Regions participate to scale methods and results in the respective areas as a test of replicability, thus adding the countries of Portugal and Italy. This abstract presents part of the project dedicated to the Portuguese case study focused in the water resources management in the Sado river basin.

Keywords: Climate risk management; adaptation to climate change; forecasting; monitoring.

1. INTRODUCTION

The project CRISI-ADAPT II aims to monitor and improve the adaptation planning through a real time implementation and validation according to near, long and seasonal range forecast of climate-related natural hazards (Figure 1). Since risk management requires a holistic treatment of all interconnected sectors affected, CRISI-ADAPT II will provide a democratisation of both the climate risk information required by each end-user and the vulnerability information of them that is required by each impact model. Therefore, identified available tools and data will be expanded and transparently used to support the adaptation and risk reduction activities planned by city governments, modellers, investors and traders related to all sectors potentially affected by climatic impacts. This includes public services or critical infrastructures, such as: port infrastructures, the water sector (source availability, treatment, supply and sanitation), energy (generation and supply) and commodity (production and commercialisation) among others. In order to implement the project consistently, it plans a standardisation of metrics and capacity building for the climatic analysis criteria to ensure a correct use and interpretation of the possible climate scenarios and forecast uncertainties.

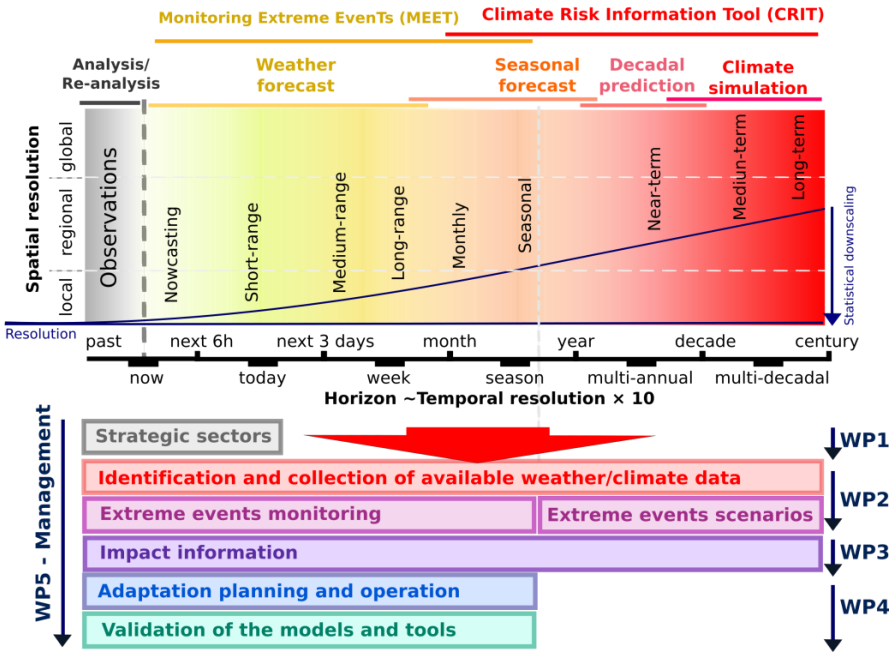

Figure 1. Scheme of the CRISI-ADAPT II project.

The expected impacts of this work are guaranteed by several international projects that support local-scale application of our methodology (Ribalaygua et al., 2013). Since climate and seasonal forecasts present high uncertainty levels, it is planned to use ensemble-prediction strategies (Monjo et al., 2016). For instance, seasonal forecast will be provided combining dynamical models like the Copernicus C3S multi-system seasonal forecast (Manubens et al., 2017) and statistical forecast outputs, obtained from the European RESCCUE project, whose method is based on multi-perturbation prediction of teleconnection indexes (Redolat et al., 2018). Finally, three representative scenarios (low, medium and high probability/danger levels) will be selected for each time horizon in order to feed impact models, whose results improve the management of uncertainty.

Available novel and promising models and tools for the simulation of climate-related natural hazards and their corresponding impacts on city services will be used. Moreover, cascade effects among different critical sectors will be analysed through a holistic approach (Velasco et al. 2018). Cost-benefit analysis will be also used to identify maximum risks and prioritize the adaptation strategies proposed and selected in a participative process involving local actors and end-users (World Bank 2010, UNFCCC 2011).

2. SCOPE

The challenge of the adaptation to climate-related risks is demanded for increasingly closer time horizons. Information on potential impacts modelled from near-term climate forecast is important to support adaptation planning and operation to deal with the main related natural disasters. Currently, European Horizon 2020 projects (e.g. BINGO, PLACARD or RESCCUE) are especially focused in long-term climate change projections, although they are beginning to explore closer horizons but without applying seasonal timescale for adaptation plans. The novelty of CRISI-ADAPT II is to extend the available climate services for monitoring extreme events, taking advantage of thanks to early warning systems and thus allow the implementation of adequate preventive/adaptive measures. Another innovation of the proposed project is the standardisation of climate analysis criteria to consistently interpret and manage the uncertainty related with the climate scenarios. The monitoring of the extreme events will provide an excellent opportunity to test adaptation measures and operations. This real time validation will allow adjusting the designed methodology and the standardised climate criteria.

The analysis includes public services and infrastructures, such as the water sector (urban drainage, water source management, water treatment, supply, sanitation and emergency response), energy (generation and supply) and commodities (production and commercialisation), including agriculture among others. In order to achieve a consistent implementation of the project, it is performing a standardisation of metrics and capacity building for the climatic analysis criteria to ensure a correct use and interpretation of the possible climate scenarios and forecast uncertainties.

The Sado river basin is located in the south-west part of the Iberian Peninsula, in Portugal (Figure 2). This region is characterized by a dry sub-humid climate, with an average annual precipitation of 620-650mm and high variability throughout the year. Main water users in the basin are from the agricultural sector but urban water supply plays an important role thus making water management and planning a determinant task. In recent years water availability has been diminishing and scarcity is a growing issue with obvious impacts on agriculture and severe concerns related with urban water supply, these also due to increased water quality problems. Climate change has been pointed out has the main cause of more frequent and extend drought periods although growing water demands also plays a relevant role in the problem. Águas de Portugal (AdP) benefits from three water sources in the basin located in the Roxo and the Monte da Rocha reservoirs, and at Ermidas withdrawal infrastructure in the Sado river, the latter for industrial water use.

Figure 2. The Sado river basin in Portugal.

3. CONCLUSIONS

CRISI-ADAPT II will identify the most important variables related to the climate change that can seriously affect water uses, urban services, infrastructures, local economies and the health of the citizens. The project will identify the risk associated to the climate change, and finally, provide a tool for early assessing and prevent the impact of the climate change in cities, citizens and critical infrastructures, including such as water, energy, transport and port sectors among others. Moreover, increased the more open access to the climate risk information will facilitate the adaptation in other sectors not included in this study.

CRISI-ADAPT II aims to reduce the impacts of the climate change and climate extreme events on critical infrastructures and activities framed in strategic sectors (as water, energy, agriculture, transport and port). To achieve this goal, the project will run along two paths:

1) Democratising and mainstreaming climate risk information to the decision-making systems in order to support adaptation and operation. The project plans a Capacity Building for end user to translate technical climate information to specific indicators encompassing a holistic view.

2) Forecasting and monitoring climate impacts though an Early Warning System (MEET and CRIT tools) based on near, long and seasonal range forecast of extreme events. This climate service will allow validating the adaptation measures in a real time implementation.

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