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Final Report

PROJECT FINAL REPORT

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Final Report

Please note that the contents of the Final Report can be found in the attachment.

4.1 Final publishable summary report

Executive Summary

Drought Dialogue Fora at the pan-European (pan-EU DDF) and the Case Study scale (CS DDF) were held from the start and served as excellent platforms through facilitated discussions among stakeholders, policy-makers and the consortium: (i) to collect information on factors that govern vulnerability and risk to drought, (ii) to interpret options proposed in EC policy documents, (iii) to test and further shape developed methods (e.g. vulnerability, risk reduction) to identify drought-sensitive in Europe, and (iv) to communicate on past and future natural hazard.
A European Drought Reference database (EDR) was established that displays historical drought as a natural hazard (1958–2009). Trend studies using recent instrumental data confirmed the wetting trend in northern Europe and a drying trend in southern Europe. Time series of historic drought beyond the instrumental record (1500-1950) derived from proxy data (e.g. archives) reveal that frequency of dry episodes has not increased in several European regions. Understanding has improved about to what degree observed climatic trends can be attributed to changes in atmospheric circulation changes (i.e. trends in circulation type frequencies, anthropogenic forcing). Historic drought information (e.g. EDR) was used to test performance of large-scale hydrological models that reveal that ensembles of multi hydrological models are required for impact studies (climate change). Several modelling experiments using different IPCC climate output assessed climate change impact on drought. Large spreads over all time frames are observed, but projected droughts are more robust by the end of 21st century in multiple European regions. Different research lines were followed to improve drought forecasting, essential for early warning. Links of antecedent ocean-atmosphere variation to large-scale drought characteristics show that atmospheric bridge connecting North Atlantic SSTs to drought development is too complex to be described solely by NAO. Improved understanding of drought generating processes led to a comprehensive drought typology that is essential for credible multi-monthly to seasonal drought forecasting. Catchment storage is essential to explain the connection between lagged cumulative precipitation deficits and streamflow drought. Policy recommendations for future drought risk reduction were identified for the six selected Case Study areas (CS) based upon: (i) collated past drought hazards and responses, (ii) anticipated future drought impacts and vulnerability, (iii) assessment of alternative options, (iii) recommendations of CS DDFs, and (iv) EU and international guidance documents. Factors that either reduce or increase drought vulnerability and risk are given, which due to context-specific conditions differ per CS. The CS studies conclude that an 'auto-pilot' approach to drought risk mitigation is impossible: even in a particular area, because drought intensity and impacts are not the same and particularities of potential measures may change from one event to another.
The European Drought Impact Report Inventory (EDII, publicly available through the EDC website) was used for impact analysis to identify drought sensitive areas in Europe. EDII contains categorized data on drought impacts derived from a variety of text sources (about 5000 reports). Impact reports on agriculture, water supply, water quality and freshwater ecosystems dominate, although region-specific as well as event-specific differences and temporal changes occur. Some sectors (e.g. rainfed agriculture) respond to short-term drought, whereas other sectors (water supply, freshwater ecosystems, energy and industry) relying on groundwater and river flow are more sensitive to long-duration droughts. Some regions (e.g. the Mediterranean) are more adapted through reservoir storage and irrigated agriculture. Thresholds in drought indicators were found by combining EDII with the natural hazard database (EDR). Based on these threshold and the assumption that drought impacts can serve as a proxy for vulnerability, the Likelihood of Impact Occurrence (LIO, varies between 0 and 1) was introduced to generate pan-European drought risk maps for different sectors and severity of the natural hazard. Spatial variations of drought risk occur. For moderate drought (hazard), risk is highest in the Mediterranean, in particular for agriculture, and in the densely populated areas of central Europe, for public water supply. In addition to the LIO approach, pan-European vulnerability to drought has been elaborated through a detailed factor-based vulnerability assessment. The three vulnerability components (exposure, sensitivity, adaptive capacity) were broken down in 19 individual factors. Maps per factor were stepwise aggregated and

eventually to a pan-European map showing drought vulnerability (NUTS-2 scale. Assessment of drought vulnerability and associated risk at pan-European level involves compromises because these are different for individuals, sectors and regions, depending on several biophysical and socio-economic factors.
Because of the complex nature of the drought phenomenon, one single quantification of drought (indicator) does not exist that satisfies all monitoring and early warning requirements. Best predictive indicators for particular drought impacts depend on sector and on sectorial management practices and need to be defined with stakeholders. At the detailed, operational scale use of tailored indicator systems in a combined monitoring-modeling-decision support system framework are a prerequisite to communicate with stakeholders about ongoing and forecasted hazards, usually manifold impacts, potential measures to be taken, real time drought management and pro-active drought planning.

Summary description of project context and objectives

The DROUGHT-R&SPI project aimed to reduce future Europe's vulnerability and risk to drought by innovative in-depth studies that combine drought investigations in six case study areas in water-stressed regions (river basin and national scale) with drought analyses at the pan-European scale. Knowledge transfer across these scales is paramount because vulnerability is context-specific (e.g. physical, environmental, socio-economic, cultural, legal, institutional), which requires analyses on detailed scales, whereas international policies and drought-generating climate drivers and land surface processes are operating on large scales. The project planned to adopt Science-Policy Interfacing at the various scales, by establishing Case Study Dialogue Fora and a pan-Europe Dialogue Forum, which should ensure that the research was well integrated into the policy-making from the start of the project onwards. The study intended to foster a better understanding of past droughts (e.g. underlying processes, occurrences, environmental and socio-economic impacts, past responses), which then is anticipated to contribute to the assessment of drought hazards and potential vulnerabilities in the 21th C. Methodologies for early drought warning at the pan-European scale were proposed to be developed, which aim to improve forecasting of a suite of interlinked physical and drought impact indicators. This intends to increase drought preparedness, and to identify and implement appropriate Disaster Risk Reduction measures. The project meant to result through combined drought studies at different scales to the identification of drought-sensitive regions and sectors across Europe, which likely will lead to a more thorough implementation of the EU Water Framework Directive, particularly by further developing of methodologies for Drought Management Plans at different scales (incl. EU level). The work was anticipated to be linked with the European Drought Centre (EDC) ensuring that the outcome has been consolidated beyond the project' lifetime.

The main objectives of Drought-R&SPI were:
1. Foster a better understanding of past droughts (underlying processes, occurrences, incl. frequencies, severities and scales) and in particular to investigate driving factors and characteristics of the most extreme historic events at the pan-European scale, which will be validated against observed natural hazards at the small scale (case studies);
2. Provide an in-depth understanding of the range of pertinent environmental and socio-economic impacts triggered by past drought hazards in different contexts, taking into account economic, political, and social factors at a small scale in water-stressed regions (case studies) and considering the large-scale drivers (transfer of knowledge and information across scales);
3. Evaluate past responses to drought events at the local, river basin and national scale (case studies), and identify best practice examples and lessons learnt in alleviating drought impacts and reducing associated risks from different local environments, which are crucial for the development of methodologies for drought management planning;
4. Develop and test an innovative suite of drought indicators that integrate physical, impact and vulnerability indices, which will address different spatio-temporal scales, interaction across scales and water-related sectors, and that will build upon: (i) the comprehensive knowledge obtained in different contexts at the detailed scale (case studies), and (ii) exploration of the link between impact records (socio-economic, environmental), management factors and vulnerability thresholds across Europe. Development and testing will be linked and shared with research done through the European Drought Observatory (EDO) at the EC Joint Research Centre (JRC) and Waterbase, WSDIS and WISE-RTD (European Environmental Agency, EEA);
5. Develop an innovative methodology for early warning (monitoring and forecasting) of drought at the pan-European scale using the developed European Drought Impact Inventory (EDII database) and suite of indicators, which will help to: (i) to increase drought preparedness, and (ii) to identify

and implement appropriate Disaster Risk Reduction (DRR) measures. Drought-R&SPI will share the obtained knowledge and information with the JRC, which are designing and developing an operational version;
6. Establish Drought Dialogue Fora at different scales, i.e. Science-Policy Interfacing, (i) to identify and evaluate, in close collaboration with the Case Study Drought Dialogue Fora, potential responses for drought risk mitigation, taking into account the drought hazard, its impacts, vulnerabilities and desired development goals, strategies and relevant trade-offs, and (ii) to recognize and assess, in close dialogue with the pan-European Drought Dialogue Forum through an iteration process with feedback loops, how EU and other international policies affect potential responses at the small scale (case studies). Finally, how these together with large-scale impact maps and vulnerabilities will support design, development or implementation of drought-related international policies and planning, incl. Drought Management Plans at different scale (river basin to EU level);
7. Assess the drought hazard at the pan-European scale in the 21st Century (future climate) and identify drought sensitive regions through combining improved knowledge on past events (through the developed European Drought Reference Database, EDR) and related long-term climate variability with projected future changes, incl. the analyses of the outcome from multi-models and multi-scenarios;
8. Assess potential vulnerabilities of the studied systems at the local, river basin and national scale in (potentially) water stressed areas (case studies), taking into account the assessment of the large-scale 21st Century drought hazard, socio-economic drivers of change and anticipated impacts of relevant EU policies, which is essential for development of drought management planning;
9. Assess changes in the modelled impacts for the 21st Century and resulting changes in risk of passing a vulnerability threshold at the pan-European scale in co-operation with the pan-European Drought Dialogue Forum to identify drought sensitive sectors, incl. their geographical location; 10. Share knowledge on drought with experts working on the 2nd cycle of WFD River Basin Management Plans and the general public through a web-based information and discussion platform hosted by the European Drought Centre (EDC)5, and to disseminate knowledge through a summer school and on the proposed 2nd Drought Conference as follow-up of the 1st Drought conference held in Brussels, February 2010.

The DROUGHT-R&SPI project consisted of five work packages. The objectives of these work packages (excl. management package) are given below.

DROUGHT AS A NATURAL HAZARD

The work package Drought as a Natural Hazard elaborated past and future drought and had the following objectives:

• Foster a better understanding of drought as a natural hazard (i.e. controlling processes and occurrence), and in particular to investigate the main climate drivers and characteristics (onset, severity, persistence and recovery) of the most extreme events in Europe;
• Identify drought sensitive regions by combining new knowledge on past events, natural long-term variability and projected future change;
• Advance system knowledge (persistence characteristics) and methodology for drought early warning (i.e. monitoring and forecasting), considering different time scales and geo-climatic regions;
• Develop and test a range of drought indicators suitable for early warning and impact studies at the pan-European scale;
• Facilitate the transfer of knowledge and information across scales through interaction between the pan-European scale and the case studies (local, river basin and national scale).

DROUGHT VULNERABILITY ASSESSMENT AND RISK REDUCTION AT DIFFERENT SCALES; DEVELOPMENT OF CASE STUDIES

This work package elaborated drought impacts, vulnerabilities, risk reduction and response options at the smaller scale (case studies) and had the following objectives:

• Provide an in-depth understanding of past drought hazards and of the range of pertinent environmental and socio-economic impacts in different contexts;
• Evaluate past responses to drought events, and identify best practice examples and pitfalls in

alleviating drought impacts and reducing relevant risks;
• Assess future drought hazards and potential vulnerabilities of the studied systems, on the basis of climate projections, socio-economic drivers of change, environmental constraints and anticipated impacts of relevant EU policies;
• Identify and evaluate, in collaboration with the local Case Study Dialogue Platforms, potential responses for drought risk reduction, in line with the Hyogo Framework for Action;
• Assess the applicability of drought monitoring and early warning indicators at different contexts (local, river basin and national), and develop recommendations for their refinement to support decision-making.
• Examine the link between local-level research results to the pan-European assessments of drought hazards and vulnerabilities, to reveal whether drought events at local/regional scale, their impacts and root causes are relevant to broader contexts and vice -versa.

DROUGHT SENSITIVE AREAS IN EUROPE; IMPACTS, VULNERABILITIES & RISKS

This work package elaborated drought impacts, vulnerabilities and risks at the pan-European scale and had the following objectives:

• Improve the knowledge on links between drought indicators that can be monitored and predicted and a range of drought impacts (incl. crop loss, water supply shortage, low flow, energy production loss, forest fire, heat waves, user conflicts etc.) in different geo-climatic regions in Europe.
• Evaluate and compare vulnerability thresholds and explore the link between the magnitude of impacts and socio-economic, environmental and management factors influencing drought resilience.
• Develop in collaboration with the pan-European Dialogue Platform mapping procedures and map prototypes that allow the identification of sensitive areas in Europe in terms of drought risk from the physical exposure to drought, future changes, and the identified vulnerability thresholds.
• Provide recommendations for impact-related drought indicators and indices that will complement and expand existing Pan European hazard assessment, vulnerability monitoring, and early warning suitable to inform risk reduction measures in EU policies.

SCIENCE-POLICY INTERFACTING; DIALOGUE FORA AND DISSEMINATION AND TRAINING

The work package Science-Policy Interfacing: Dialogue Fora and dissemination and training had the following objectives:

• Foster live dialogue, an iteration and feedback process between researchers and water actors at different levels (river basin, national, pan-European) on drought research and policy agendas through establishing Dialogue Platform Fora;
• Support information-sharing and dissemination of knowledge among the DROUGHT-R&SPI consortium across scales (local, national, pan-European), and with non-European experts (USA, Canada, Asia), particularly with regard to identifying drought-sensitive regions and sectors, and efficient solutions for reducing drought vulnerabilities.
• Develop policy recommendations, stemming from the DROUGHT-R&SPI research and Science-Policy Interaction, to support the formulation of post-2015 WFD River Basin, incl. Drought Management Plans, and other international policies (e.g. UN/ISDR HFA);
• Effectively disseminate and communicate the DROUGHT-R&SPI results to wider audiences, incl. science, policy making and practitioner’s communities at different levels (river basin, national.

Description of main S & T results/foregrounds

DROUGHT AS A LARGE-SCALE NATURAL HAZARD

The European Drought Reference database (EDR) has been developed during the project and was used to disseminate a detailed summary of for major European drought events. The database was made publicly available through the website of the European Drought Centre (www.geo.uio.no/edc). It contains a tool to display drought conditions on any day in the historical period 1958 - 2009, including the recommended meteorological indicators (Standardised Precipitation Index, SPI, Standardised Precipitation and Evaporation Index, SPEI) and hydrological drought indicators.

Studies using historical meteorological drought indicators confirmed the wetting trend in northern Europe and a drying trend in southern Europe. Understanding has improved about to what degree observed climatic trends can be attributed to changes in atmospheric circulation changes (i.e. trends in circulation type frequencies). Circulation changes from January to March were to found to have relatively high influence, contributing to wetting in the North and drying in the South. In general, circulation influence affects climate trends in north-western Europe stronger than the South-East. Several studies explored whether these trends are associated with natural forcing or anthropogenic climate change. Only the change pattern from simulations with anthropogenic forcing could resemble the observed changes.

Time series of historic drought beyond the instrumental record, i.e. 1500-1950 also have been obtained using proxy data (e.g. archives). The cases of England, France, Rhine and Syros series do not prove any increase in frequency of dry episodes since the 16th century, but outcome requires careful interpretation because drought reports are driven by negative impacts, which are associated with the vulnerability at that time. Likely vulnerability has decreased over time.

Historic drought information was also used to test performance of a suite of large-scale hydrological models (GHGs). The choice of model has a significant effect on areal statistics and persistence of historic drought and there is an overall tendency to overestimate the number of drought events and hence, underestimate drought duration. The studies learnt that ensembles of multi hydrological models are required for impact studies, incl. adaptation to climate change.

Impact of climate change on future meteorological drought, soil water and hydrological drought (severity, frequency, duration in different geo-climatic regions across Europe) was assessed through several modelling experiments using SREX or CMIP5 climate output. These experiments display large spreads over all time frames, but projected changes in the frequencies of future drought events show more robust signal-to-noise ratios towards more frequent meteorological drought and soil water drought before the end of the 21st century, particularly in the Mediterranean region. A high-resolution study focussing only at the European continent confirmed significant increases in meteorological drought severity for the Mediterranean region along with increases for areas along the Atlantic coast and in south-eastern Europe. Additional studies in several river basins across the globe, incl. Europe showed that not all combinations GHM-GCM were able to sufficiently capture historic drought in runoff. The constrained multi-model ensemble projects for the cold climates a regime shift and increase in low flows between the control period and future period (increased temperature and precipitation). Dry climates were found to become even drier in the future. One of the modelling studies demonstrated for the Case Study areas that the signal-to-noise ratios clearly are higher for climate change impact on drought characteristics (e.g. duration, severity) than on low flows. A model experiment showed that the drought identification approach has a large influence on projected hydrological droughts. Only in about 25% of the world both the drought duration and the deficit volume are expected to increase when applying an identification approach that considers gradual adaptation to the altered hydrological regime as compared to over 60% when the conventional approach (reference: 1971-2000 hydrological regime) was applied.

Improved understanding of hydroclimatological and catchment processes generating drought development is essential for credible multi-monthly to seasonal drought forecasting, which is a major scientific imperative of direct practical relevance. Different research lines were followed to improve drought forecasting. The first line is a large-scale approach based on antecedent atmospheric circulation or sea surface temperature. Processes were studied that link antecedent ocean-atmosphere variation to drought characteristics in Great Britain (streamflow) and Europe (SPI and SPEI). Patterns in geopotential height, wind, moisture vapour flux and precipitation prior to streamflow drought onset in Great Britain support the influence of the NAO, but also demonstrate that the atmospheric bridge linking North Atlantic SST to drought development is too complex to be described solely by indices of the NAO. Correlation of monthly time series of the percentage of European area in drought with geopotential height indicates that a weakening of the prevailing westerly circulation is associated with drought onset. Such conditions are linked to variation in the East Atlantic/Western Russia (EA/WR) and North Atlantic Oscillation (NAO) atmospheric circulation patterns. In the second research line, the potential to forecast streamflow drought from SPI and SPEI using different time accumulation periods was explored for a large set of catchments across Europe. The analysis illustrates that lagged cumulative precipitation deficits may be useful proxies to estimate hydrological drought, but that there is a large variability of relevant lag times and time accumulation periods from place to place due to catchment storage processes. A more comprehensive approach to understand drought-generating processes relevant for forecasting of hydrological drought involved the development of a drought typology, which describes how

meteorological drought propagates into hydrological drought. A generic framework explains for 8 different drought types how precipitation and temperature anomalies control the conversion of a meteorological drought into a hydrological drought. In the last research line the potential predictability of soil moisture and streamflow drought was investigated using a hydrological model. The two drought types are predictable until lead times of approximately 7 days and 2–3 days, respectively, when using initial soil moisture information and climatological atmospheric forcing. Using also initial snow information and seasonal weather forecasts as forcing, the predictable lead time doubles in case of soil moisture (2 weeks) and triples for streamflow (1 week). Furthermore, the study demonstrates that soil moisture and streamflow forecast skills increase with increasing initial soil moisture anomalies, which implies an increased predictability for very dry soil moisture conditions.

VULNERABILITY AND RISK REDUCTION AT CASE STUDY SCALE

A detailed inventory and an ex-post evaluation of past practices to cope with drought were performed in the six selected Case Studies areas to support identification and selection of options for policy development and drought risk reduction. Stakeholders still perceive significant gaps in the establishment of preventive measures, structured drought planning, and a poor tradition of ex-post evaluation. In a few Case Study areas a detailed economic impact analysis was performed, which generated interesting outcome, in particular for the agriculture and energy sectors (producers and consumers are differently affected, i.e. winners and losers).
Policy recommendations for future drought risk reduction were formulated for the Case Study areas, on the basis of: (i) anticipated future drought impacts and vulnerability, (ii) assessment of alternative options, (iii) recommendations made by the members of the Case Study Dialogue Fora, and (iv) provisions in EU and international guidance documents. A common methodological framework was formulated for each research activity, however, in the implementation phase differentiation among Case Studies was introduced, to account for differences in spatial scales (regional, river basin, national), data availability, policy priorities in each of the areas, and stakeholder involvement. Each Case Study concluded on strategy-related actions for reducing drought risk and, as a further step, on recommendations/outcomes that were of value for the more generic Pan-EU drought assessments.
The analysis of future vulnerability to drought and of potential impacts as a result of future drought exposure and socio-economic development scenarios focused on three sectors: agriculture, urban water supply and energy production. Qualitative (surveys, stakeholder consultation through Case Study Drought Dialogue Fora) and quantitative (modelling) approaches were adopted. Agriculture remains the sector most affected by drought, whereas the risk of forest wildfires is expected to increase also in the future. Factors that may reduce future vulnerability are: (i) improvement of institutional framework on drought, (ii) overcoming policy gaps, (iii) establishment of monitoring & early warning systems, (iv) development of Drought Management Plans, (v) increasing water-use efficiency, and (vi) use of alternative water sources, and increasing user awareness. Factors that may increase future vulnerability are: (i) conflicts due to water scarcity, (ii) status of water sources (quality and quantity), (iii) increased variability of water availability due to climate change, and (iv) economic development patterns. Water scarcity was mentioned as an important exposure-related factor of vulnerability to drought. Any effort to cope with water scarcity will thus contribute to reducing vulnerability to drought. Stakeholder anticipation is that the socio-economic development pattern is the most influencing factor on future drought-related risks, even more than climate change.
Following the analysis of future impacts and vulnerability, options for drought risk reduction were analysed (quantitatively and qualitatively) using also input from stakeholders (next round Case Study Drought Dialogue Fora)). The identification of options was also based on recommendations from EU (e.g. Blueprint to safeguard water resources) and International (e.g. Hyogo Framework for Action) guidance documents. The study learnt that there a wide range of measures that can be implemented for drought risk mitigation and improved drought management. Their applicability is context-specific as susceptibility to drought and coping capacity are local in nature and defined by local/ regional characteristics. Currently already drought-prone and affected areas will more easily develop and implement options adapted to the local context, compared to areas that do not experience droughts frequently. The selection and implementation of drought risk mitigation options depends on the characteristics of the ongoing or upcoming drought. An 'auto-pilot' approach to drought risk mitigation is not possible: even in a particular area, drought intensity and impacts are not the same and particularities of measures may change from one event to another. All Case Studies concluded on proposals for enhancing drought management and summarised the guiding principles for their

implementation, focusing on legislative requirements, technical capacity (tools, data requirements), financial issues, environmental considerations, and any other constraints for the strategy development or its improvement.

DROUGHT SENSITIVE AREAS IN EUROPE; IMPACTS, VULNERABILITIES & RISKS

The European Drought Impact Report Inventory (EDII) was developed during the project and extensively used for analysis of impacts to identify drought sensitive areas in Europe. EDII contains categorized data on drought impacts derived from a variety of text sources. The EDII was made publicly available through the website of the European Drought Centre (www.geo.uio.no/edc). Early 2015, the European Drought Impact Report Inventory (EDII) database contained about 5000 entries. The impact reports span the period 1900 to date, but most entries relate to impacts that occurred since the 1970s. Impact reports on agriculture, water supply, water quality and freshwater ecosystems were found to have dominated in most regions during most events. We found and illustrated that at the pan-European scale, the relative percentage of reported impacts by country suggests slightly higher relative importance of agriculture in the South and East, and of public water supplies in the South and West. The importance of energy and industry impacts, for example, but also other impact types, appears to be more country or region-specific as well as event-specific, e.g. dependent on whether an event is short and accompanied by a heat wave, such as the event of 2003 in Central Europe or characterized by a long multi-year deficit in surface water supplies such as the event of 2004-2008 in the Iberian Peninsula.
The EDII was combined with the natural hazard database (EDR) showing that the major large-scale drought events that occurred in Europe over the past few decades had SPI values below -2 for extended regions. However, a variety of drought impacts have also occurred for values below about -1 or -1.5. Regional studies found that impacts on water supplies, freshwater ecosystems, and energy and industry, which all rely on surface or groundwater resources, are more sensitive to long-duration droughts. These are best indicated by SPI-12 to -24. There are regional differences. Generally, the Mediterranean, which has adapted to lower precipitation and longer dry periods with reservoir storage and irrigated agriculture is less sensitive to short precipitation anomalies and is affected most by long accumulated precipitation deficits. The remainder of Europe responds to more seasonal droughts.
In addition to the impact analysis approach using EDII, quantitative drought impact data (crop yields, and area-burned by forest fire reported by member states) were used. In a pan-European study crop yield anomalies for five major crops were correlated with time series of SPI and SPEI. Correlations are low, but correlation patterns for wheat and barley show stronger links with SPI accumulated over three months in the flowering period. The potential to predict above normal wildfire activity was assessed using meteorological drought indicators (SPI). The study illustrates significant predictability of wildfire activity in southern Europe several months in advance.
Multi-model ensembles of GHM-GCM were used to investigate the impact of a changing climate on crop yields across Europe. For both the near future and the far future, a substantial increase in mean yield reduction was found for the mid-latitudes in Europe due to climate change (SRES A2 scenario). Because the southern regions already suffered from a high yield reduction under the current climate, changes were smaller. Northern regions in Europe are projected to have a lower yield reduction. However, the spread in individual model results was high indicating the high uncertainty in the changes towards the future.
Assessment of vulnerability to drought on a pan-European scale has been elaborated through evaluating and comparing vulnerability thresholds and explore the link between the magnitude of impacts and socio-economic, environmental and management factors influencing drought resilience through a detailed factor-based vulnerability assessment and mapping exercise focusing at the pan-European scale. For this purpose, a wealth of data was collected and evaluated to quantify vulnerability factors. The three vulnerability components (exposure, sensitivity, adaptive capacity) were broken down in 19 individual factors, such as physical drought characteristics, water stress, water body status (WFD), population, legal/institutional aspects, socio-cultural circumstances, water infrastructure, financial and economic conditions. After mapping individual factors these were aggregated to produce maps by component, and eventually the map of vulnerability to drought at pan-European level was produced. The results of this work lead to a number of key findings that show variation and relevance of factors vary for spatial scales around the NUTS-2 level, for situations and particular sectors. The maps resulting from this vulnerability assessment indicate trends of the level of vulnerability across Europe that can contribute to inform the design of future

drought management policies and guidelines.
The vulnerability maps, which typically were based on a combination of relevant, more or less subjectively weighted vulnerability factors, served to complement the modelling and drought risk mapping. For the risk assessment the DROUGHT-R&SPI project took advantage of reported drought impacts from the EDII database and empirically estimated risk as the Likelihood of Impact Occurrence (LIO). The approach assumes that drought impacts are symptoms of vulnerability and can therefore serve as a proxy for part of the vulnerability. Three generations of risk model development and risk map construction were developed within the project. The EDII version (i.e. reflect number of impact reports) and the number of explaining variables (single variable versus multi variable) are the main differences. To map the risk of drought, LIOs were displayed for four impact categories “Agriculture & Livestock Farming”, “Public Water Supply”, ”Energy & Industry” and “Water Quality” for given hazard levels (index of SPEI), which correspond to particular drought return periods. The maps show interesting spatial variations of drought risk. For moderate drought, risk is highest in the Mediterranean, in particular for Agriculture and Livestock Farming, and in the densely populated areas of central Europe, in particular for Water Quality and Public Water Supply, a pattern that generally dominates the maps. However, for more severe drought hazard (SPEI values of -2.5 to -2), risk increases everywhere, but with the most differences spatially and for different considered categories. LIO of impacts on Energy and Industry only increase for the most severe drought hazard. For the most severe drought, risk is high almost everywhere.
The impact reports in the EDII evidenced that there are European regions where awareness of drought hazard has increased in recent years, and resilience building likely took place. The dynamics of drought vulnerability to be expected was analysed based on the reported drought impacts over time. Under the assumption that the composition of impacts represents a particular vulnerability profile at the time of a drought event, the study revealed that vulnerability is dynamic, i.e. changes from event to event. The distributions of impact types suggest at gradual changes following a certain trend over time but also following particular legislative changes that may have influenced this pattern. Overall, national water management plans and the European Framework directive may have decreased the vulnerability for impacts related to water resources management, but, may also have increased the awareness and recognition of environmental impacts (and with that seemingly the vulnerability) as a result of better monitoring and public interaction. Untangling these aspects for the past will be a key towards understanding the combination of future hazard predictions and vulnerability changes that lead to changes in drought risk in the future.
The studies also have revealed important issues complicating analyses. For instance, the spatial differences of impact reporting at administrative regional levels is often too coarse to associate it to other relevant units such as river basins, thus limiting the use of hydrological indicators. Hydrological indicators are also more difficult to obtain, as no EU wide observation based data product exist that is freely accessible to support a suitable analysis at the pan-European scale. Commonly, large-scale models do not account for important human alterations to river flow in the necessary detail.
Assessment of vulnerability to drought and associated risk at a pan-European level is a comprehensive task because it is different for individuals, sectors and nations, depending on several biophysical and socio-economic factors. Thus all indices, models, and consequently the maps are based on a number of compromises due to the aim for pan-European comparability.

DROUGHT INDICATORS

The complex nature of drought related phenomena also implies that there cannot be one single quantification of drought, satisfying all monitoring and early warning requirements. Hence, it is unlikely that one single drought monitoring and early warning system will satisfy the needs of all potential users. Therefore, a prerequisite for an efficient monitoring system is to identify the relevant stakeholders and to formulate well defined monitoring and early warning objectives, incl. indicators. Drought indicators are usually associated with so-called triggers, i.e. indicator values at which negative drought impacts are expected. Typical triggers can be classified into: (i) probabilistic triggers, which relate to the occurrence frequency of drought events; (ii) deterministic triggers, which refer to indicator values that should not be reached (e.g. environmental flow regulations); and (iii) empirical triggers which are based on empirically linking past drought impacts to drought indicators using statistical techniques.
The pan-European analyses and modelling of drought impacts and vulnerability served as a basis to provide recommendations for impact-related drought indicators and indices that will complement and

expand existing Pan European hazard assessment, vulnerability monitoring, and early warning suitable to inform risk reduction measures in EU policies. Main observations are:

• Drought indicators showing the best link to drought impacts varied regionally at spatial scales smaller than the national or continental scale. Scale differences between impacts reported for administrative units (NUTS) and river basins used for hydrological monitoring complicate analyses.
• SPEI showed closer links to impacts than SPI, confirming other studies on the correlation between SPI (or SPEI) and different hydrological, agricultural, and ecological response variables. In the case of the quantitative crop yield anomalies SPEI links were not substantially stronger than the SPI.
• Best predictive indicators for particular drought impacts depend on sector and on sectorial management practices, e.g.:
- For rainfed agriculture, predominantly short to intermediate accumulation periods of SPI or SPEI (about 2-6 months) are better linked to impact occurrence.
- For irrigated agriculture, water supply, energy and industry, generally longer accumulation times of SPI and SPEI or combination of short and long accumulation periods are better linked to impacts, with optimal choices varying.
- For water-borne transport on the large rivers rather short accumulation periods of SPI or SPEI (about 1 2 month) likely will apply, although not specifically investigated in this project.
To fully account for these practices, more information and complex models and/or hydrological indices will be necessary (see below, detailed operational scale).
• Different drought impacts occur during different seasons, highlighting the need for a season-specific analysis, indicator or to otherwise account for this. Unfortunately, many impact reports only allow determining the year of occurrence, not the month or season.
• The link between drought indicators and impacts is often non-linear and affected by competing influences (e.g. fuel availability for wildfires; positive effects of drought-related weather during particular phases of crop growth or for particular crops) that can be revealed through analysis with well-chosen indicators.
• Little information is available for the onset, duration and end of impacts, making it difficult to analyse impacts over prolonged droughts as common in the Mediterranean and in large groundwater bodies in other parts of Europe (e.g. UK), and thus to select specific indicators that take into account the severity and duration of these long droughts.

However, at the detailed, operational scale (river basin scale, or in some cases national scale, like the Netherlands) use of tailored indicator systems is more efficient to communicate with stakeholders about the ongoing and forecasted hazard, the usually manifold impacts, the potential measures to be taken and the real time drought management, to better link with impacts and also for real time management of events. The physical meaning is hard to communicate to stakeholders. For these purposes, the use of a Decision Support System for drought management is almost indispensable to accomplish appropriate planning for drought and also an effective real time decision making. The involvement of stakeholders is essential, not only to support decision making during the drought (incl. the onset and recovery phases), but also for the planning of structural measures to reduce future drought vulnerability, hence to lower the risk (pro-active).

SCIENCE-POLICY INTERFACING; DROUGHT DIALOGUE FORA

Drought Dialogue Fora (DDFs) were further been developed. In most Case Study areas several rounds of fora (CS DDFs) were organised. These fora were excellent platforms through facilitated discussions to collect information on factors that governed vulnerability and risk of past drought or will determine these in the future. The dialogue was also fundamental in testing the developed methods (see Vulnerability and risk reduction at Case Study scale, above). Stakeholders in the CS DDFs prefer regular contact and cooperation with scientists in an open discussion atmosphere, rather than simply participating in annual events/workshops with single-way presentations and short discussion time in usually considerably crowded places The outcome of the CS DDFs very much contributed to defining methodologies to assess drought sensitive areas in Europe: through pan-European analyses of impacts, vulnerabilities and risks (see above). The methodologies for large-scale analyses were further shaped and tested in three pan-European Drought Dialogue Fora (pan-EU DDF). On the other hand the pan-EU DDFs helped to interpret options proposed in EC policy documents (e.g. Blueprint) to become meaningful at the Case Study scale.
While the 1st pan-EU DDF (Nicosia, Cyprus) served to explore requirements of policy makers and

coordinators of other large national and international projects in terms of methodologies for drought vulnerability and risk assessment (see 1st Periodic Report), the 2nd pan-EU DDF (Brussels) focussed on discussion and feedback to four issues related to drought vulnerability assessment and potential risk mapping at the pan-European scale. The four issues were: (i) the scale and use of risk maps, (ii) specific impacts (and hence sectors) of drought that are relevant in different geo-climatic regions in Europe, (iii) factors that affect vulnerability to drought, and (iv) potential models to assess this vulnerability. Options for the size of spatial units were indicated, as well as factors that either increase vulnerability (e.g. high population density in urban areas, high dependence of energy production on freshwater) or decrease vulnerability (prominent stakeholders involvement, well-developed regulatory framework related to drought, high degree of social awareness about drought risk). On the 3rd pan-EU DDF (Brussels) preliminary project' outcome was presented and discussed. This involved: (i) European Drought Impact Database (EDII); (ii) first pan-EU maps of drought vulnerability factors, (iii) drought: monitoring, forecasting and indicators; and (iv) how to upscale context-specific CS experiences to the pan-European scale. The 4th pan-EU DDF had a more scientific nature and was linked to the final DROUGHT-R&SPI Conference in Valencia. Final vulnerability and risk maps were presented there. Associated developments were presented and discussed, such as the guidelines for ecological flows (e-flows) and implementation of pan-EU knowledge and experiences in the Member States (Portugal, UK and Jucar).

Potential impact and main dissemination activities and exploitation results

POTENTIAL IMPACT

The adoption of a trans-disciplinary approach and the incorporation of stakeholders and policy makers across scales right from the beginning led to DROUGHT-R&SPI having already impact on Drought Management Planning, i.e. helping to formulate reduce drought vulnerability and policy options in the Case Study areas. In particular, in the Mediterranean cases (Portugal, Jucar River basin, Po River basin and the Island of Syros) were in close co-cooperation happened with stakeholders and policy makers to formulate options. In the less-water stresses cases (Switzerland, the Netherlands), the DROUGHT-R&SPI project was not steering, but contributed to planning to make the countries less vulnerable to drought through associations with ongoing national drought initiatives (Switzerland: DROUGHT.CH project; and the Netherlands: Delta programme, securing fresh water supply programme).
The DROUGHT-R&SPI project has provided scientifically sound and new knowledge that is ready to be used to reduce drought vulnerability and associated risk in Europe through:
• Development of a methodology to assess and map pan-European drought vulnerability at the level of the NUTS2 scale, which is based on 19 vulnerability factors that address exposure, sensitivity and adaptive capacity as key vulnerability components
• Development of a methodology to assess and map pan-European drought risk taking advantage of a wealth of collated historic impact reports (European Drought Impact Report Inventory, EDII). Risk is estimated as Likelihood of Impact Occurrence (LIO). LIO maps were displayed for four impact categories "Agriculture & Livestock Farming", "Public Water Supply", "Energy & Industry" and "Water Quality" for given hazard levels (expressed as Standardized Precipitation Evaporation Index), which correspond to particular drought return periods.
The maps resulting from the vulnerability assessment indicate the spatial distribution of the level of vulnerability across Europe, incl. causing factors. The generated vulnerability maps can be combined with the impact-based risk maps to identify drought sensitive areas and impacted sectors for different return periods. The outcome of this analysis can contribute to fine tune the design of future drought management policies and guidelines.
The pan-European vulnerability and associated risk maps have a generic nature because of their pan-European inter-comparability. These large-scale maps can be complemented with outcome of: (i) the analysis of the future vulnerability to drought and of potential impacts at the Case Study scale as a result of future drought exposure and socio-economic development scenarios, and (ii) policy recommendations for future drought risk reduction.
In addition to the above-mentioned vulnerability and risk maps, the project' results can assist further development of drought management plans, incl. adequate drought monitoring and early warning (DMEW) as part of River Basin Management Plans, EU Water Framework Directive (WFD). Drought indicators are an important DMEW component. Guidance is provided on drought indicators, which can have a different nature (probabilistic, deterministic, empirical). Awareness indicators are

recommended for large-scale studies and for informing the general public. These indicators may have a composite nature combining different drought types, provided that these are well communicated. More specific, impact-based indicators are required when decisions need to be taken. The studies using the EDII prove that these indicators should be specific to the vulnerability of sector)s) and potential impacts of the region or river basin. At the pan-European scale, DMEW mainly benefits from transboundary communication in its current state. However, it could become an important tool for future policy choices (e.g. drought declaration, aid and compensation) and risk management decisions at the national and multi-national scale, if it was linked more specifically to drought impacts Comprehensive, real-time drought management at the river basin scale often uses a framework of monitoring-modeling-Decision Support Systems driven by operational drought indicators. Monitored and forecasted spatial-distributed states of hydrometeorological variables and fluxes are translated in indicators tailored to the impacted sectors. Indicators are also simulated to explore effects of potential short-term measures that reduce impacts. Knowledge obtained on drought impacts is already used to explore if information provided by the European Drought Observatory can be enhanced.

The project will provide support to adaption to climate change, in particular through:

• The European Drought Reference database (EDR) that can help to test the next generation of global hydrological models (e.g. better subsurface storage representation, higher spatial resolution) driven by recent climate projections. DROUGHT-R&SPI has provided a number of methods on how drought characteristics identified with multi-model ensembles can be tested against observations and documented events

• Projections of different drought types (meteorological, soil water, runoff, river flow) using different future climate forcings. Different uncertainty assessment methods (e.g. multi-model, signal-to-noise) have been developed

• Different drought identification approaches (e.g. standardized variables, threshold approaches). Moreover, the project has illustrated the substantial influence of the identification method on hydrological drought whether it considers adaptation to a gradually changing hydrological regime or not. The latter usually is applied, with e.g. the period 1971-2000) as reference

• Quantitative Impacts on future crop yield, incl. ways to express uncertainty

• The EDR that can assist further development of adaptation measures by using exposure data form historic and projected droughts. The EDII can help with reported manifold impacts as response to drought and the links between the impacts and meteorological indicators (Standardized Precipitation Index, SPI; Standardized Precipitation Evaporation Index, SPEI.

The DROUGHT-R&SPI communicated with several policy makers in Brussels, i.e. DG Environment, DG Climate and DG Enterprise, as well as with Commission Services (JRC, EEA) dealing with hydrological extremes. This was done through the pan-European Drought Dialogue Fora, targeted meetings, the WFD-CIS Expert Group on Water Scarcity and Drought, the WFD-CIS Working Group on Groundwater and a recent EEA meeting on climate and weather-induced extremes.

The European Drought Impact Report Inventory (EDII) is a powerful database to be used in the European Research Area (ERA). It can be extremely suitable, for example in Water and Climate studies, disaster risk studies that aim to further develop or to introduce new measures and technologies to enhance effective response capacity to extreme weather and climate events affecting the security of people and assets.

The project also impacted the implementation of the WMO/Global Water Partnership Integrated Drought Management Programme (IDMP) in ten Central and Eastern European countries (CEE). The 7-step approach to develop a national drought management policy and plan was reviewed and concrete suggestions were given to improve. The IDMP-CEE approach will be the basis for the drought chapter in the next cycle of River Basin Management Plans that the EU countries compile as response to the EU Water Framework Directive (WFD). The non-EU countries in CEE are encouraged to adopt the IDMP approach in their national and regional water management and policy.

The DROUGHT-R&SPI project can also assist implementation of several priorities of the Hyogo Framework for Action, in particular to: (i) identify, assess and monitor disaster risks and enhance early warning, (ii) reduce the underlying risk factors, (iii) strengthen disaster preparedness for effective response at all levels, and (iv) use knowledge, innovation and education to build a culture of safety and resilience at all levels. Further development of these priorities is essential as concluded at the recent World Water Forum in Korea (April 2015), where it was discussed that globally, water-related disasters account for 90% of all natural disasters, and impacts from water-related disasters can in economic terms be up to 15% of annual GDP for certain countries.

The project already has significant outreach during the project life time due to Drought Dialogues in the Case Study areas and four pan-European Drought Dialogue Fora (pan-EU DDFs). In some of the pan-EU DDFs there was also interaction with several drought-related EU projects, initiatives of International Organisations (e.g. UNESCO-IHP, WMO/GWP) and large national projects (e.g. SCARCE). The project further trained about 10 PhD and postdocs. The Drought Summer School in Syros (Greece) increased knowledge of 25 PhD students, postdocs and junior scientists and allowed them to build a network. Preliminary Project' outcome was already presented and discussed at tens of conferences and workshops. The DROUGHT-R&SPI Conference in Valencia (March 2015) allowed the consortium to present the final outcome and to discuss it with over 150 people working on drought. Project's results will be available beyond its lifetime through the Science-Policy Briefs, 35 two-page flyers, about 50 peer-reviewed papers, and 35 DROUGHT-R&SPI Technical Reports. The website will be accessible until at least 2020. The European Drought Reference database (EDR) and the European Drought Impact Report Inventory (EDII) and the R-software package to calculate Standardized Climate Indices (SCI) will also help to remain the DROUGHT-R&SPI project still visible for a number of years.

DISSEMINATION ACTIVITIES AND EXPLOITATION RESULTS

In the 2nd Science-Policy Brief (SPB), the DROUGHT-R&SPI consortium decided for two perspectives, both starting from the urgent need to reduce drought impacts, through increased knowledge, drought management plans and an improved science-policy interfacing that will lead to better preparedness and reduced vulnerability to future drought and the risks they pose for Europe. One perspective is that of the "Tools and Instruments" that contribute to Improved Drought Management and Preparedness. The second perspective resulted from realising that "Science-Policy Interfacing" alone is not enough in the chain to implement procedures and measures in relation to drought. There is a need to move beyond SPI towards SPI-Implementation. After 'science' and 'policy' have 'interfaced' to enable formulation and implementation of policies, guidelines, procedures and the like, the Member States' water managers have to ensure the correct 'Implementation' of the measures, in cooperation with stakeholders.
The drought-related messages to different audiences started from the view that drought is a multi-stakeholder and multi-dimensional phenomenon for which uniform measures are difficult to provide and implement, and therefore management plans need to include local demands and make use of tailored advice to deal adequately with the uncertainties involved in dealing with drought. An on-line questionnaire survey was designed to collect views from different people dealing with drought. Eventually messages were developed for three major stakeholder groups: i.e. Public Authorities, Businesses and Citizens. The desire for water saving technologies, techniques and drought management strategies and plans, in other words pro-active measures, were topics to be addressed in all messages. The same applies to communication on drought, but the means are different for the categories. Businesses and Public Authorities appear to have similar preferences in way they would like to obtain information (e.g. meetings, information sessions/conferences and educational programmes), whilst Citizens have a preference towards the media and smart phone applications.
The "International Conference on Drought Research and Science-Policy Interfacing" was the final event of DROUGHT-R&SPI project. The conference was held from 10-13 March 2015 in Valencia, Spain. With a total number of about 150 participants, it included 61 oral presentations and 36 posters. A total of 73 of these contributions were published in a book (CRC/ Balkema). The conference incorporated the 4th pan EU DDF. Drought related research were discussed, incl. progress on response policies to foster development of Drought Policies and Plans to reduce risk and vulnerability, and to enhance preparedness and resiliency. The conference addressed drought identification and characterization, drought assessment (impacts) and drought policies to develop drought management plans at different scales (river basin, national and international). The conference was an outstanding platform to convey the main results from the project and it served as a forum for discussion among scientists researching drought, stakeholders, water managers, experts and representatives of authorities on experiences, about the needs and challenges for drought management.
The 1-week Summer School on 'Drought Hazard and Management: Challenges in a Changing World' was held in June 2014 in Hermoupolis Syros, Greece. It brought together 25 PhD candidates and young researchers (14 women; 11 men; 6 participants had a non-European nationality and came from China, India, Algeria, Brazil, Iran, German/Uruguayan). The School included lectures,

workshops, a poster session, where participants presented their on-going research activities, a field trip and a closing session, where participants presented the outcomes from the Workshops. In addition to obtaining knowledge about drought and skills to handle drought, the school offered a perfect platform for networking, which should not be underestimated. Previous school with a similar setup have proven to be the basis for long-lasting working contacts.
In the project about 10 PhD students and postdocs were further educated in the various aspects related to drought. About 35 DROUGHT-R&SPI Technical Reports were written, which explain in detail the methodologies that have developed and the results that were obtained. Around 35 two page flyers have been made available, which provide specific project' outcome in two pages. Two Science Policy Briefs were written. The reports, flyers and Science Policy Briefs are freely available on the internet. About 50 peer-reviewed papers are published in scientific journals dealing with natural hazards, water management, hydrology, climate, environment. Almost all are open access. In addition to the Drought Dialogue Fora, project results have been presented and shared with colleagues on almost 100 conferences, workshops, assemblies, symposia, seminars. The content of many of these presentations can be found in abstracts or conference proceedings (see 2nd Periodic Report, Section 4.5 and 1st Periodic Report, Section 4.2).
The project website (www.eu-drought.org/) provides in addition to information about the DROUGHT-R&SPI project, links to the DROUGHT-R&SPI Technical reports, flyers, Science Policy Briefs and peer-reviewed papers. The website will remain accessible at least until 2020. The DROUGHT-R&SPI website is closely linked to the website of the European Drought Centre (EDC, www.geo.uio.no/edc). The EDC website houses both the European Drought Reference (EDR) database, which provides detailed meteorological and hydrological drought statistics, and the European Drought Impact Report Inventory (EDII), which stores user-provided information about drought impacts. The EDC platform has been used in the project for an interactive web based discussion forum to further develop the EDII. This was particularly linked to the Drought Summer School in Syros.
A software package in R (Repository CRAN) was developed. The R package "SCI" calculates Standardized Climate Indices, such as SPI, SRI or SPEI. SCI is a transformation of (smoothed) climate (or environmental) time series that removes seasonality and forces the data to take values of the standard normal distribution. SCI was originally developed for precipitation. In that case it is known as the Standardized Precipitation Index (SPI).

Address of project public website and relevant contact details

The public project website can be found at: http://www.eu-drought.org/
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European Drought Centre: www.geo.uio.no/edc
WATCH (WATer and global Change): http://www.eu-watch.org/
DROUGHT-R&SPI SPI (Fostering European Drought Research and Science-Policy Interfacing): http://www.eu-drought.org/

4.2 Use and dissemination of foreground

Section A (public)

Publications

LIST OF SCIENTIFIC PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
No.	Title / DOI	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Date of publication	Relevant pages	Is open access provided to this publication ?	Type
1	Exploring the link between drought indicators and impacts 10.5194/nhess d-2-7583-2014	S. Bachmair , I. Kohn , K. Stahl	Natural Hazards and Earth System Science	Vol. 2/Issue 12	European Geosciences Union		01/01/2014	7583-7620	Yes	Peer reviewed
2	Investigation of variable threshold level approaches for hydrological drought identification 10.5194/hessd -11-12765-2014	B. S. Beyene , A. F. Van Loon , H. A. J. Van Lanen , P. J. J. F. Torfs	Natural Hazards and Earth System Science	Vol. 11/Issue 11	European Geosciences Union		01/01/2014	12765-127 97	Yes	Peer reviewed
3	Towards pan-European drought risk maps: quantifying the link between drought indices and reported drought impacts 10.1088/1748- 9326/10/1/014008	Veit Blauhut , Lukas Gudmundss on , Kerstin Stahl	Environmental Research Letters	Vol. 10/Issue 1	Institute of Physics Publishing		01/01/2015	014008	Yes	Peer reviewed
4	Western Mediterranean precipitation over the last 300 years from instrumental observations 10.1007/s1058 4-012-0539-9	D. Camuffo , C. Bertolin , N. Diodato , C. Cocheo , M. Barriendos , F. Dominguez -Castro , E. Garnier , M. J. Alcoforado , M. F. Nunes	Climatic Change	Vol. 117/Issu e 1-2	Springer Netherlands	Netherlands	01/03/2013	85-101	Yes	Peer reviewed

5	Predicting above normal wildfire activity in southern Europe as a function of me teorological drought 10.1088/1748- 9326/9/8/084008	L Gudmunds son , F C Rego , M R ocha , S I Senevirat ne	Environmental Research Letters	Vol. 9/Iss ue 8	Institute of Physics Publishing		01/08/2014	084008	Yes	Peer revie wed
6	Attribution of European precipitatio n and temperature trends to changes in circulation types 10.5194/hessd -11-12799-2014	A. K. Fleig , L . M. Tallakse n , P. James , H. Hisdal , K. Stahl	Hydrology and Earth System Sciences	Vol. 11/Is sue 11	European Geosci ences Union		01/01/2014	12799-128 31	Yes	Peer revie wed
7	The future for global water assessment 10.1016/j.jhy drol.2014.05.014	Richard J. Harding , Graham P. Weedon , Henny A.J. van Lanen , Douglas B. C lark	Journal of Hydrology	Vol. 518	Elsevier	Netherlands	01/10/2014	186-193	Yes	Peer revie wed
8	A Model for Solving the Optimal Water Al location Problem in River Basins with Ne twork Flow Programming When Introdu cing Non-Linearit ies 10.1007/s1126 9-012-0129-7	D. Haro , J. Pa redes , A. Sole ra , J. Andreu	Water Resources Management	Vol. 26/Is sue 14	Springer Netherlands	Netherlands	01/11/2012	4059-4071	Yes	Peer revie wed
9	Methodology for Drought Risk Assessment in Within-year Regulated Reservoir Syste ms. Application to the Orbigo River Syst em (Spain) 10.1007/s1126 9-014-0710-3	David Haro , Abel Solera , Javier Paredes , Joaquín And reu	Water Resources Management	Vol. 28/Is sue 11	Springer Netherlands	Netherlands	01/09/2014	3801-3814	Yes	Peer revie wed
10	Ocean–Atmosph ere Forcing of Summer Streamflow Drought in Great Britain http://dx.doi .org/10.1175/JHM-D-11-010 0.1	Daniel G. Kingston , Anne K. Fleig , Lena M. Tallakse n , David M. Hannah	Journal of Hydrometeorol ogy	Vol. 14/Is sue 1	American Meteor ologic al Society	United States	01/02/2013	331-344	Yes	Peer revie wed
11	European-Scal e Drought: Understandin g Connections between Atmospheric Circu lation and Meteorologica l Drought Indices 10.1175/JCLI- D-14-00001.1	Daniel G. Kingston , James H. Stagge , Lena M. Tallaksen , David M. Ha nnah	Journal of Climate	Vol. 28/Is sue 2	American Meteor ologic al Society	United States	01/01/2015	505-516	Yes	Peer revie wed

12	Development of operating rules for a complex multi-reserv oir system by coupling genetic algorithms and network optimization 10.1080/02626 667.2013.779777	N. Lerma , J. Paredes- Arquiola , J. Andreu , A. Solera	Hydrological Sciences Journal/Journ al des Sciences, Hydrologiques	Vol. 58/Issue 4	Taylor and Francis Ltd.	United Kingdom	01/05/2013	797-812	Yes	Peer reviewed
13	Assessment of evolutionary algorithms for optimal operating rules design in real Water Resource Systems http://dx.doi .org/10.1016/j.envsoft.20 14 .09.024	Néstor Lerma , Javier Paredes-Arquiola , Joaquín Andreu , Abel Solera , Giovanni M. Sechi	Environmental Modelling and Software	Vol. 69	Elsevier BV	Netherlands	01/07/2015	425-436	Yes	Peer reviewed
14	Evolutionary network flow models for obtaining operation rules in multi-reservo ir water systems 10.2166/hydro .2013.151	Néstor Lerma , Javier Paredes-Arquiola , Jose-Luis Molina , Joaquín Andreu	Journal of Hydroinformat ics	Vol. 16/Issue 1	IWA Publishing	United Kingdom	01/01/2014	33	Yes	Peer reviewed
15	Adapting water accounting for integrated water resource management. The Júcar Water Resource System (Spain) http://dx.doi .org/10.1016/j.jhydrol.20 14 .10.002	Andrea Momblanch , Joaquín Andreu , Javier Paredes- Arquiola , Abel Solera , María Pedro-Monzonís	Journal of Hydrology	Vol. 519	Elsevier	Netherlands	01/11/2014	3369-3385	Yes	Peer reviewed
16	Managing water quality under drought conditions in the Llobregat River Basin 10.1016/j.sci totenv.2014.06.069	Andrea Momblanch , Javier Paredes-Arquiola , Antoni Munné , Andreu Manzano , Javier Arnau , Joaquín Andreu	Science of the Total Environment	Vol. 503-504	Elsevier	Netherlands	01/01/2015	300-318	Yes	Peer reviewed
17	Integration of research advances in modelling and monitoring in support of WFD river basin management planning in the context of climate change http://dx.doi .org/10.1016/j.scitotenv. 20	Philippe Quevauvi ller , Damia Barceló , Martin Beniston , Slobodan Djo	Science of the Total Environment	Vol. 440	Elsevier	Netherlands	01/12/2012	167-177	Yes	Peer reviewed

	12.07.055	rdjevic , Richard J. Harding , Ana Iglesias , Ralf Ludwig , Antonio Navarra , Alícia Navarro Ortega , Ole Mark , Roberto Roson , Daniel Sempere , Markus Stoffel , Henny A.J. van Lanen , Micha Werner								
18	Elusive drought: uncertainty in observed trends and short- and long-term CMIP5 projections 10.5194/hess- 17-1765-2013	B. Orlowsky , S. I. Seneviratne	Hydrology and Earth System Sciences	Vol. 17/Issue 5	European Geosciences Union		01/01/2013	1765-1781	Yes	Peer revie wed
19	Today#s virtual water consumption and trade under future water scarcity 10.1088/1748- 9326/9/7/074007	B Orlowsky , A Y Hoekstra , L Gudmundsson , Sonia I Seneviratne	Environmental Research Letters	Vol. 9/Issue 7	Institute of Physics Publishing		01/07/2014	074007	Yes	Peer revie wed
20	Inferring Soil Moisture Memory from Streamflow Observations Using a Simple Water Balance Model 10.1175/JHM-D -12-099.1	Rene Orth , Randal D. Koster , Sonia I. Senevira tne	Journal of Hydrometeorol ogy	Vol. 14/Issue 6	American Meteorologic al Society	United States	01/12/2013	1773-1790	Yes	Peer revie wed
21	Using soil moisture forecasts for sub-seasonal summer temperature predictions in Europe 10.1007/s0038 2-014-2112-x	René Orth , Sonia I. Senevirat ne	Climate Dynamics	Vol. 43/Issue 12	Springer Verlag	Germany	01/12/2014	3403-3418	Yes	Peer revie wed
22	Introduction of a simple-model-based land surface dataset for Europe 10.1088/1748- 9326/10/4/044012	Rene Orth , Sonia I Senevirat ne	Environmental Research Letters	Vol. 10/Issue 4	Institute of Physics Publishing		01/04/2015	044012	Yes	Peer revie wed
23	Does model performance improve with complexity? A case study with three hydrological models 10.1016/j.jhy drol.2015.01.044	Rene Orth , Maria Staudinger , Sonia I. Senevira tne , Jan Seibert ,	Journal of Hydrology	Vol. 523	Elsevier	Netherlands	01/04/2015	147-159	Yes	Peer revie wed

		Massimil iano Zappa								
24	Key issues for determining the exploitable water resources in a Mediterranea n river b asin http://dx.doi .org/10.1016/j.scitotenv. 20 14.07.042	María Pedr o-Mon zonís , Javier Ferrer , Abel Solera , Teodoro Estr ela , Javier Pa redes- Arqu iola	Science of the Total Environment	Vol. 503-504	Elsevier	Netherlands	01/01/2015	319-328	Yes	Peer revie wed
25	Candidate Distribution s for Climatological Drought Indices (SPI and SPEI) 10.1002/joc.4 267	James H. S tagge , Lena M. Tallaksen , Lukas G udmunds son , Anne F. Van Loon , Kerstin Stahl	International Journal of Climatology	35/7	John Wiley and Sons Ltd	United Kingdom	01/02/2015	n/a-n/a	Yes	Peer revie wed
26	Filling the white space on maps of Europ ean runoff trends: estimates from a mult i-model ensemble 10.5194/hess- 16-2035-2012	K. Stahl , L. M. Tallaksen , J. Hannaford , H. A. J. van Lanen	Hydrology and Earth System Sciences	Vol. 16/Is sue 7	European Geosci ences Union		01/01/2012	2035-2047	Yes	Peer revie wed
27	A generic method for hydrological drought identificatio n across different climate reg ions 10.5194/hess- 16-2437-2012	M. H. J. van Huijgevo ort , P. Hazenber g , H. A. J. van Lanen , R. Uijlenhoe t	Hydrology and Earth System Sciences	Vol. 16/Is sue 8	European Geosci ences Union		01/01/2012	2437-2451	Yes	Peer revie wed
28	Global Multimodel Analysis of Drought in Runoff for the Second Half of the Twent ieth Century 10.1175/JHM-D -12-0186.1	M. H. J. van Huijgevo ort , P. Hazenber g , H. A. J. van Lanen , A. J. Teuling , D. B. Clark , S. Folwell , S. N. Gosling , N. Hanasaki , J. Heinke , S. Koirala , T. S tacke , F. Voss , J. Shef field , R. Uijl	Journal of Hydrometeorol ogy	Vol. 14/Is sue 5	American Meteor ologic al Society	United States	01/10/2013	1535-1552	Yes	Peer revie wed

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29	Identificatio n of changes in hydrological drought characterist ics from a multi-GCM driven ensemble constrained by observed discharge 10.1016/j.jhy drol.2014.02.060	M.H.J. van Huijgevoo rt , H.A.J. van Lanen , A.J. T euling , R. Uij lenhoet	Journal of Hydrology	Vol. 512	Elsevier	Netherlands	01/05/2014	421-434	Yes	Peer revie wed
30	Hydrological drought across the world: i mpact of climate and physical catchment structure 10.5194/hess- 17-1715-2013	H. A. J. Van Lanen , N. W anders , L. M. Tallakse n , A. F. Van Loon	Hydrology and Earth System Sciences	Vol. 17/Is sue 5	European Geosci ences Union		01/01/2013	1715-1732	Yes	Peer revie wed
31	A process-based typology of hydrological drought 10.5194/hess- 16-1915-2012	A. F. Van Loon , H. A. J. Van Lanen	Hydrology and Earth System Sciences	Vol. 16/Is sue 7	European Geosci ences Union		01/01/2012	1915-1946	Yes	Peer revie wed
32	Evaluation of drought propagation in an ensemble mean of large-scale hydrological models 10.5194/hess- 16-4057-2012	A. F. Van Loon , M. H. J. Van Huijg evo ort , H. A. J. Van Lanen	Hydrology and Earth System Sciences	Vol. 16/Is sue 11	European Geosci ences Union		01/01/2012	4057-4078	Yes	Peer revie wed
33	Hydrological drought typology: temperatu re-r elated drought types and associated societal impacts 10.5194/hessd -11-10465-2014	A. F. Van Loon , S. W. Ploum , J. P arajka , A. K. Fleig , E. Garnier , G. L aaha , H. A. J. Van Lanen	Hydrology and Earth System Sciences	Vol. 11/Is sue 9	European Geosci ences Union		01/01/2014	10465-105 14	Yes	Peer revie wed
34	Making the distinction between water sca rcity and drought using an observation-m odeling framework 10.1002/wrcr. 20147	A. F. Van Loon , H. A. J. Van Lanen	Water Resources Research	Vol. 49/Is sue 3	American Geophy sical Union	United States	01/03/2013	1483-1502	Yes	Peer revie wed
35	Hydrological drought severity explained by climate and catchment characterist ics doi.org/10.10 16/j.jhydrol.2014.10.059	A.F. Van L oon , G. L aaha	Journal of Hydrology	Vol. 526	Elsevier	Netherlands	01/07/2015	3-14	Yes	Peer revie wed
36	How climate seasonality modifies drought duration and deficit 10.1002/2013J D020383	A. F. Van Loon , E. Tijdeman , N. Wanders , H. A. J. Van Lane	Astronomy and Geophysics	Vol. 119/I ssu e 8	Blackwell Publishing		27/04/2014	4640-4656	Yes	Peer revie wed

		n , A. J. Teuling , R. Uijlenho et								
37	Future discharge drought across climate regions around the world modelled with a synthetic hydrological modelling approach forced by three general circulation models 10.5194/nhess -15-487-2015	N. Wanders , H. A. J. Van Lanen	Natural Hazards and Earth System Science	Vol. 15/Issue 3	European Geosciences Union	Germany	01/01/2015	487-504	Yes	Peer revie wed
38	Global hydrological droughts in the 21st century under a changing hydrological r egime 10.5194/esd-6 -1-2015	N. Wanders , Y. Wada , H. A. J. Van Lanen	Earth System Dynamics	Vol. 6/Issue 1	Copernicus Gesellschaft mbH	Germany	01/01/2015	1-15	Yes	Peer revie wed
39	Probabilistic analysis of hydrological d rought characteristi cs using meteorologic al drought 10.1080/02626 667.2012.753147	G. Wong , H.A.J. van Lanen , P.J.J. F. Torfs	Hydrological Sciences Journal/Journ al des Sciences, Hydrologiques	Vol. 58/Issue 2	Taylor and Francis Ltd.	United Kingdom	01/02/2013	253-270	Yes	Peer revie wed
40	Drought and exceptional laws in Spain: the official water discourse 10.1007/s1078 4-015-9275-8	Julia Urquijo , Lucia De Stefano , Abel La Calle	International Environmenta l Agreements: Politics, Law and Economics	15/58	Springer Netherlands	Netherlands	23/04/2015	1573-1553	Yes	Peer revie wed
41	Social capacities for drought risk manag ement in Switzerland	Kruse, S. & Seidl, I.	Natural Hazards and Earth System Science	13/12	European Geosciences Union		01/07/2013	3429–3441	Yes	Peer revie wed
42	Social capacities for drought risk manag ement in Switzerland	Kruse, S. & Seidl, I.	Natural Hazards and Earth System Science	13/12	European Geosciences Union		01/07/2013	3429–3441	Yes	Peer revie wed
43	Spatial and temporal patterns of large-scale droughts in Europe: Model dispersion and performance 10.1002/2013G L058573	Lena M. Tallakse n , Kerstin Stahl	Geophysical Research Letters	Vol. 41/Issue 2	American Geophysical Union	United States	28/01/2014	429-434	Yes	Peer revie wed
44	Influence of model structure on base flow estimation using BILAN FRIER and HBV-light models	Machlica, A., Horvát, O., Horacek, S., Oosterwijk, J., Van Loon, A.F., Fendeková , M. & Van Lanen, H.A.J.	Vodohospodars ky Casopis/Journ al of Hydrology and Hydromechani cs	60/4	Slovak Academy of Sciences		02/07/2012	242-251	Yes	Peer revie wed
	Vulnerability to drought: Mapping underl	M Ballesteros	Drought: Research and Science-Polic y Int	2015	CRC Press		13/02/2015	361	Yes	Article

	ying factors across Europe 10.1201/b1807 7-61	, I Tánago , J Urquijo , L De Stefano	erfacing							
	Impact of meteorologic al drought on crop yield on pan-European scale, 1979–2009 10.1201/b1807 7-19	Larissa Gunst , Francisco Rego , Susana Dias , Carlo Bifulco , Ja mes Stagge , Marta Rocha , Henny Van Lanen	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	113	Yes	Article
	A comprehensive drought climatology for Europe (1950–2013) 10.1201/b1807 7-7	L Gudmunds son , S Se nevira tne	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	31	Yes	Article
	Exploring situations of vulnerabilit y to drought from a sectorial perspective: A star ting point for regional assessments 10.1201/b1807 7-58	I Tánago , M Balleste ros , J Urquijo , L De Stefano	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	341	Yes	Article
	Towards policy recommendati ons for futur e drought risk reduction 10.1201/b1807 7-77	E Kampragou , D Assi macop oulos , L De Stefano , J Andreu , D Musolino , W Wolters , H van Lanen , F Rego , I Seidl	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	453	Yes	Article
	Drought vulnerability assessment and pot ential adaptation options in the Aegean islands 10.1201/b1807 7-60	P Stathatou , E Kampragou	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	355	Yes	Article
	An impact perspective on pan-European dr ought sensitivity 10.1201/b1807 7-56	K Stahl , I Kohn , L De S tefano , L Tall aksen , F Rego , S S enevira tne , J Andreu , H van Lanen	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	329	Yes	Article
	Characteristi cs and drivers of drought in	Lena Tallakse	Drought: Research and Science-Polic y Int		CRC Press		13/02/2015	15	Yes	Article

	Europe—a summary of the DROUGHT-R &SPI project 10.1201/b1807 7-5	n , James St agge , Kerstin Stahl , Lukas Gudmunds son , Rene Or th , Sonia Senevirat ne , Anne Van L oon , Henny Van Lanen	erfacing							
	Fostering drought research and science-p olic y interfacing: Achievements of the D ROUGHT-R&SP I project 10.1201/b1807 7-3	Henny Van Lanen , Lena Tallakse n , Dionysis A ssimaco pou los , Kerstin S tahl , Wouter Wolters , J oaquin And reu , Sonia Seneviratne , Lucia De Stefano , Irmi Seidl , Francis c o Rego , Antonio Ma ssarut to , Emmanuel Garnier	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	3	Yes	Article
	European experience with science-poli cy interfacing to cope with drought 10.1201/b1807 7-85	W Wolters , J Andreu , D Assimaco po ulos , F Puma , S Dias , I Sei dl , H van Lanen	Drought: Research and Science-Polic y Int erfacing		CRC Press		13/02/2015	501	Yes	Article
	Research and Science Policy Interfacing	Andreu, J., Solera, A., P aredes- Arq uiola, J., Haro -Mont eagud o, D. & Van Lanen	CRC/Balkema Publishers				01/07/2015	514	Yes	Article
	A historic experience for a strengthened resilience. European societies in front of h	Garnier, E	Prevention of hydrometeoro logical extrem e events-Interf acing sciences and policies	1	Wiley Publisher, New York		01/07/2015	3-26	No	Article

	ydro-meteor s 16th-20th centuries’									
	Hydrology in a Changing World: Envi ronmental and Human Dimensions.	Daniell, T.M., Van Lanen, H.A.J., D emuth, S., Laaha, G., Ser vat, E., Mahe, G., Boyer, J-F, Paturel, J-E, Dezetter , A., Ruelland , D. (Eds.)	IAHS Publ	363	IAHS Publ	England	01/07/2014	478	No	Article
	Drought: how to be prepared for the haza rd?	Van Lanen, H.A.J.	Prevention of hydrometeoro logical extrem e events – Interfacing sciences and policies		Wiley Publisher	England	01/07/2015	171-202	No	Article
	The dynamics of vulnerability to drought in Europe.	Blauhut, V., Kohn, I. & S tahl, K.	Drought: Research and Science-Polic y Int erfacing		CRC press	England	03/03/2015		No	Conference
	Ex-post evaluation of the socio-economi c impact of drought on agriculture in some European areas, in Andreu J. et al (Eds.)	Musolino D., Massarut to A . & De Carli A.	Drought: research and Science-Polic y Int erfacing		CRC/Balkema Pub lishing		03/03/2015	355–360	No	Conference
	Trends in low flow and drought in selected European areas derived from WATCH for cing data and simulated Multi-model mean runoff.	Alderlies te, M.A.A. & Lanen, H.A.J. van	Technical Report 1	1	Wageningen Univ ersity	The Netherlands	01/12/2012		Yes	Monogram
	The effect of climate on droughts and their propagation in different parts of the hyd rological cycle.	Tijdeman, E., Van Loon, A .F., Wanders, N. & Van La nen, H.A.J	DROUGHT-R&SPI Technical Report No. 2	2	Wageningen Univ ersity	The Netherlands	01/06/2012		Yes	Monogram
	A European drought impact report invento ry (EDII): Design and test for selected recent droughts in Europe	Stahl, K., Blauhut, V., K ohn, I., A cácio, V., Assi macop oulos, D., Bifulco, C., De Ste fano, L., Dias, S., Eilertz, D., Freiling sdorf, B., Hegdahl,	DROUGHT-R&SPI Technical Report No 3	3	ALU-FR	Freiburg, Germany	01/06/2012		Yes	Monogram

		T.J., Kampragou, E., Kourentzis, E., Melsen, L., Lanen, H.A.J. van, Loon, A.F. van, Massarut to, A., Musolino, D., De Paoli, L., Senn, L., Stagge, J.H., Tallakse n, L.M. & Urquijo, J.								
	Policy and Drought Responses – Case Study scale	De Stefano, L., Urquijo Reguera, J., Acácio, V., Andreu, J., Assimacop olus, D., Bifulco, C., De Carli, A., De Paoli, L., Dias, S., Gad, F., Haro Monteagu do, D., Kampragou , E., Keller, C., Lekkas, D., Manoli, E., Massarutto, A., Miguel Ayala, L., Musolino, D., Paredes Arquiola , J., Rego, F., Seidl, I., Senn, L., Solera Solera, A., Stathatou, P. & Wolters, W.	DROUGHT-R&SPI Technical Report No. 4	4	UCM	Madrid, Spain	01/06/2012			Monogram
	Change in future low flow and drought in selected European areas derived from WATCH GCM Forcing Data and simulated	Alderlies te, M.A.A., and Van Lanen,	DROUGHT-R&SPI Technical Report No. 5	5	Wageningen University	Wageningen, The Netherlands	01/02/2013		Yes	Monogram

	multi-model runoff.	H.A.J.								
	Review of current drought monitoring	Acácio, V., Andreu, J., Assimaco poulos, D., Bifulco, C., De Carli, A., Dias, S., Kampragou, E., Haro Monteagudo, D., Rego, f., Seidl, I., Vasiliou, E. & Wolters, W	DROUGHT-R&SPI Technical Report No. 6	6	ISA	Lisbon, Portugal	01/03/2013		Yes	Monogram
	Evaluation 1st Phase Case Study Dialogue Fora.	Acácio, V., Andreu, J., De Carli, A., Dimakis, A.A., Assimaco poulos, D., Bifulco, C., Dias, S., Gudmundsson, L., Massarut to, A., Haro Monteagudo, D., Musolino, D., Paredes, J., Rego, F., Seidl, I., Senevira tne, S., Senn, L. & Solera, A.	DROUGHT-R&SPI Technical Report No. 7	7	ISA	Lisbon, Portugal	05/12/2013		Yes	Monogram
	Quantitative analysis of historic droughts in selected European case study areas.	Van Lanen, H.A.J., Alderlie ste, M.A.A., Acacio, A., Andreu, J., Garnier, E., Gudmundsson, L., Haro Monteagudo, D., Lekkas, D., Paredes, J., Solera, A.,	DROUGHT-R&SPI Technical Report No. 8,	8	Wageningen University,	Wageningen, The Netherlands	02/12/2013		Yes	Monogram

		Assimacopoulos, d., Rego, F., Seneviratne, S., Stahl, K., & Tallaksen, L.M.								
	Analysis of historic events in terms of socio-economic and environmental impacts.	Massarutto, A., Musolino, D., Pontoni, F., De Carli, A., Senn, L., De Paoli, L., Castro Rego, F., Dias, S., Bifulco, C., Acacio, V., Andreu, J., Assimacopoulos, D., Miguel Ayala, L., Gad, F., Haro Monteagudo, D., Kampragkou, E., Kartalides, A., Paredes, J., Solera, A., Seidl, I. & Wouters, W.	DROUGHT-R&SPI Technical Report No. 9	9	UB-CerTet	Milan, Italy	02/12/2013		Yes	Monogram
	Evaluation of the 1st Phase Progress in the pan-European Dialogue Forum	Wolters, W., Miguel Ayala, L. & Davy, T	DROUGHT-R&SPI Technical Report No. 10	10	Wageningen University	Wageningen, The Netherlands	02/12/2013		Yes	Monogram
	Likelihood of future drought hazards: selected European case studies	Van Lanen, H.A.J., Alderlieste, M.A.A., Van der Heijden, A., Assimacopoulos, D., Dias, S., Gudmundsson, L., Haro Monteagudo, D., Andreu, J., Bifulco, C., Gero, F., Parede	DROUGHT-R&SPI Technical Report No.11	11	Wageningen University	Wageningen, The Netherlands	02/12/2013		Yes	Monogram

		s, J. & Solera, A.								
	A European Drought Reference Database: Design and Online Implementatio n	Stagge, J.H., Tallakse n, L.M., Kohn, I, Stahl, K. & Van Loon, A.F.	DROUGHT-R-SPI Technical Report no. 12	12	University of Oslo	Oslo, Norway	02/12/2013		Yes	Monogram
	Comparison of agricultural and water res ources drought characterist ics across the world.	De Boer, F., Van Lanen, H .A.J. & Torfs, P.J.J.F.	DROUGHT-R&SPI Technical Report No. 13	13	Wageningen Univ ersity	Wageningen, The Netherlands	02/12/2013		Yes	Monogram
	Evaluation 2nd Phase Case Study Dialogue Fora	Kampragou , E., Andreu, J., de Carli, A., Assimacop oulos, D., Bifulco, C., D ias, S., Massar ut to, A., Haro Monteagu do, D., Musolino, D., Paredes, J ., Rego, F. & Solera, A.	DROUGHT-R-SPI Technical Report no. 14	14	NTUA	Athens, Greece	01/04/2014			Monogram
	Investigating winter conditions before s pring snowmelt droughts in cold climates: a comparative study in Austria, Norway.	Ploum, S. & Van Loon, A.F.	DROUGHT-R&SPI Technical Report No. 15	15	Wageningen Univ ersity	Wageningen, The Netherlands	01/01/2014		Yes	Monogram
	Comparison of drought indices for the pr ovince of Gelderland, the Netherlands.	Ten Broek, J., Teuling, A.J. & Van Loon, A.F.	DROUGHT-R&SPI Technical Report No.1 6	16	Wageningen Univ ersity	Wageningen, The Netherlands	01/01/2014		Yes	Monogram
	Stakeholder views on drought impacts and drought risk maps at the pan-European s cale results from the 2nd pan-European D rought Dialogue Forum	Stahl, K., Blauhut, V., K ohn, I., De Ste fano, L., Dias, S., Urquijo, J., Tallakse n, L .M., Van L anen, H.A.J. & Wolters, W .	DROUGHT-R-SPI Technical Report no. 17	17	ALU-FR	Freiburg, Germany	02/06/2014		Yes	Monogram

	Exploring the relationship between low soil moisture availability and yield of major crops on the pan-European scale	Oude Lenferink, K.J.B., Van Loon, A.F., Van Huijgevoort, M.H.J. & Van Lanen, H.A.J.	DROUGHT-R-SPI Technical Report no. 18	18	Wageningen University	Wageningen, The Netherlands	02/06/2014		Yes	Monogram
	DROUGHT-R&SPI Summer School	Kampragou, E & Assimacopoulos, D.	DROUGHT-R-SPI Technical Report no. 19	19	NTUA	Athens, Greece	04/08/2014		Yes	Monogram
	Future drought impact and vulnerability - case study scale.	Assimacopoulos, D., Kamprago u, E., Andreu, J., Bifulco, C., De Carli, A., De Stefano, L., Dias, S., Gudmundsson, L., Haro-Monteagudo, D., Musolino , D., Paredes-Arquiola, J., Rego, F., Seidl, I., Solera, A., Urquijo, J., Van Lanen, H.A.J. & Wolters, W.	DROUGHT-R-SPI Technical Report no. 20	20	NTUA	Athens, Greece	04/08/2014		Yes	Monogram
	Guidelines for monitoring and early warning of drought in Europe.	Gudmundsson, L., Van Loon, A.F., Tallaksen, L.M., Seneviratne, S.I, Stagge, J.H., Stahl, K. & Van Lanen, H.A.J.	DROUGHT-R-SPI Technical Report no. 21	21	ETH	Zurich, Zwitserland	04/08/2014		Yes	Monogram
	Exploration of future crop yield reduction from an ensemble of large-scale hydrological models	Van Huijgevoort, M.H.J. & Van Lanen, H.A.J.	DROUGHT-R-SPI Technical Report no. 22	22	Wageningen University	Wageningen, The Netherlands	31/03/2015		Yes	Monogram

	Drought Conference	Haro Monte agu do, D., Momblanch Benavent, A. Andreu Álva rez, J., Solera Solera, A., Pa redes Arqu iola, J. & Van Lanen, H.A.J.	DROUGHT-R-SPI Technical Report no. 23	23	UPVLC	Valencia, Spain	31/03/2015		Yes	Monogram
	Systematic classificatio n of drought vul nerability and relevant strategies - case stu dy scale	Kampragou , E., Assimaco poulos, D., Andreu, J., Bifulco, C., de Carli, A., D ias, S., Gonzál ez Tánago, I., Haro Monte agu do, D., Massarutt o, A., Musolino, D., Paredes, J., Rego, F., S eidl, I., Soler a, A., Urqujo Reguera, J. & Wolters, W.	DROUGHT-R-SPI Technical Report no. 24	24	NTUA	Athens, Greece	31/03/2015		Yes	Monogram
	Future Meteorologica l Drought: Projectio ns of Regional Climate Models for Europe	Stagge, J.H., Rizzi, J., Talla kse n, L.M. & Stahl, K.	DROUGHT-R-SPI Technical Report no. 25	25	University of Oslo	Oslo, Norway	31/03/2015		Yes	Monogram
	Methodologica l approach considering diff erent factors influencing vulnerability - pan -European scale	De Stefano, L., González Tánago, I., Ballesteros, M., Urquijo, J., Blauhut, V., Stagge, J. H. & Stahl, K.	DROUGHT-R-SPI Technical Report no. 26	26	UCM	Madrid, Spain	31/03/2015		Yes	Monogram
	Mapping Drought Risk in Europe	Blauhut, V. & Stahl, K.	DROUGHT-R-SPI Technical Report no. 27	27	ALU-FR	Freiburg, Germany	31/03/2015		Yes	Monogram
	Recommendatio ns for indicators for monit oring and early-warnin g considering diff	Stahl, K., Stagge, J.H.,	DROUGHT-R-SPI Technical Report no. 28	28	ALU-FR	Freiburg, Germany	31/03/2015		Yes	Monogram

	erent sensitivities : pan-European scale	Bachmair , S., Blauhut, V., Rego, F.C., De Stefano, L., Dias, S., G udmunds son, L., Gunst, L., Kohn, I., Van Lanen, H.A.J. Urquijo Re guera, J. & Tallaksen, L. M.								
	Drought risk mitigation options – case s tudy scale.	Assimacop o ulos, D., Kamprago u, E., Andreu, J., Bifulco, C., De Carli, A., De Stefano, L., Dias, S., Kartalid is A., L., Massarut to, A., Haro-Mon teagudo, D., Musolino, D., Paredes-Arquiola , J., Rego, F., Sei dl, I., Solera, A., Urquijo, J. & Wolters, W.	DROUGHT-R-SPI Technical Report no. 29	29	NTUA	Athens, Greece	31/03/2015		Yes	Monogram
	Identificatio n of Drought Messages for P olicy Makers, Businesses and Citizens	Witmer, F.P, Wolters, W., Van Lanen, H.A.J., Senev ira tne, S.I., A ssimaco pou los, D., De Ste fano, L., Talla kse n, L.M., Massarutto, A ., Stahl, K., A ndreu, J., Rego, F.C. &	DROUGHT-R-SPI Technical Report no. 30	30	Wageningen Univ ersity	Wageningen, The Netherlands	31/03/2015		Yes	Monogram

		Seidl, I.								
	Discussing drought at the pan-European l evel: results from the 3rd pan-European Drought Dialogue Forum.	Wolters, W., Stahl, K., G onzález Tá nago, I., Andreu, J., Van Lanen, H.A.J., Kamp ragou , E. & Davy, T	DROUGHT-R-SPI Technical Report no. 31	31	Wageningen Univ ersity	Wageningen, The Netherlands	31/03/2015		Yes	Monogram
	From SPI to SPI-I: discussing what is be yond science-poli cy interfacing, at the 4th pan-European Drought Dialogue Forum	Wolters, W., Witmer, F.P., Van Lanen, H.A.J. & Dav y, T.	DROUGHT-R-SPI Technical Report no. 32	32	Wageningen Univ ersity	The Netherlands	31/03/2015		Yes	Monogram
	Drought indicators: monitoring, forecasting and early warning at the case study scale.	Andreu, J., Haro, D., Sol era, A., P aredes, J., Ass imacopoulos, D., Wolters, W., Van L anen, H.A.J., Kamprago u, E., Bifulco, C. , De Carli, A., Dias, S., Gonz ález Tánago, I., Massarutto, A., Musolino , D., Rego, F., Seidl, I. & U rquijo Reg uera, J.	DROUGHT-R-SPI Technical Report no. 33	33	UPVLC	Valencia, Spain	31/03/2015		Yes	Monogram
	Evaluation of the potential and limitations of Pan-European analyses on local and nat ional scale	Van Loon, A.F., Van Lanen, H.A.J., Andreu, J., Assimaco poulos, D., Massarutto, A ., Castro Rego, F., Senevira tne, S.I. & Wolte	DROUGHT-R&SPI Technical Report no. 34	34	Wageningen Univ ersity	Wageningen, The Netherlands	31/03/2015		Yes	Monogram

		rs, W.								
	Historic droughts beyond the modern inst rumental records: an analysis of cases in United Kingdom, France, Rhine and Syros	Garnier, E., Assimaco poulos, D. & Van Lanen, H.A.J.	DROUGHT-R&SPI Technical Report No. 35	35	UNICAEN	Rochelle, France	31/03/2015		Yes	Monogram
	Methodology for the optimal management design of water resources system under hy drologic uncertainty	Haro Monte agu do, D			UPVLC	Valencia	01/07/2014		Yes	Thesis
	Persistence of soil moisture - Controls, associated predictabilit y and implications f or land surface climate	Orth, R.			ETH	Zurich	01/07/2013		Yes	Thesis
	Hydrological drought-Characterisation and representatio n in large-scale models.	Van Huijgevo ort, M.H.J			Wageningen Univ ersity	The Netherlands	23/05/2014		Yes	Thesis
	On the propagation of drought. How clima te and catchment characteristi cs influence hydrological drought development and recovery,	Van Loon, A.F.			Wageningen Univ ersity	The Netherlands	26/04/2013		Yes	Thesis

LIST OF DISSEMINATION ACTIVITIES								
No.	Type of activities	Main Leader	Title	Date	Place	Type of audience	Size of audience	Countries addressed
1	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Presentation and discussion, WFD-CIS WG C Groundwater workshop	12/10/2011	Warsaw, Poland	Scientific community (higher education, Research)	70	Poland
2	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought and climate change	08/11/2011	Brussels	Policy makers	70	All EU member states
3	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought hazard and management	08/11/2011	Brussels	Policy makers	35	Members of Parliament, stakeholders
4	Oral presentation to a scientific event	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Drought impacts (at ConHAz Final Synthesis conference)	17/11/2011	Leipzig	Scientific community (higher education, Research) - Policy makers	70	several EU countries
5	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	American Geophysical Union - assembly; oral presentations, posters, leading hydroclimatic & drought sessions and discussions	05/12/2011	San Francisco	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	15000	International; North America, many EU countries and some from other continents
6	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought management (presentation and discussion Workshop Drought management)	02/02/2012	Seville	Scientific community (higher education, Research) - Policy makers	40	Spain
7	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	DROUGHT-R&SPI project achievements (at General Assembly of FP7 project DEWFORA)	06/02/2012	Sharm-El-Sheik	Scientific community (higher education, Research)	45	European and African countries, JRC, ECMWF
8	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought: science policy making (International Symposium 'Climate change: an analysis from Science to Politics	22/02/2012	Heredia, Costa Rica	Scientific community (higher education, Research) - Policy makers	60	International: Latin American countries, USA, some EU countries

9	Oral presentation to a scientific event	UNIVERSITETET I OSLO	Drought: hazard and impacts (at symposium on Climate Impacts on Low Flow and Droughts)	01/03/2012	Vienna, Austria	Scientific community (higher education, Research)	60	International, several EU countries
10	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	DROUGHT-R&SPI (discussion with EC DG)	01/03/2012	Brussels, Belgium	Policy makers	5	International; EC and The Netherlands
11	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	DROUGHT-R&SPI Dialogue Fora (discussion meeting for 1st Pan EU DDF)	07/03/2012	Nicosia, Cyprus	Scientific community (higher education, Research) - Civil society	8	International: Cyprus, Greece, The Netherlands, EC
12	Organisation of Workshops	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	Drought National scale - CS DDF (discussions DROUGHT-CH, NRP61 project)	13/03/2012	Vitznau, Switzerland	Scientific community (higher education, Research)	100	International, Switzerland, Germany
13	Oral presentation to a wider public	Instituto Superior de Agronomia	Drought impacts (discussion working group Agriculture, Forest and Fisheries from the National Strategy for Adaptation to Climate Changes)	20/03/2012	Lisbon, Portugal	Scientific community (higher education, Research) - Policy makers	25	National: Portugal
14	Oral presentation to a wider public	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	Drought hydroclimatic extremes (Presentatation and discussion Planet under Pressure conference)	26/03/2012	London, UK	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	5000	International; many countries from all over the world
15	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought monitoring, management, current measures (discussions DROUGHT-R&SPI 1st CS DDF - Jucar River Basin Spain)	28/03/2012	Valencia, Spain	Scientific community (higher education, Research) - Industry - Policy makers	60	International: several EU countries
16	Oral presentation to a scientific event	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	Drought - hydro climatology (presentation and discussion WCRP Global Drought Information	12/04/2012	Frascati, Italy	Scientific community (higher education, Research) - Civil society	200	International; many countries from all over the world

			System Workshop)					
17	Oral presentation to a scientific event	UNIVERSIDAD COMPLUTENSE DE MADRID	Water stress and security	17/04/2012	Oxford, UK	Scientific community (higher education, Research) - Policy makers	200	several EU countries and some overseas
18	Oral presentation to a scientific event	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	Drought Risk Management (PhD block course from vulnerability to Resilience in disaster risk management)	21/04/2012	Bonn, Germany	Scientific community (higher education, Research)	20	International; several EU countries and many overseas
19	Organisation of Workshops	UNIVERSITETET I OSLO	European Geophysical Union (oral presentation, posters, leading drought sessions, discussions)	24/04/2012	Vienna, Austria	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	10000	International; all European countries and many overseas
20	Oral presentation to a wider public	Instituto Superior de Agronomia	Risk reduction - fires - water stress (good practices on disaster prevention in Europe - Fires & droughts)	04/05/2012	Brussels, Belgium	Scientific community (higher education, Research) - Policy makers	12	International; several EU countries, EC
21	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	DROUGHT-R&SPI project achievements (presentation and discussion for Southeastern Europe)	14/05/2012	Ljubljana, Slovenia	Scientific community (higher education, Research) - Civil society	50	international; several South-eastern European countries, JRC, The Netherlands
22	Oral presentation to a scientific event	Instituto Superior de Agronomia	Drought - tree ageing	25/05/2012	Serpa, Portugal	Scientific community (higher education, Research)	30	Portugal
23	Oral presentation to a wider public	Instituto Superior de Agronomia	Drought responses	31/05/2012	Lisbon, Portugal	Scientific community (higher education, Research) - Civil society - Policy makers	21	Portugal
24	Oral presentation to a wider public	Instituto Superior de Agronomia	Drought - climate change	01/06/2012	Costa da Caparica, Portugal	Scientific community (higher education, Research) - Policy makers	120	Portugal
25	Organisation of	NATIONAL T	Drought responses	06/06/2012	Hermoupolis, Sy	Civil society	10	Greece

	Workshops	ECHNICAL U NIVERSITY OF AT HENS - NTUA	(Discussion local stakeholders)		ros, Greece			
26	Organisation of Workshops	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impacts drought (workshop)	21/06/2012	Parma, Italy	Scientific comm unity (higher educat ion, Research) - Pol icy makers	25	Italy
27	Oral presentation to a scientific event	UNIVERSIDAD COMPLUTENSE D E MADRID	Large-scale vul nerability to drought (discussion)	16/07/2012	Oregon State Un iversity, USA	Scientific comm unity (higher educat ion, Research)	15	Spain, USA
28	Oral presentation to a wider public	Instituto Superior de Agronomia	Ecological impact dr ought (discussion)	04/07/2012	Guimaraes, Port ugal	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers	400	International; many European countries and overseas
29	Oral presentation to a scientific event	EIDGENOESS ISCHE TECH NISCHE HOC HSCHULE ZU RICH	Drought modeling (Presentation and discussion CAHM DA workshop)	11/07/2012	Twente, The Net herlands	Scientific comm unity (higher educat ion, Research)	100	International; sever al EU countries and some overseas
30	Interviews	Instituto Superior de Agronomia	Drought and fires (i nterviews with stake holders)	16/07/2012	Castelo de Bode, Portugal	Scientific comm unity (higher educat ion, Research) - Civ il society - Policy makers	11	Portugal
31	Organisation of Workshops	NATIONAL T ECHNICAL U NIVERSITY OF AT HENS - NTUA	Drought impacts and responses (Discussio n case study DDF, Syros)	17/07/2012	Hermoupolis, Sy ros, Greece	Scientific comm unity (higher educat ion, Research) - Civ il society	20	Greece
32	Organisation of Workshops	Instituto Superior de Agronomia	Drought responses (Meeting with EDP, Municipality of Br aganca and Univ ersity of Trasosmont es e Alto Douro)	07/08/2012	Braganca and Vila Real, Portugal	Scientific comm unity (higher educat ion, Research)	10	Portugal
33	Oral presentation to a wider public	EIDGENOESS ISCHE FORS CHUNGSANST ALT WSL	CH: drought man agement & measures (discussion internati onal geographical co ngress)	28/08/2012	Cologne, Germany	Scientific comm unity (higher educat ion, Research)	60	Several EU coun tries
34	Organisation of	EIDGENOESS	Drought national sca	31/08/2012	Zurich, Switzerland	Scientific comm	25	Switzerland, Ge

	Workshops	ISCHE TECH NISCHE HOC HSCHULE ZU RICH	le - CS DDF (di scussion)			unity (higher educat ion, Research)		rmany
35	Oral presentation to a scientific event	EIDGENOESS ISCHE TECH NISCHE HOC HSCHULE ZU RICH	Drought forecasting & prediction (E CMWF seminar on seasonal prediction)	07/09/2012	Reading, UK	Scientific comm unity (higher educat ion, Research)	200	International; many European countries and overseas
36	Organisation of Workshops	EIDGENOESS ISCHE TECH NISCHE HOC HSCHULE ZU RICH	Drought responses, measures (Discus sion CS drought dial ogue forum)	05/09/2012	Zurich, Switzerland	Civil society	20	Switzerland
37	Organisation of Workshops	Instituto Superior de Agronomia	Forest - water regim es (Discussion exper ts workshop: Strateg ic framework on mediterranean fores t)	12/09/2012	Chania, Greece	Scientific comm unity (higher educat ion, Research) - Pol icy makers	25	Several EU coun tries
38	Oral presentation to a scientific event	EIDGENOESS ISCHE TECH NISCHE HOC HSCHULE ZU RICH	Drought: causes (pre sentation and discus sion workshop on "attributes of cli mate and weather extremes")	12/09/2012	Oxford, UK	Scientific comm unity (higher educat ion, Research)	100	International; many European countries and overseas
39	Organisation of Conference	UNIVERSITETET I OSLO	Drought - natural ha zard - processes (pr esentation and discu ssion international conference: mod elling hydrology, cl imate and land surfa ce processes	11/09/2012	Losby Gods, Nor way	Scientific comm unity (higher educat ion, Research)	50	International; many European countries and overseas
40	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	DROUGHT-R&SPI project - achiev ements (presentation and discussion, EC-CIS-WFD water s carcity and drought expert group)	13/09/2012	Athens, Greece	Scientific comm unity (higher educat ion, Research) - Pol icy makers	35	all EU member s tates
41	Organisation of Workshops	UNIVERSITETET I OSLO	Droughts in Sub -Sahara Africa (disc	26/09/2012	Lilongwe, Malawi	Scientific comm unity (higher educat	60	International; sever al African countries

			ussion international workshop: climate change in Sub-Saharan Africa and impacts on agriculture and economic development)			ion, Research) - Civil society - Policy makers		, Norway
42	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought - natural hazard, impact monitoring (UNESCO FRIEND-water - low flow and drought meeting)	03/10/2012	Payerbach, Austria	Scientific community (higher education, Research)	25	International; several European countries
43	Organisation of Workshops	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought vulnerability	06/10/2012	Donana, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	40	Spain
44	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Drought Science-Policy interfacing (Discussion DROUGHT-R&SPI 1st pan-EU DDF - linked to Blueprint publication	30/10/2012	Nicosia, Cyprus	Scientific community (higher education, Research) - Policy makers	50	International; several EU countries
45	Organisation of Conference	WAGENINGEN UNIVERSITEIT	Water regimes - erosion and sedimentation (opening adress UNESCO MED-FRIEND-water conference	13/11/2012	Istanbul, Turkey	Scientific community (higher education, Research) - Civil society	150	International; many European countries and overseas
46	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Vulnerability and water security (Presentation and discussion freshwater governance for sustainable development)	06/11/2012	Drakensberg, South Africa	Scientific community (higher education, Research) - Civil society - Policy makers	200	International; several African countries, Spain
47	Oral presentation to a scientific event	Instituto Superior de Agronomia	Ecological impact of water shortage (presentation and discussion seminar conservation of cereal steppe)	07/11/2012	Castro Verder, Portugal	Scientific community (higher education, Research)	120	Portugal

48	Oral presentation to a wider public	STICHTING DIENST LAN DBOUWKUNDIG ONDERZOEK	EU project - progres s science policy int erfacing (presentati on and discussion 3r d EU CIS-science policy interface e vent)	14/11/2012	Brussels, Belgium	Scientific comm unity (higher educat ion, Research) - Pol icy makers	70	International; most EU member states
49	Organisation of Workshops	Instituto Superior de Agronomia	Drought: hazard and impacts (discussion workshop drought in a changing climate - an overview)	16/11/2012	Lisbon, Portugal	Scientific comm unity (higher educat ion, Research) - Pol icy makers	120	Portugal
50	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	Drought and water scarcity (present ation and discussion SCARCE confere nce)	26/11/2012	Valencia, Spain	Scientific comm unity (higher educat ion, Research)	75	Spain and some EU countries
51	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	DROUGHT-R&SPI project - achiev ements (presentation and discussion, EC-CIS-WFD water s carcity and drought expert group)	04/12/2012	Bratislava, Slovakia	Scientific comm unity (higher educat ion, Research) - Pol icy makers	50	International; all E U member states
52	Oral presentation to a scientific event	ALBERT-LUD WIGS-UNIVE RSITAET FR EIBURG	American Geophy sical Union (As sembly; oral present ations, posters, dis cussions)	04/12/2012	Francisco, USA	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers - Medias	15000	International; North America, many European countries and some from ot her continents
53	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought on agric ulture (discussion c onference "Acqua e agricoltura: tra sicu rezza del territorio e competitivita delle imprese")	04/12/2012	Rome, Italy	Scientific comm unity (higher educat ion, Research) - Civ il society - Policy makers	50	Italy
54	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE D E MADRID	Drought vulnerabilit y (presentation and discussion internati onal workshop: the s ecurization of water discourse)	17/12/2012	Jerusalem, Isreal	Scientific comm unity (higher educat ion, Research) - Civ il society	30	International; some European countries

55	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Future drought vulnerability, measures (Discussion DROUGHT-R&SPI Po CS DDF)	11/02/2013	Parma, Italy	Civil society - Policy makers	50	International; Italy, many EU countries
56	Oral presentation to a wider public	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Review based on DROUGHT-R&SPI experiences (discussion WASSERMed final conference)	21/02/2013	Milan, Italy	Scientific community (higher education, Research) - Civil society	40	International; some European countries
57	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought and water scarcity in Europe (presentation and discussion 5th CIREDD2013 conference)	24/02/2013	Algiers, Algeria	Scientific community (higher education, Research) - Civil society - Policy makers	150	International; North African countries, some European countries
58	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Report Europe: academic curricula (discussion WMO high meeting national drought policy (HMNDP))	12/03/2013	Geneva, Switzerland	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	300	International; Members of WMO (almost all countries across the world)
59	Oral presentation to a wider public	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	Drought impacts (European climate change adaptation conference 2013)	19/03/2013	Hamburg, Germany	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	500	International; many European countries and overseas
60	Organisation of Workshops	UNIVERSITETET I OSLO	European Geophysical Union (Assembly; oral presentations, posters, leading drought sessions, discussions)	10/04/2013	Vienna, Austria	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	10000	International; all European countries and many overseas
61	Oral presentation to a scientific event	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	EC meeting DG R&I AR5 IPCC (comments IPCC AR5; identification research gaps)	17/04/2013	Brussels, Belgium	Scientific community (higher education, Research) - Policy makers	10	International; several EU FP7 project leads and DG R&I and DG ENV
62	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	43 Giornata della terra: Le problematiche ecologiche nel bacino del Po: vecchi p	22/04/2013	Parma, Italy	Scientific community (higher education, Research) - Policy makers	50	National; Po river basin authority, University of Parma, S.I t.E.

			roblemi e nuove sfid e I (Workshop S ocieta Italiana di e cologica; presentati ons, discussions)					
63	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	Drought and Water scarcity	23/04/2013	Lisbon, Portugal	Scientific comm unity (higher educat ion, Research)	20	Portugal and Ne therlands
64	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	WMO-UNESCO workshop on data (p resentation on regio nal flow regimes, gl obal runoff data cen tre steering committ ee)	10/06/2013	Koblenz, Germany	Scientific comm unity (higher educat ion, Research) - Pol icy makers	25	International; sever al EU countries, Canada
65	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Water scarcity dry r egions (presentation & identification re search gaps water co nference water resea rch horizon)	24/06/2013	Berlin, Germany	Scientific comm unity (higher educat ion, Research) - Pol icy makers	90	International; mainl y Germans, several EU countries, USA
66	Organisation of Conference	WAGENINGEN UNIVERSITEIT	Session on drought a nd water scarcity (S ession chair, 8th in ternational conferen ce of EWRA)	28/06/2013	Porto, Portugal	Scientific comm unity (higher educat ion, Research) - Pol icy makers	180	International; most EU countries and some overseas
67	Organisation of Workshops	UNIVERSITAT POLITECNICA DE VALENCIA	Drought impacts, vulnerability (2nd Jucar River CS drou ght dialogue forum)	27/06/2013	Valencia, Spain	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers	30	Portugal
68	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought as natural h azard, impacts, vuln erability (leading s essions, presentatio ns, discussions CEST conference)	04/09/2013	Athens, Greece	Scientific comm unity (higher educat ion, Research) - Civ il society - Policy makers	150	International; sever al EU countries and some overseas
69	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought (Present ation and discussion XXXIV AISRe co nference)	12/09/2013	Palermo, Italy	Scientific comm unity (higher educat ion, Research)	350	Italy

70	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought monitoring, identification (presentation and discussion, workshop african drought monitor princeton Univ., UNESCO, AGRIHYMET)	20/10/2013	Niamey, Niger	Scientific community (higher education, Research) - Civil society	50	International
71	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	World cafe style discussions (2nd pan-European drought dialogue forum DROUGHT-R&SPI project)	05/11/2013	Brussels, Belgium	Scientific community (higher education, Research) - Policy makers	30	International; several EU countries
72	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	impact drought on agriculture Po basin (presentations and discussions Italia tra siccita ed alluvioni, troppe emergenze senza risposta" Conf agricoltura Workshop "Acque e agricoltura: tra sicurezza del territorio e competitivita delle imprese")	04/12/2013	Rome, Italy	Policy makers	50	Italy
73	Oral presentation to a scientific event	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought vulnerability (presentation and sicussion Iberian Conference on water management and planning)	06/12/2013	Lisbon, Portugal	Scientific community (higher education, Research) - Civil society - Policy makers	100	International; Portugal, Spain and several EU countries
74	Oral presentation to a scientific event	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	AGU fall meeting, American Geophysical Union (Assembly; oral presentations, posters, leading hydroclimatic sessions, discussions)	11/12/2013	San Francisco, USA	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	15000	International; North America, many European countries and some from other continents)
75	Oral presentation to a scientific event	Instituto Superior de Agronomia	Ecological impact drought (presentations and discussions VIII congresso de ornit	02/03/2014	Almada, Portugal	Scientific community (higher education, Research)	150	Portugal

			ologia da SPEA (National Ornithology Congress))					
76	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Fresh water supply under drought (discussion workshop methods and tools to assess fresh water supply; NL CS DDF)	04/03/2014	Utrecht, the Netherlands	Scientific community (higher education, Research) - Civil society - Policy makers	35	The Netherlands
77	Oral presentation to a wider public	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	Drought impacts, vulnerability, policy options (presentation and discussion conference on European climate change adaption, CIRCLE 2 adaption frontiers)	10/03/2014	Lisbon, Portugal	Scientific community (higher education, Research) - Civil society - Policy makers	150	International; many EU countries
78	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought vulnerability - water security (presentation and discussion OECD/GWP task force on water security and sustainable growth)	12/03/2014	Oxford, UK	Scientific community (higher education, Research) - Civil society - Policy makers	40	International; several EU countries
79	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought (presentation and discussion international workshop "Peri-urban areas and food-energy-water nexus")	28/03/2014	Milan, Italy	Scientific community (higher education, Research) - Industry - Civil society - Policy makers	40	Italy and several EU countries
80	Oral presentation to a scientific event	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	Hydroclimatology and drought (presentation and discussion 15th Swiss Global Change Day 2014)	02/04/2014	Bern, Switzerland	Scientific community (higher education, Research) - Policy makers	100	Switzerland
81	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought management (presentation, peer review, discussion, WMO global water partnership, integrated drought management progra	08/04/2014	Ljubljana, Slovenia	Scientific community (higher education, Research) - Civil society - Policy makers	40	International; many central and Eastern European countries, The Netherlands, JRC

			mme central east Europe IDMP-CEE)					
82	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought (present ation and discussion conference about hy dropower: "Quale future per l'idroelettr ico in Italia Le reg ole per le nuove Con cessioni")	14/04/2014	Milan, Italy	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers	100	Italy and several EU countries
83	Organisation of Workshops	STICHTING DIENST LAN DBOUWKUNDIG ONDERZOEK	Drought adaptation (Discussion meeting t o fine tune intereg DROP project)	15/04/2014	Almelo, The Net herlands	Scientific comm unity (higher educat ion, Research) - Civ il society - Policy makers	3	The Netherlands
84	Organisation of Workshops	UNIVERSITETET I OSLO	European Geophy sical Union (As sembly; oral present ations, posters, lea ding drought session s, discussions)	29/04/2014	Vienna, Austria	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers - Medias	10000	International; all E uropean countries and many overseas
85	Organisation of Workshops	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Drought Impacts, manegement, m easures (discussions 4th CSDF of DR OUGHT-R&SPI pro ject for the Po river basin case study a rea)	06/06/2014	Parma, Italy	Scientific comm unity (higher educat ion, Research) - Ind ustry - Civil society - Policy makers	20	Italy
86	Organisation of Workshops	EIDGENOESS ISCHE TECH NISCHE HOC HSCHULE ZU RICH	Drought natural hazard, impacts, ma nagement, policy options (discussions 3rd case study fo rum drought and agriculture)	12/06/2014	Switzerland?	Scientific comm unity (higher educat ion, Research) - Civ il society - Policy makers	30	Switzerland
87	Organisation of Workshops	NATIONAL T ECHNICAL U NIVERSITY OF AT HENS - NTUA	Drought natural hazard, impacts, ma nagement, policy options (DROU GHT-R&SPI summer school)	17/06/2014	Syros, Greece	Scientific comm unity (higher educat ion, Research)	35	International; many EU countries and some countries ove rseas

88	Organisation of Workshops	NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA	Drought impacts, management, policy (discussion case study drought dialogue forum Syros)	17/06/2014	Syros, Greece	Scientific community (higher education, Research) - Civil society - Policy makers	15	Greece, The Netherlands
89	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought vulnerability - water security (Discussion workshop the Food, Energy, Environment and Water Network)	10/06/2014	Oxford,UK	Scientific community (higher education, Research) - Policy makers	35	UK and some EU countries
90	Organisation of Workshops	UNIVERSITAT POLITECNICA DE VALENCIA	Drought impacts, management (discussion 3rd Jucar River CS drought dialogue forum)	25/06/2014	Valencia, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	25	Spain
91	Oral presentation to a wider public	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH	Climate and Water Cycle (presentation and discussion 7th international scientific conference on the global water and energy cycle, the world forum)	15/07/2014	The Hague, The Netherlands	Scientific community (higher education, Research) - Industry - Civil society - Policy makers	300	International; EU countries, North America, several other countries
92	Oral presentation to a wider public	UNIVERSITAT POLITECNICA DE VALENCIA	Drought monitoring, impacts, management, measures (presentation and discussion 16th international water distribution systems analysis conference)	16/07/2014	Bari, Italy	Scientific community (higher education, Research) - Civil society - Policy makers	250	Italy, several EU countries
93	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought on agriculture and energy (presentation and discussion A.N.B.I. 2014 conference, " Acque irrigue per la crescita e il lavoro")	15/07/2014	Rome, Italy	Scientific community (higher education, Research) - Civil society - Policy makers	150	Italy
94	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Economic impact of drought (Presentation and discussion	02/09/2014	Padua, Italy	Scientific community (higher education, Research) - Ind	350	Italy

			XXXV AISRe conference)			ustry - Civil society - Policy makers		
95	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Water and water shortage (wat-a-game introduction course, IRSEA)	18/09/2014	French Embassy, Madrid, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	10	Spain
96	Oral presentation to a scientific event	WAGENINGEN UNIVERSITEIT	Future hazard and vulnerability (presentation and discussion UK NERC Marius drought project)	22/09/2014	Oxford, UK	Scientific community (higher education, Research) - Policy makers	30	UK, The Netherlands, Spain, Canada
97	Oral presentation to a scientific event	Instituto Superior de Agronomia	Fires, ecological impact drought (presentation and discussion 5th biologging science symposium)	24/09/2014	Strassbourg, France	Scientific community (higher education, Research)	70	International; several EU countries
98	Organisation of Workshops	WAGENINGEN UNIVERSITEIT	Drought management (Presentation, peer review, discussion, WMO global water partnership, integrated drought management programme central Eastern Europe IDMP-CEE)	03/10/2014	Budapest, Hungary	Scientific community (higher education, Research) - Civil society - Policy makers	35	International; many central and Eastern European countries, The Netherlands, JRC
99	Organisation of Conference	WAGENINGEN UNIVERSITEIT	Regional flow regimes, extremes management (Oral presentation, posters, leading drought session, discussions UNESCO int. Conf. FRIEND2014)	08/10/2014	Montpellier, France	Scientific community (higher education, Research) - Industry - Civil society - Policy makers	120	International; several EU countriews, representatives form all continents
100	Oral presentation to a wider public	UNIVERSITA COMMERCIALE 'LUIGI BOCCONI'.	Water quality, impacts, water stressors (final SCARCE international conference river conservation under water scarcity: integration of water quantity and quality in Iberian ri	12/10/2014	Tarragona, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	100	Spain, several EU countries

			vers under global change)					
101	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	Drought impacts indicators, management, policy options (discussions 3rd pan-European drought dialogue forum, DROUGHT-R&SPI project)	04/11/2014	Brussels, Belgium	Scientific community (higher education, Research) - Policy makers	25	International; many EU countries
102	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought management (presentation and discussion workshop on drought management in the Madrid science week)	11/10/2014	Madrid, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	15	Spain
103	Organisation of Conference	WAGENINGEN UNIVERSITEIT	Regional flow regimes, extremes management (oral presentations, posters, leading drought sessions, discussions Leonardo Int. HYPERdrought Conference	13/11/2014	Prague, Czech Reeplubic	Scientific community (higher education, Research) - Civil society - Policy makers	130	International; several EU countries representatives from all continents
104	Oral presentation to a wider public	Instituto Superior de Agronomia	Forest fire and drought as natural hazard (presentation and discussion 7th international conference on forest fire research)	18/11/2014	Coimbra, Portugal	Scientific community (higher education, Research) - Civil society - Policy makers	150	Portugal, Norway, several EU countries
105	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought in Europe (UNESCO Int. workshop on drought)	20/11/2014	Santiago, Chile	Scientific community (higher education, Research) - Industry - Civil society - Policy makers	80	South America, Spain, USA, The Netherlands
106	Organisation of Workshops	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	Drought monitoring (presentation, discussion, chairing sessions, Workshop global drought information system GDIS)	12/12/2014	Pasadena, USA	Scientific community (higher education, Research) - Industry - Policy makers	50	International; North America and countries from all over the world

107	Oral presentation to a wider public	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	AGU fall meeting, American Geophysical Union (assembly; oral presentations, posters, leading hydroclimatic & drought sessions, discussions)	12/12/2014	San Francisco, USA	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	15000	International; North America, many European countries and some from other continents
108	Oral presentation to a wider public	UNIVERSIDAD COMPLUTENSE DE MADRID	Drought vulnerability, management (presentation and discussion international forum about managing drought and scarcity in semi-arid lands: the cases of California and Spain)	29/01/2015	Madrid, Spain	Scientific community (higher education, Research) - Civil society - Policy makers	160	Spain and several EU countries
109	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought: European experiences (presentations, discussions, expert view, workshop lead, Univ. Tehran Ministry of Energy, Univ. Tabriz, Lake Urmia rescue committee	17/02/2015	Tehran, Tabriz, Iran	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	160	Iran, The Netherlands
110	Organisation of Conference	UNIVERSITAT POLITECNICA DE VALENCIA	All drought aspects (Oral presentations, posters, leading drought sessions, discussions DROUGHT-R&SPI Int, Conference)	12/03/2015	Valencia, Spain	Scientific community (higher education, Research) - Industry - Civil society - Policy makers - Medias	150	most EU countries, several overseas countries, North America, South America, China, India, Iran
111	Organisation of Workshops	STICHTING DIENST LANDBOUWKUNDIG ONDERZOEK	From science-policy interfacing to implementation (discussions DROUGHT-R&SPI, 4th pan_EU DDF)	12/03/2015	Valencia, Spain	Scientific community (higher education, Research) - Industry - Policy makers	35	International; most EU countries
112	Organisation of Workshops	ALBERT-LUDWIGS-UNIVERSITAET FREIBURG	Drought vulnerability, monitoring, early warning (DrIVER project stakeholder workshop on "droug	17/03/2015	Wallingford, UK	Scientific community (higher education, Research) - Civil society - Policy makers	40	UK focus (some international)

			ht: understanding and reducing vulnerability through monitoring and early warning systems")					
113	Oral presentation to a wider public	WAGENINGEN UNIVERSITEIT	Drought hazard and impacts (expert meeting weather and climate extremes)	18/03/2015	Copenhagen, Denmark	Scientific community (higher education, Research) - Civil society - Policy makers	20	International; several EU countries, EEA, JRC
114	Oral presentation to a wider public	Instituto Superior de Agronomia	Drought hazard, impacts, management, measures (discussion stakeholder meeting)	18/03/2015	Alentejo, Gimonde, Braganca Portugal	Scientific community (higher education, Research) - Civil society	6	Portugal
115	Oral presentation to a wider public	Instituto Superior de Agronomia	Drought hazard, impact, management, measures (discussions stakeholder meeting)	25/03/2015	Braganca and Porto, Portugal	Scientific community (higher education, Research) - Civil society - Policy makers	10	Portugal

Section B (Confidential or public: confidential information marked clearly)

LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS,UTILITY MODELS, ETC.					
Type of IP Rights	Confidential	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant(s) (as on the application)

OVERVIEW TABLE WITH EXPLOITABLE FOREGROUND								
Type of Exploitable Foreground	Description of Exploitable Foreground	Confidential	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application	Timetable for commercial use or any other use	Patents or other IPR exploitation (licences)	Owner and Other Beneficiary(s) involved

ADDITIONAL TEMPLATE B2: OVERVIEW TABLE WITH EXPLOITABLE FOREGROUND	
Description of Exploitable Foreground	Explain of the Exploitable Foreground

4.3 Report on societal implications

B. Ethics

1. Did your project undergo an Ethics Review (and/or Screening)?	No
If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final reports?	

2. Please indicate whether your project involved any of the following issues :

RESEARCH ON HUMANS

Did the project involve children?	No
Did the project involve patients?	No
Did the project involve persons not able to consent?	No
Did the project involve adult healthy volunteers?	No
Did the project involve Human genetic material?	No
Did the project involve Human biological samples?	No
Did the project involve Human data collection?	No

RESEARCH ON HUMAN EMBRYO/FOETUS

Did the project involve Human Embryos?	No
Did the project involve Human Foetal Tissue / Cells?	No
Did the project involve Human Embryonic Stem Cells (hESCs)?	No
Did the project on human Embryonic Stem Cells involve cells in culture?	No
Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	No

PRIVACY

Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	No
Did the project involve tracking the location or observation of people?	No

RESEARCH ON ANIMALS

Did the project involve research on animals?	No
Were those animals transgenic small laboratory animals?	No
Were those animals transgenic farm animals?	No
Were those animals cloned farm animals?	No
Were those animals non-human primates?	No

RESEARCH INVOLVING DEVELOPING COUNTRIES

Did the project involve the use of local resources (genetic, animal, plant etc)?	No
Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	No

DUAL USE

Research having direct military use	No
Research having potential for terrorist abuse	No

C. Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator	0	1
Work package leaders	2	3
Experienced researchers (i.e. PhD holders)	10	19
PhD student	6	7
Other	14	12

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	20
Of which, indicate the number of men:	10

D. Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project ?	Yes

6. Which of the following actions did you carry out and how effective were they?	
Design and implement an equal opportunity policy	Not Applicable
Set targets to achieve a gender balance in the workforce	Effective
Organise conferences and workshops on gender	Not Applicable
Actions to improve work-life balance	Effective
Other:	

7. Was there a gender dimension associated with the research content - i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?	No
If yes, please specify:	

E. Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?	Yes
If yes, please specify:	WU: Project outcome was each year discussed with MSc student in course under Hydrological Extremes. ForALU-FR: students participated in the data collection and analysis of the European Drought Impact report Inventory. ISA-CEABN: 2 project presentations in the seminar involving students from the Institute of agronomy, University of Lisbon. ETH: Resarchers contributing to the project were involved in teaching activities at the ETH (lectures, field courses). UCM: parcipated in the MAdrid Science Week in November 2014, where it organised, a serious game about drought management for general public. Same game also used in a MSc cours at UCM.
9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?	Yes

F. Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?	
Main discipline:	
Associated discipline:	1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)
Associated discipline:	5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

G. Engaging with Civil society and policy makers

11a. Did your project engage with societal actors beyond the research community? (if 'No', go to Question 14)	Yes
11b. If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?	Yes, in communicating /disseminating / using the results of the project
11c. In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	Yes
12. Did you engage with government / public bodies or policy makers (including international organisations)	Yes- in framing the research agenda
13a. Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?	Yes - as a secondary objective (please indicate areas below - multiple answer possible)
13b. If Yes, in which fields?	
Agriculture	Yes
Audiovisual and Media	No
Budget	No
Competition	No
Consumers	No
Culture	No
Customs	No

Development Economic and Monetary Affairs	No
Education, Training, Youth	Yes
Employment and Social Affairs	No
Energy	No
Enlargement	No
Enterprise	No
Environment	Yes
External Relations	No
External Trade	No
Fisheries and Maritime Affairs	No
Food Safety	No
Foreign and Security Policy	No
Fraud	No
Humanitarian aid	No
Human rightsd	No
Information Society	No
Institutional affairs	No
Internal Market	No
Justice, freedom and security	No
Public Health	No
Regional Policy	Yes
Research and Innovation	Yes
Space	No
Taxation	No
Transport	No
13c. If Yes, at which level?	European level

H. Use and dissemination

14. How many Articles were published/accepted for publication in peer-reviewed journals?	99
To how many of these is open access provided?	92
How many of these are published in open access journals?	44
How many of these are published in open repositories?	2
To how many of these is open access not provided?	5

Please check all applicable reasons for not providing open access:	
publisher's licensing agreement would not permit publishing in a repository	Yes
no suitable repository available	No
no suitable open access journal available	Yes
no funds available to publish in an open access journal	Yes
lack of time and resources	Yes
lack of information on open access	Yes
If other - please specify	
15. How many new patent applications ('priority filings') have been made? (''Technologically unique'': multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).	0

16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	
Trademark	0
Registered design	0
Other	0

17. How many spin-off companies were created / are planned as a direct result of the project?	0
Indicate the approximate number of additional jobs in these companies:	0

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:	, None of the above / not relevant to the project

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (FTE = one person working fulltime for a year) jobs:	11.6

I. Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?	Yes
21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?	Yes

22. Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?	
Press Release	Yes
Media briefing	No
TV coverage / report	Yes
Radio coverage / report	Yes
Brochures /posters / flyers	Yes
DVD /Film /Multimedia	No
Coverage in specialist press	Yes
Coverage in general (non-specialist) press	Yes
Coverage in national press	Yes
Coverage in international press	No
Website for the general public / internet	Yes
Event targeting general public (festival, conference, exhibition, science café)	Yes

23. In which languages are the information products for the general public produced?	
Language of the coordinator	No
Other language(s)	Yes
English	Yes

Attachments	
Grant Agreement number:	282769
Project acronym:	DROUGHT-R&SPI
Project title:	Fostering European Drought Research and Science-Policy Interfacing
Funding Scheme:	FP7-CP-FP
Project starting date:	01/10/2011
Project end date:	31/03/2015
Name of the scientific representative of the project's coordinator and organisation:	Dr. Henny van Lanen WAGENINGEN UNIVERSITEIT
Name	
Date	

This declaration was visaed electronically by Linda OUD (ECAS user name noudouli) on