



Deliverable 6.2

Scenarios development

Authors and affiliation:

David Pulido Velázquez (IGME), Antonio Juan Collados Lara (IGME), Leticia Baena Ruiz (IGME), K. Hinsby (GEUS), Jacob Kidmose (GEUS), Anker L. Højberg (GEUS), Amraoui Nadia (BRGM), Helene Bessiere (BRGM), Majdi Mansour (BGS), Henry Debattista (MTI), Manuel Sapiano (MTI), Andrej Stroj (HGI-CGS), Bonzi Luciana (GSS), Severi Paolo (GSS), Lorenzo Calabrese (GSS), Gu Oude Essink (NL, Deltares), Timo Kroon (NL, Deltares), Attila Kovács (MBFSZ),

This report is part of a project that has received funding by the European Union's Horizon 2020 research and innovation programme under grant agreement number 731166.



Deliverable number	D6.2
Dissemination level	Public
Deliverable name	Scenarios development
Work package	WP6,
Lead WP/Deliverable beneficiary	IGME, Spain
Deliverable status	
Version	1.0
Date	07/10/2019

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LIST OF ABBREVIATIONS & ACRONYMS

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1 ASSESSMENT OF POTENTIAL ADAPTATION STRATEGIES

This TACTIC deliverable reports the outcome of tasks “6.2 Definition of scenarios: climate change projections and adaptation scenarios”. The deliverable is focused on 2 different issues, the generation of climate change scenarios (developed in this section 3) and the identification of potential adaptation strategies (developed in section 1 and 2). With respect to the first issue, a method to generate ensemble scenarios to assess drought, reducing the bias in drought statistics (frequency, duration, magnitude and intensity) was developed and published in a research paper (Collados-Lara et al., 2018).

In order to help in the assessment of potential adaptation strategies a review of methods that can be applied has been performed and discussed within the involved partner in the previous meetings. The assessment of adaptation strategies can be performed by applying two different groups of approaches: top-down, which is focused on the analyses of the physical vulnerability; and bottom-up, which tries to assess social vulnerability, and even a mixed of both approaches. The bottom-up approach allows to define plausible socioeconomic scenarios and to assess adaptation measures through participatory processes and workshops with the main actors. The top-down approach intends to identify optimal measurement programs for the different climatic and socio-economic scenarios by using model simulations. The top-down approach is commonly used and will be applied in most TACTIC pilots, while the bottom up approach is being exploring in a few selected pilots such as the Upper Guadiana Basin, with involvement of different stakeholders.

A list of potential adaptation strategies has been identified based on the review of the scientific literature about this issue. This list may help to identify potential adaptation measurements in the pilots. Note that we have not only included measures that are directly related with groundwater management (highlighted in red in the list), but also other measures that could have an indirect impact on groundwater status.



2 LIST OF POTENTIAL ADAPTATION STRATEGIES

The potential adaptation strategies have been classified in three groups: Measures on the demand, on the offer and mixed (demand and offer). The measures on the demand are those that intend to reduce water requirements for the different water uses. The target of the measures on the demand is to obtain additional resources or to improve the regulation of the water resources systems. There are also some measures that affect to both levels, demand and offer.

DEMAND
CHANGES IN LAND USE
Transformation of irrigated area in urban areas Relocation of industry Changing/Introducing new irrigation areas Soil conservation and reduction of floods (Eg. Reforestation and flood plain conservation)
CHANGE IN CROPS AND CROPPING PATTERNS
Re-negotiation of allocation agreements (water concessions) Set clear water use priorities Improve crop diversification Increase short life-cycle (horticultural) crops Promote woody crops Change to rainfed crop I+D+i in Crops. Develop climate change resilient crops
WATER USE EFFICIENCY
Modernization of irrigation systems Irrigation good practices Improve soil moisture retention capacity Improve nitrogen fertilisation efficiency
ECONOMIC INSTRUMENTS
Prices. Ej. Set block rate tariff (agricultural demands); regulatory fees and taxes Subsidies (CAP) to low water requirement crops Water markets
OFFER
INCREASE REGULATION & CONTROL
Small-scale water reservoirs on farmland Improve the reservoir capacity

Conjunctive use management (including artificial recharge) New technologies in aquifer control Increase rainfall interception capacity Hard defences against floods and erosion Improve drainage systems
COMPLEMENTARY RESOURCES
Water reutilization Water transfer Increase groundwater pumping Desalination plants
MIXED (improving resilience)
Improve planning, control and resources allocation More participative and transparent management Management decision by farmer organizations Improved monitoring and early warning Innovation and technology Integrate water demands in conjunctive systems Insurance to floods or drought
REDUCING ENVIRONMENTAL IMPACTS (environmental demand/improve resources quality)
Fitoremediation Increase/optimization water allocation for ecosystems Maintain ecological corridors. Restore rivers and wetlands

3 AN INTEGRATED STATISTICAL METHOD TO GENERATE POTENTIAL FUTURE CLIMATE CHANGE SCENARIOS TO ANALYSE DROUGHT

A research paper has been published focused on the task proposed in the proposal: the development of a new method to generate climate change scenarios considering drought statistics.

The objective of the paper is to investigate different methods to generate future potential climatic scenarios at monthly scale considering meteorological droughts. We assume that more reliable scenarios would be generated by using regional climatic models (RCMs) and statistical correction techniques that produce better approximations to the historical basic and drought statistics. A multi-objective analysis is proposed to identify the inferior approaches. Different ensembles (equifeasible and non-equifeasible) solutions are analysed, identifying their pros and cons. A sensitivity analysis of the method to spatial scale is also performed. The proposed methodology is applied in an alpine basin, the Alto Genil (southern Spain). The method requires historical climatic information and simulations provided by multiple RCMs (9 RCMs are considered in the proposed application) for a future period, assuming a potential emission scenario. We generate future series by applying two conceptual approaches, bias correction and delta change, using five statistical transformation techniques for each. The application shows that the method allows improvement of the definition of local climate scenarios from the RCM simulation considering drought statistics. The sensitivity of the results to the applied approach is analysed.



REFERENCES

Collados-Lara AJ, Pulido-Velazquez D, Pardo-Igúzquiza E. 2018. An Integrated Statistical Method to Generate Potential Future Climate Scenarios to Analyse Droughts. *Water*, 10(9), 1224. doi:10.3390/w10091224.

