EUPORIAS

Report On:

First EUPORIAS Stakeholder Meeting

Rome, ENEA-Headquarters
22-23 January 2013

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First Stakeholders Workshop: Executive Summary Report

During the last week of January 2013 the first EUPORIAS stakeholders' meeting took place at ENEA Headquarters in Rome. Forty-three people representing ten different sectors from across Europe registered for the workshop. The primary objective of the workshop, in line with EUPORIAS' main aims, was to start a process for bridging the existing gap between producers and users of seasonal and decadal information. Questionnaires and interactive workshops were used as means to activate a dialogue with stakeholders. The main findings of the workshop are are summarised here.

Climate parameters:

- While the list of relevant parameters tend to be sector specific (e.g. number of land-falling tropical cyclones for insurance, or number of marginal nights for the transport sector) in general, two parameters emerged as being the most relevant for the majority of stakeholders: temperature and precipitation.This appears to be particularly true for the *water*, *energy*, *health*, and *agriculture sectors*. While this is certainly an interesting finding, it may also suggest that stakeholders ask for what they know climate models can provide.

Users' needs

- Interaction and training. While seasonal predictions are interesting and potentially useful and while many sectors use them, there is still a huge need for *education and training*. This was one of the priorities identified by the users. Direct access to experts, for instance via sector specific workshops or seminars, is seen as a vital way of providing this education and training. This was also reflected by the fact that some of the model development the users required could be addressed by technology already available.

- Decision making calendar. With the exclusion of the agricultural sector which would benefit from seasonal predictions throughout the year, and the insurance sector for which the 1st of January and the 1st of April are crucial dates, the requirements of the other sectors tend to cluster in spring (for the summer outlook) and autumn (for the winter outlook).

- Decision relevant scale. Contrary to the initial expectation, *downscaling* was not necessarily perceived as being the most important need for all sectors. A number of stakeholders would prioritise the improvement of the large scale drivers over the increase the resolution of model output.

- Bidirectional communication. A significant language barrier exists between the different communities (users and producers of climate information) and even common concepts such as '*confidence' or 'level of certainty'* appear to have different meaning.

- Consideration of additional climate variables of interest. Some gaps indicated by stakeholders can be easily taken into account within the EUPORIAS project (e.g. tailored products and parameters at important stages of crop development, statistical dynamical downscaling, and integration with existing decision support systems). The EUPORIAS project plan will need to be adapted to account for these needs.

Climate parameters:

In general, during the workshop it emerged that temperature and precipitation are the most relevant climate parameters requested by stakeholders especially in *water*, *energy*, *health*, and *agriculture sectors*;
Some sectors provided additional details:. For example:

- *transport sector*: the most valuable climate parameters are ground temperature (influenced by air temperature, wind, soil moisture) and number of marginal nights (zero-crossing);
- *insurance*: the most important parameters for the sector include the number of land-falling tropical storms, extreme precipitation, river runoff over pre-specified, insurance specific drought indices; weather profile of year including lack of snow and late frosts, general "crop failure indices" with focus, drought lengths of dry spells, etc.

The questionnaire results (which do not distinguish among the different sectors) confirm that precipitation and temperature are priorities for most stakeholders, followed by: wind speed, run off, solar radiation and surface pressure. Moreover, stakeholders suggested other parameters, such as: humidity, sea-surface temperature, wet days, thresholds, drought, severe event, etc.

Needs:

The requirements of the most sectors tend to cluster in spring (for the summer outlook) and autumn (for the winter outlook). The exceptions are the agricultural sector which would benefit from seasonal predictions throughout the year, and the insurance sector for which the 1st of January and the 1st of April are crucial dates, .

Contrary to the initial expectation, *downscaling* was not necessarily high on the stakeholder agenda. Stakeholders prioritised investing resources in improving the large scale drivers rather than increasing the granularity of the data.

While seasonal predictions are interesting and potentially useful and while many sectors use them there is still a huge need for *education and training*. This was one of the priorities identified by the users. Direct access to experts for instance sector specific workshops or seminars, is seen as a vital way of providing this education and training.

Even among some of the users of seasonal prediction there is somehow a misconception on the *level of certainty* they need to make decision. E.g. "we need 95% confidence" to make a decision.

It is important to notice that some *gaps* indicated by stakeholders are only *perceived gaps*, as the information is in fact already available, such as: high frequency information, daily time series to feed impact models; interpretation of confidence levels, model outputs not bias-corrected. This highlights a need for better communication of available information.

Some gaps indicated by stakeholders can be easily taken into account within the EUPORIAS project, such as: tailored products and parameters at important stages of crop development, four-six months seasonal forecasts, statistical dynamical downscaling to local level taking into account fine scale topography differences, integration with other food

security relevant info for decision making, customized forecasts for user or business application, interface with existing (early warning) systems, etc.

Among these gaps (see 3.4.2), it is relevant for EUPORIAS to define four/five priorities together with other WPs in the next two/three months and organise future research activity in this direction.

Introduction

The primary **objective** of the workshop was to *inform* stakeholders and *capture* information on their current knowledge and usage of S2D data; the critical/relevant choices in their business that could be affected by climate; how does climate influence their business choices; and how does climate information enter in decision making procedure. Secondary objectives were to create a community of users of climate information; develop climate user champions; share knowledge and learning among peers (P2P); provide a good experience for attendees.

Means and method

Preliminary questionnaire

A preliminary questionnaire was distributed to the stakeholders at the moment of their on line registration, with the aim of catch their attitude towards seasonal or decadal climate predictions and organise at the best the workshop itself. The following questions were posed:

1. Do you use seasonal or decadal climate predictions in your organisation?
2. How do you use it?
3. What are the barriers in using seasonal or decadal climate predictions in your organisation?

Stakeholders' Workshop

The meeting consisted in an *opening session*, a *talk over dinner* and a number of *interactive sessions*. The interactive sessions applied design methods to generate knowledge exchange and capture. Face-to-face interviews will be carried out on the light of the results achieved in this workshop.

The first day interactive session had the scope to create connections between participants, and the second day a session with a more rigorous, scientific approach had the scope to ensure that questions were answered more comprehensively and consistently.

The used format of interactive sessions involved two parts.

1. *Breakout Groups*
   Participants were divided into groups of 4-5. Groups included different sectors, one experienced user, and a facilitator) Groups were asked to produce post its or each of the questions they were given within the landscape established in the opening presentations.
   Groups were asked to produce at least 2 of each kind
   Groups retained the badges on their table during the activity.

2. *Feedback*

In turn, a nominee from each group placed the badges from their group on a landscape board. They were asked to speak for 10-30 seconds about each badge they place. Groupings or links were drawn on the board by the moderator/team members. Cluster of ideas that relates to most of the participants were indicated, if needed.to visualise how different sectors rate these issues. In this may recurring themes across sectors, to enable insight and applications have been shared across disparate sectors, and peer-to-peer dialogue and engagement across stakeholders and partners have been built.

Questions for interactive session

An on line questionnaire was prepared to generate discussion during the workshop and, at the same time to further investigate stakeholders' attitude towards S2D forecasts, the present and/or potential user's needs, with the aim of sharing of insight, developing users' perspective on the topic and generating new ideas:

1. **What are the critical activities or decisions in your business that are affected by climate?** (e.g. communication, operational management, long term adaptation strategies, pure research)
2. **How are these affected**? (e.g. financial risks)
3. **What are near term benefits or future opportunities can you envision through access to S2D information** (e.g. improving operational efficiency, diversification, new climate services)
4. **Mapping the gaps – what is the information we are not supplying?** (e.g. level of confidence, temporal or geographical resolution)
5. **What are the barriers in using S2D climate sectors**? (e.g. lack of information, complexity, financial constraints, uncertainty).

Pictures of workshop: http://www.euporias.eu/workshop-photos
Video of the workshop: **EUPORIAS, Quando La Scienza del Clima esce dal Laboratorio**

1. Preliminary registration questionnaire

Forty one people provided a response to the Stakeholder Workshop registration questionnaire.

Although some of the respondents could not make the workshop in person, their answers are still included in the following analysis. Furthermore, there were some attendees to the workshop who did not fill in the registration questionnaire and hence are not included in this analysis.

The answers from 8 of the initial respondents have been removed as they are either EUPORIAS staff or ENEA observers giving a total of 33 respondents.

All participants (total 33):

1.1 Do you use seasonal or decadal climate predictions in your organisation?

Yes – 26
No – 7

No clear distinction across sectors between those answering 'Yes' and those answering 'No'. However, all of the respondents from the Energy, Insurance and Food Aid sectors use such predictions.

Of those that answered yes to above:

1.2 How do you use it?

Respondents could give multiple uses

Use for operations/planning	17
Use for research	10
Develop seasonal/decadal predictions	3

Of those that answered no to above:

6/7 said that seasonal or decadal predictions would be of use to their organization (one specifying that they would need to be tailored; one not answering)

All participants:

1.3 What are the barriers in using seasonal or decadal climate predictions in your organisation?

(Respondents could give multiple barriers)

Value of the predictions to the sector(s)	9
Technical complexity/data availability	7

Difficulties in communicating uncertainties/probabilities	7
Cost (in terms of time, money and knowledge needed)	7
Perceived skill of predictions	5
Lead time not fitting with decision making	4
No barriers specified	1
Not answered	8

In conclusion, the preliminary registration questionnaire shows that the majority of the identified stakeholders use seasonal or decadal climate predictions mainly for operation/planning and for research. A small group indicate that they use them to develop seasonal/decadal prediction. Among the minority that do not use seasonal or decadal climate predications, most of them indicate that it may be useful for their organization. This means that in future EUPORIAS stakeholders' activity, attention is to be devoted not only to refining tools for those stakeholders that already use them, but also to identify "potential" future uses of these tools.

Stakeholders express concern on technical barriers, data availability, difficulties in communicating uncertainties and costs.

2. Sector specific summary of the Stakeholders Workshop

In this section a summary of the main results of the workshop is reported for each sector. **The complete results of the discussions are reported in the enclosed spreadsheets for each sector**.

2.1 Water

Stakeholders:

- *Philippe Verjus, DRIEE France (Direction Régionale et Interdépartementale de l'Energie et de l'Environnement)*
- *Dr Bastien Klein, FIH (Federal Institute of Hydrology)*
- *Creus Rodriguez Ramon, AGBAR, Spain*

***Stakeholder Expert (water resources**: Laurent Pouget (CETaqua)*
***Climate Expert** : Jean Pierre Ceron, Météo France*
***Moderator** : Adeline Cauchy (TEC)*
Link to water spreadsheet: http://bit.ly/matrix_water

2.1.1 Climate parameters

Two relevant climate parameters are requested by the stakeholders in the field of water resources management: *temperature* and *rainfall*. These two indicators are highly correlated with hydrological processes studied and/or controlled by the Stakeholder i-e changes in river flows and groundwater recharges.

2.1.2 Potential applications of seasonal climate forecasts in water management

Several applications of seasonal forecast have been discussed between stakeholders:

- Water resources management at the river basin scale (water allocation).
- Seasonal forecast could be used for planning drought management strategies at different scales and could support various types of activities: control and monitoring of water resources availability, operational decisions on water supply or demand (restriction on agricultural withdrawals in groundwater / dams management).
- Operational management of material and human resources: teams management and organization (for rivers measurement, maintenance of dams etc.) according to future hydrologic conditions.
- ship traffic management: predict river low flow and ice in the river.

2.1.3 Levels of uncertainty and confidence

At this stage there are no specific recommendations from stakeholders about the level of confidence or uncertainty that would allow or not allow them to use this information.

However, a high level of uncertainty can of course be an important barrier for communication and decision making.

2.1.4 Communication and capacity building

A significant need for training has been identified by stakeholders, in the form of workshop or courses. Three groups with different needs have been identified: 1/ Climate data provider (e.g. the one providing data on future temperature and rainfall), 2/ Impacts data provider (e.g. the one providing data on future water availability) and 3/ End-user (e.g. the one managing / operating the resources). The trainings could encompass all the 3 groups, or could be more organized between groups 1/ and 2/ (exchange of information regarding the use of climate information, model skills) and between groups 2/ and 3/ (exchange of information regarding the integration of the forecast in operational processes).

2.2 Energy

***Stakeholders**:*
- *Niglio Gennaro, GSE SPA*
- *Pestana Rui, REN – Rede Eléctrica Nacional, S.A.*

***Stakeholder Expert (energy)**:*
***Climate Expert** : Laurent Dubus, EDF R&D*
***Moderator**: Melanie Davis, IC3*
Link to water spreadsheet: http://bit.ly/matrix_energy

Operations and planning for the energy sector relies on the balance of energy demand to supply. Variation in demand is primarily determined by above or below average temperatures, whereas supply depends on the energy mix available over different geographical areas (e.g. wind, hydro, solar, nuclear, coal etc.). The energy companies involved in the EUPORIAS project represent both energy supply managers (e.g. EDF) and grid managers (e.g. TERNA).

2.2.1 Climate parameters and potential application

Hydro resource management (precipitation) was identified as the most valuable climate variable, due to the fact that hydro energy resources can be stored, their operations are highly flexible and can therefore respond quickly to the demand. Temperature and pressure variables are also key, in order to evaluate variations in energy demand. Over seasonal and interannual timescales, summer and winter periods are the most vulnerable times to the energy system. Climate forecast (or outlook) information that could be provided leading up to these seasons could therefore play an important role in helping the energy sector to prepare for and manage such high-risk periods. Therefore, climate forecasts should, as a minimum, be provided in autumn (October) for a winter outlook, and in spring (April) for a summer outlook. Over longer decadal timescales, a wider range of climate information could be useful to guide decisions related to energy generation sites, infrastructure planning, interconnectivity of the energy network etc. For these timescales, variation in the climate extremes is most useful.

European regions where there are intercountry grid connections are also most vulnerable to energy supply and demand. Central Europe is therefore a key region to improve the provision of climate information year round, whilst southern Europe is a priority in the summer and northern Europe in the winter.

2.2.2 Level of uncertainty and future challenge

The skill of climate forecasts needs to be compared to, and improve upon current practices. An on-going validation exercise to benchmark the different approaches could therefore be a good starting point. One of the key challenges will be the introduction of climate forecast information into the existing operational tools of the energy management sector - for example, a temporal resolution of daily means is requested by the energy community, although climate forecast skill has, to date, only shown to be useful when using monthly means.

Hydro power management and demand forecasts are the key issues on seasonal/annual time scales. Current practises generally use a climatological approach: use of historical time series of precipitation and temperature in hydrological model, to make projections of how the initial water stocks (dams, snow pack in mountains...) may evolve in the future. Hence, forecasts of T and P are valuable if they are more skillful than this climatological approach.

The relevant spatial scale is the watershed for hydro but also the regional (sub-country)/national scale. The ideal temporal scale is the day (for demand in particular), but weekly information are enough for hydro power management

Longer term projections/forecasts are important as well:

- How the annual water cycle will evolve? (more/less precipitation over the year, or a shift in the rainy/dry seasons inside the year).
- Will the interannual variability increase/decrease?
- How will the key variables evolve (mean, variability, distributions, extremes)? => temperature, precipitation, soil wetness indices.

At the seasonal time scale, as of today, wind/solar energy are not a key issue, but they may become rapidly due to their fast developing ratio. On longer time scales, of course, they are a major issue, and then forecasts/projections of wind/solar radiation at the local scale are important.

2.3 Health

Stakeholders:

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SH Expert*:*

Climate Expert *:*

Moderator *:*

Link to health spreadsheet: http://bit.ly/matrix_health

2.3.1 Climate parameters and potential application

Temperature is one of the most important *parameter* requested for decisions concerning:

- prediction of possible temperature anomalies in *winter season* (October to March) and in *summer season* (May to September), in order to plan prevention activities and alert health services. For the winter season the decision time is around August and for the summer season is April, with a monthly frequency, a forecast length of three months, from August and then monthly after that until March, and for the summer season from April and then monthly after that until September.
- Mean temperature (useful to have longer range forecast to help fill the information gap between seasonal forecasts and long-term projections), with a forecast length from 5 to 10 years.

As for the other *parameters*:

- Sea surface temperature (STT), for *decisions* concerning the knowledge of SST for summer season (starting in February) in terms of overall change and trend in STT.
- Precipitation and temperature for *decisions* related to severe flooding events in Europe (e.g. August and during winter time due to snow melt), with a monthly frequency and a all year monthly forecast.
- Wind storms.

The spatial resolution for all the parameters is European level (EU state members, plus Russia, central Asia, Caucasus, and Southeast Europe).

2.3.2 Level of uncertainty and confidence

In general the use of seasonal information is used if there is a 70% probability of exceeding a particular threshold; the shorter the forecast can be provided at this percentage of certainty the better.

2.3.3 Communication

Clear key messages to the media on what people need to do (otherwise don't do it); closer collaboration between producers and users (e.g. defining specific roles; workshops).

2.4 Transport

***Stakeholders**:*
- *Tuni Max, Predictia*

***SH Expert**:*
***Climate Expert**:*
***Moderator** :*
Link to transport spreadsheet: http://bit.ly/matrix_transport

2.4.1 Parameters and potential applications

The *parameters* indicated by the stakeholder are:

1. ground temperature (influenced by air temperature, wind, soil moisture) with objectives or decisions of interest regarding road management, with a forecast required in an uncertain time and 1 month before the period, a monthly frequency, a forecast length of monthly forecast for winter months (November, December, January) , with a very high resolution (sub 1km) and a forecast required in September/October, with an annual frequency, a seasonal forecast length and a seasonal spatial resolution, a very high resolution (sub 1km).

and

2. number of marginal nights (zero-crossing), with objectives or decisions of interest regarding understanding risks to bridge stability; frost heave, etc., with a decadal forecast required, not available Characteristic timescale needed to implement forecast decision, a Multi-year/decadal forecast length and resolution a country level spatial resolution.

2.4.2 Level of uncertainty

As high resolution data as possible with quantified level of certainty.

2.4.3 Communication

Decision makers may require data, Good communication about the level and range of confidence, Data format needs to integrate with existing application, no desire for lots of additional post-processing.

2.5 Insurance

***Stakeholders**:*

- *Allianz RE*

***SH Expert**:*
***Climate Expert** :*
***Moderator** :*
***Link to insurance spreadsheet**: http://bit.ly/matrix_insurance*

2.5.1 Parameters

The most important indicated *parameters* are:

- Number of landfalling tropical storms.
- Extreme precipitation; river runoff over threshold 'x' in Asia, Europe.
- Insurance specific drought indices; weather profile of year including lack of snow and late frosts.
- General "crop failure indices" with focus on US and China; drought; length of dry spells (soil moisture?).

As a second priority the following *parameters* are indicated:

- European windstorms above defined wind speed. Number of severe convective storms; Australia, U.S..
- Frost in Europe: number of frost days below a certain temperature threshold in a row (freezing pipes).
- Snow load on roofs: amount of accumulated snow over x number of days with little or no melting; snow and rain combined.
- Precipitation extremes leading to surface water flooding; hourly maximum precipitation.

2.5.2 Potential applications

The most important *objectives/decisions* indicated are:

1) Annual insurance profile; provide information to customers.
2) 5-year/decadal overview for reinsurance.
3) Plan ahead for claims; provide advice to customers.

All the parameters of the above indicated objectives/decisions have an annual *frequency*, with a *forecast length* going from relevant for tropical storm season, seasonal to annual. The *spatial resolution*s are from: Ocean basin (Atlantic, WNP) plus more regional breakdown e.g. SCS, GoM etc., regional and country-level; in the US and China with a regional split for the major farming regions,

Investigations of anti-/correlation between basins any cross-country correlation/anti-correlation, and what is the most reliable "crop failure index" which can be predicted with high skill have been indicated as *complementary actions*.

2.5.3 Level of uncertainty and confidence

The level of uncertainty in this sector is due to the fact that two different audiences receiving information:

(a) communication with customers advising adaptation/mitigation actions e.g. clear drains, keep eye on snow load etc. Level of confidence in projections needs to be relatively high (>70%) but if it's 'wrong', there's reputational issues but no great financial risk
(b) buying reinsurance needs forecasts with high degree of skill. Generally short timeframes involved means that decisions can be tested and evaluated.

2.5.4 Communication and capacity building

Communications to customers will always be filtered and it's likely emphasis will be put on actions, not on the forecast itself

Messages about risks need to be backed up by the science but that needs to be clear about how skilful or not it is

2.6 Agriculture and Forestry

***Stakeholders**:*
- *Stefan Niemeyer, JRC*
- *Philip Amingo, IGAD-ICPAC*
- *Andreas Weigel, Cargil International, SA*
- *Graça Antonio, Sogrape Vinos SA*
- *Lars Barring, SMHI*

***SH Expert**:*
***Climate Expert** : Paolo Ruti, ENEA*
***Moderato**r:*
Link to agriculture spreadsheet: 3. http://bit.ly/matrix_agriculture

2.6.1. Climate parameters

The main requested climate parameters are:

- Temperature.
- Total precipitation and its probability density function.
- Number of rainy days, dry spells, drought and SPI index (parameters can be derived from main variables).
- Low temperature (minima).
- Sea Surface Temperature.
- Number of frost days.
- Snow cover.

2.6.2 Potential applications

The most important objectives/decisions indicated are:

- Crops management (logistic, harvesting, protection during flowering period, irrigation management).
- Water management.
- Forestry management.

All the parameters of the above indicated objectives/decisions have an annual frequency, with a forecast length going from one month to a season. Key regions have been identified: Mediterranean, Northern Europe, East Africa. The spatial resolutions should be 50 Km.

2.6.3 Levels of uncertainty and confidence

The level of reliability depends on organisation that uses this information. For example WFP can manage risk, but Governments cannot.
The production of twice for month's seasonal forecasts, soon updated, can be very useful for tuning forecast's applications and managing the associated risk.
It would be very important to initiate an internal discussion in EUPORIAS about the link between high reliability and high probability.
In addition reliability depends on season and region.

2.6.4 Communication and capacity building

Concerning communication here a short list of relevant issues:

- The involvement of stakeholders in discussing forecast results is considered important.
- Basic communication action should be devoted to teenagers.
- A handbook with few definitions, eight pages guides with graphs, and pictures (including comics) and training video, have been indicated important to diffuse the information.
- The training of new professionals and the choice of communication champions.

Analysis of the online questionnaire

An on line questionnaire has been prepared by the EUPORIAS staff, with the technical support of ENEA (ENEA server: address http://utmea.enea.it/surveys/index.php, password: xyok). The questionnaire had the aim to further investigate the stakeholders' attitude towards S2D forecasts and the present and/or potential users' needs. In addition to the stakeholders participating in the workshop, the questionnaire allowed to reach also those stakeholders who were not able to participate in it. It was filled by 16 key stakeholders.

In addition to the information concerning stakeholders' themselves (name, surname, institution, e-mail), simple and direct unstructured questions were identified (see below).

3.1 QUESTION 1: What are the critical activities or decisions in your business that are affected by climate? QUESTION 2: How are these [activities] affected?

These questions in their open structure, had the aim to leave stakeholders free to express the critical decisions they have to face in their activity in relation to climate, without any direct reference to S2D. Of course the typology of replies depends on the sectors identified for the selected workshop participants. For this reason the number of replies for each category is irrelevant for an analysis. On the contrary, it is relevant the content of the replies which confirms and/or carries new significance and new input for S2D researchers. The replies are listed and commented sector by sector.
(The complete list of replies for question 1-2 is here enclosed)

3.1.1 Agriculture/food security/forest

In the agriculture sector, among the replies, the respondents indicated as their critical activities and decisions: crop yields in Europe and beyond, early crop estimates, irrigation plan, grape and wine production, drought, water use. Seasonal-scale climatological factors could impose a risk or an opportunity for crop yields in a specific region. The commodity prices are influenced by weather variability.

Agriculture is directly dependent on weather and climate on a daily to seasonal time scale. The water levels availability in the next days/weeks is of extreme importance for the agriculture sector.

In the wine sector, considering that vineyards are meant to have a productive average life of 40 to 50 years, the critical decisions related to climate concern the choice of grape varieties, rootstocks, irrigation systems design and sizing, cultural practices and so on are all affected. Wineries, storage and bottling facilities, water treatment plants, offices are also affected. Planning for grape and wine procurement is greatly affected by weather. The price of wine is dependant to the quality of crops: "Good crops lower crops, short ones raise them". Sales and marketing campaigns can also be greatly affected. Wines are seasonal: reds and Port in cool weather, white and rosé wine in warm weather. They way spirits are promoted also changes: straight liquor in cool weather, cocktails and mixers in warm weather.

In the food security activity prevention is crucial to support food assistance intervention design, including preparedness (contingency plans, corporate, community levels, etc.) and to support decision making processes for short-term planning (prepositioning of food stocks and logistical services), and long term planning (resilience building activities and creation of livelihood assets).

A regional drought could trigger a humanitarian crisis which would affect decisions about where to preposition food, how many beneficiaries to assist, how to support governments.

Above normal or too below normal temperature and/or precipitation at specific phases in a plant's growth cycle can reduce (or also enhance) expected yields,

In the forest sector the following activities have been indicated: operation planning - logging, transport, forestry, crucial to choose the suitable table reforestation material (varieties, species), forecast pest outbreaks. The needed indices indicted are:

- Temperature e.g. frost.
- Soil moisture (precipitation, evaporation).
- Biological threshold values.
- Extreme values (max., min.).

Together with drought stress, flooding, temperature backlashes (frost damage), wind storms, the financial crisis is also indicated as important in agriculture.

3.1.2 Energy

Most of the replies concern renewable energy (solar, wind, hydro). The activities that have been indicated are:

- Site planning of wind or solar project operational planning of wind or solar project.
- Balancing grid, ensuring risk.
- Estimation of renewable energy quantity, site planning of wind or solar project.
- Operational management for hydro production in dry years, especially if they are consecutive. Very hot days and the impact of water temperature at rivers (example: bigger than 28ºC – water, 40ºC – air temperature). Number of days with very extreme wind (example: bigger than 120 km/h).energy prices and commodities prices.
- Operational management of the power system, from day +1 to 3.

Renewables are directly dependent on weather and climate on a daily to seasonal time scale, city planning more interested to decadal climatic scale. Climate have effect on financial risk (profit and losses), energy supply.

Power demand and production are affected by climate variability. The conjunction of several parameters/impacts can have very negative effects, for instance: low temperature (high demand) + low level of water available for hydro power production.

Poor site selection results in poor ROI and vice versa, poor planning results in inefficient use of energy resources = loss of money, risk of blackout.

3.1.3 Health

Decision on education campaigns, spraying programmes to eradicate mosquito, insecticide treated bed net distribution in tropical countries have been indicated among the critical decisions stakeholders have to face. Climate is indicated to have effect on loss of life/economic cost loss of working days/cost of hospitalisation.

3.1.4. Other sectors: transportation, insurance, research

For transportation stakeholders have indicated the decisions on maximum possible loading capacity based on forecasted water levels at critical locations, planning of shipping, transportation capacities.

As regards insurance, the following activities have been indicated: buying of retrocession insurance cover, providing (re)-insurance, providing primary insurance cover (property and crop). Losses due to (extreme) weather events have been indicated as consequence of climate.

As far as research is concerned, the modelling of climate impact on the risk of damage to forest ecosystems has been indicated.

3.3 QUESTION 3: What near term benefits or future opportunities can you envision through access to S2D information?

This unstructured question had the aim to receive immediate opinion and replies by stakeholders on the use of S2D information. In general respondents indicate better and more efficient operational management activities in the use of resources, in security levels, planning, etc. as benefits/opportunity deriving from S2D information.

Some respondents indicate as important management on monthly to season time scales. Others indicated reducing risks in general from short to long term. Moving from the disasters management to risks management has been indicated by many respondents in order to ensure a cost-effective decision making, to improve resilience (including business sector, and sustainable growth), improve cost-efficiency and effectiveness... convincing donors to invest in preparedness and prevention rather than response only, helps building resilience, opportunity to increase user capacity.
(The complete list of replies is here attached)

3.3.1 Agriculture/forest – food security

In agriculture respondents indicate improving crop yield forecasts (1-3 monthly forecasts), anticipating sowing conditions and frost kill risk. Reliable seasonal forecasts could help to obtain more reliable yield estimates, and more reliable yield estimates would allow to better anticipate supply and demand of a crop and thus to obtain better estimates of food availability, food need, and food prices.

Improving planning of management actions (harvesting, planting) and early warning systems - countermeasures of forest pests, have also been indicated as future opportunities deriving from S2D research.

3.3.2 Energy

Improving confidence in DMP for 4? Potential business opportunities in operational climate services to expand current weather forecasting for solar and wind, and insurance covers.

3.3.3 Insurance

Risks management is fundamental in this sector. Respondents envisage to receive the following benefits by S2D information:

- Moving from managing disasters to managing risk.
- Helps understand risk short to long term.
- Helps reduce basis risk in index insurance design.
- Improve cost-efficiency and effectiveness... convincing donors to invest in preparedness and prevention rather than response only.
- Helps building resilience.
- Optimization of reinsurance protection (mid-term).
- Optimization of insurance risk portfolio (mainly strategic , decadal).

3.3.4 Mixed

Estimation of future water levels/runoff situations for decision making. Planning of ship capacities, optimizing stock management, be prepared for extreme low flow events (reducing economic risks).

3.4 QUESTION 4. Mapping the gaps - what is the information we are not supplying?

This unstructured question aiming to catch the gaps of the information which is according to respondents non supplied, is very important since it enlightens the needs but also the information gaps about S2D forecast.

The replies are listed according to the four categories: 1) information already available, 2) information that is not available that can be achieved with some affordable work within EUPORIAS project life span, 3) Real Gaps, 4) non applicable

3.4.1 Information already available

- high frequency information: for example, daily time series to feed impact models, which then will be aggregated/averaged,
- Interpretation of confidence levels,
- Model outputs not bias-corrected compared to the observation data,
- where are operational climate information available from relevant to user needs,
- communication on uncertainty/skill/predictability/windows of predictability/future improvements to all.

3.4.2 Information that is not available but can be achieved with some affordable work within EUPORIAS project life span

- Tailored products and parameters at important stages of crop development (e.g. probability to reach critical threshold of precipitation during grain filling stage of maize in Spain).
- 4-6 months forecasts, seasonal.
- Overview of climate products, guidelines to use them, tailored product.
- Downscaling to local level taking into account fine scale topological differences.
- Challenge of integration with other food security relevant info for decision making.
- Customized forecasts for user or business application.
- Interface with existing (early warning) systems.
- Downscaling (temporal and spatial), model skill, timing of makind data/forecast available.
- High spatial resolution for impact models, statistical downscaling is required by the users which probably don't have experience in statistical downscaling.
- Reliable rainfall forecast (Improvement required).
- We need relationship between: - prediction period (length), - accuracy, - spatial resolution.
- Skillful tailor made products for loss relevant quantities (e.g. landfalling hurricane number vs atlantic basin activity, activity of European winter storms).
- Higher temporal resolution (e.g. seasonal forecasts in monthly or even 2-weekly resolution rather than 3-months-averages). This could perhaps be achieved by more spatial aggregation (cf we do not need information in grid-point resolution...).
- Precipitation frequency (at the moment typically only precip means are supplied) and higher moments of the precipitation statistics.
- Reliable confidence intervals for each forecast.
- Impact specific measures.

3.4.3 Real Gaps

- Representation of extreme weather events.
- The wine sector needs greater resolution both at the geographical (down to 1km ideally, at least down to 10 km level) and temporal dimensions (in some cases down to weekly periods, in other at yearly periods).

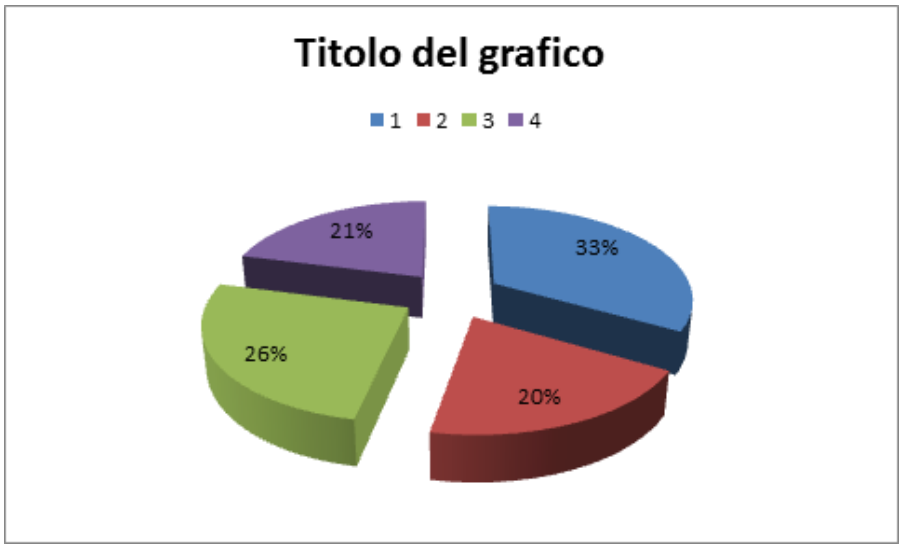
3.4.4 Not applicable

- Sharing the financial risks among scientist and business in case of errors.

- Validation / proof of benefit of use of monthly to seasonal forecasts, requires long(er) commitment of us as users to convince us and our customers".
- Format/metric(s) of data/forecasts.
- This only works with a parallel/complementary capacity building effort at all user levels.
- Overall challenge of political intervention.

3.5 <u>QUESTION 5</u>: If you were to invest 10 coins into S2D research, how many of them would you spend on (you have a total of 10 coins to distribute across these four questions)

(1) the overall skill of the predictions on the large scale - 33%
(2) improving spatial resolution of the prediction – 20%
(3) the representation of the extreme events – 26%
(4) tailoring the forecast and communicating its skill and uncertainty – 21%



Picture 1.

The four categories show a rather homogenous attention in terms of financial resources that respondents to questionnaire would allocate to S2D research. The overall skill of the prediction on the large scale shows the largest value (33%), followed by the representation of the extreme events (26%). Tailoring the forecast and communicating its skill and uncertainty (21%) and improving spatial resolution (20%) receive a smaller value. (see picture 1).

This analysis has to be completed also with the distribution of "value" and its frequency as reported in table 1. In fact, in table 1, respondents have used eight values (from 0 to 7). They have never used value from 8 to 10, and at the same time have included the negative value: 0, which was not expressly requested.

The highest value, 7, has been indicated only once and for question 4, which is the question that received the second lowest percentage in the total: "tailoring the forecast and communicating its skill and uncertainty 21%". This mitigates the negative results that comes out from the total percentage of the above indicated analysis. Questions 2, 3, 4 receive two "0" value. This diminishes the importance of question 3 "the representation of

the extreme events” as a second priority and confirm the position of the other questions, as indicated in picture 1.

The 0 value has never been indicated for question 1, which is the question with the highest percentage (33%). This confirms that “(1) the overall skill of the predictions on the large scale” is the research that respondents consider most important and are more keen to invest money on. All the others are more or less at the same level of importance.

On the whole, it can be concluded that respondents are not very keen to finance the category of research they have to choose since the frequency of low votes (from 0 to 5) is very high, while vote from 6 to 7 have a very low frequency.

Table 1: vote distribution and its frequency

Vote	Questions	Frequency
7	1	-
	2	-
	3	-
	4	1
6	1	-
	2	-
	3	1
	4	-
5	1	3
	2	-
	3	-
	4	-
4	1	5
	2	2
	3	3
	4	2
3	1	5
	2	4
	3	5
	4	2
2	1	1
	2	4
	3	3
	4	4
1	1	2
	2	3
	3	1
	4	5
0	1	-
	2	2
	3	2
	4	2

3.6 QUESTION 6: Put the following variables in order of importance for your business: temperature, precipitation, wind speed, solar radiation, surface pressure, runoff, others

Precipitation, temperature, wind speed are the variables which receive more frequently the first priority, followed by: run off, solar radiation and surface pressure. However this list has to be completed with “others”: humidity, SST, wet days, thresholds, drought, severe events, followed by: fog index, pollution, rainfall distribution, start of season, WRSI, NDVI, potential evapotranspiration, geopototential (700 and 500 hPa), soil moisture, water level, active degree-days (Winkler), evapotranspiration (Penman-Monteith), dryness index, cool-night index, grap.

See table. 2 (Order of priority of the variables)

Table 2: Order of priority of the variables as expressed by respondents

Respondent/ Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
T.	1.	-	1	3	2	2	2	2	-	1		2	3	2	2	1
P.	2.	-	-	2	-	1	1	1	-	2	4	1	4	1	4	2
W.S.	3.	1	-	-	.-	-	-	-		3	2	4	1	-	1	3
S.R.	3.	2	-	-	-	3	-	-		-	-	5	2	3	3	-
S.P.	4.	-	-	-	-	-	-	-		-	-	-	5	-	5	-
Ro	5.	.	2	1	-	-	-	-	1	-	3	3	6	-	6	-
O.	-	Fog index, pollution	geopotential (700 and 500 hPa		Extreme events (droughts, floods), rainfall distribution, start of season, WRSI, NDVI, potential evapotranspiration	-	Humidity SST, wet days, thresholds	Humidity SST, wet days, thresholds	Water level	Max/mean of the above variables	Number of extremes storms, Drought, Severe convection	active degree-days (Winkler), evapotranspiration (Penman-Monteith), dryness index, cool-night index, grape colour index (Crespy	Soil moisture			

Legenda:
T.= Temperature
P. = Precipitation
S.R. = Solar Radiation
W.S. = Wind Speed
S.P. = Surface Pressure
Ro = Runoff
O. = Others

Conclusions

The first phase of EUPORIAS stakeholders activity can be considered very satisfactory since all the objectives have been reached. Questionnaires were distributed to relevant stakeholders and a two day workshop was held during January 2013 in Rome.

Stakeholders have been informed, and at the same time information about their knowledge and use of S2D data have been acquired on: i) the critical/relevant choices in their business that could be affected by climate; ii) how climate influences their business choices; iii) how climate information enters in decision making procedure. The first steps to reach the objective to create a community of users of climate information and develop climate user champions have been made. The workshop was an occasion for stakeholders and partners to learn from each other, providing a positive experience for participants.

The *preliminary registration questionnaire* shows that the majority of the identified stakeholders use seasonal or decadal climate predictions mainly for operations/planning and for research. A small group indicate that they use them to develop seasonal/decadal prediction. Among the minority that do not use seasonal or decadal climate predications, most of them indicate that they may be useful for their organization. As a consequence in future EUPORIAS stakeholders' activity, attention is to be devoted not only to refining tools for those stakeholders that already use them, but also identify "potential" future uses of these tools. In this questionnaire stakeholders express concern for technical barriers, data availability, difficulties in communicating uncertainties and costs.

The *first Stakeholder Workshop* in Rome enabled deepened understanding of the stakeholders' needs in the different sectors: water, energy, agriculture, transport, health, insurance. Some of the information gathered thanks to the *online questionnaire* further investigated the stakeholders' attitude towards S2D forecasts and the present and/or potential users' needs.

With the exclusion of the *agricultural* sector which would benefit from seasonal predictions throughout the year, and the insurance sector for which the 1st of January and the 1st of April are crucial dates, the requirements of the other sectors tend to cluster in spring (for the summer outlook) and autumn (for the winter outlook).

In general, during the workshop it emerged that *temperature* and *precipitation* are the most relevant climate parameters requested by stakeholders especially in *water*, *energy*, *health*, and *agriculture* sectors; ground temperature (influenced by air temperature, wind, soil moisture).

The results of the online questionnaire (which do not distinguish among the different sectors) confirm that precipitation and temperature are priorities for stakeholders, followed by: wind speed, run off, solar radiation and surface pressure. Moreover, stakeholders suggested other parameters, such as: humidity, sea-surface temperature, wet days, thresholds, drought, severe event, etc.

For the *water* sector, stakeholders indicated many applications of seasonal climate forecasts, such as: water resources management at the river basin scale, drought management, monitoring water resources availability, operational decisions on water supply or demand, etc.

Stakeholders participating in the workshop express a need for training in: climate data provider, impact data provider, and end-user (e.g. managing/operating resources).

For the *energy* sector, the workshop was attended by both the energy supply managers (e.g. EDF) and grid managers (e.g. TERNA). This gave the chance to analyse the stakeholders' needs from the two perspectives. *Precipitation* was identified as the most valuable climate variable, due to the fact that hydro energy resources can be stored, their operations are highly flexible and can therefore respond quickly to demand. *Temperature* and *pressure* variables are also indicated as important to evaluate variation in energy demand.

The skill of climate forecasts needs to be analysed in the context of current sector-specific practices. An on-going validation exercise to benchmark the different approaches could therefore be a good starting point. One of the key challenges will be the introduction of climate forecast information into the existing operational tools of the energy management sector - for example, a temporal resolution of daily means is requested by the energy community, although climate forecast skill has, to date, only shown to be useful when using monthly means.

Hydro power management and demand forecasts are the key issues on seasonal/annual time scales. Current practises generally use a climatological approach based on the use of historical time series of precipitation and temperature to assess through the use of hydrological models of how the initial water stocks (dams, snow pack in mountains...) may evolve in the future. Hence, forecasts of T and P are valuable if they are more skillful than this climatological approach.

The relevant spatial scale is the watershed for hydro but also the regional (sub-country)/national scale. The ideal temporal scale is the day (for demand in particular), but weekly information is enough for hydro power management

Longer term projections/forecasts are important as well:

- How the annual water cycle will evolve? (More/less precipitation over the year, or a shift in the rainy/dry seasons inside the year).
- Will the interannual variability increase/decrease?
- How will the key variables evolve (mean, variability, distributions, extremes)? => temperature, precipitation, soil wetness indices.

At the seasonal timescale, as of today, wind/solar energy are not a key issue, but they may become so rapidly due to their fast developing ratio. On longer time scales, of course, they are a major issue, and then forecasts/projections of wind/solar radiation at the local scale are important.

Concerning the health sector, in addition to *temperature, mean temperature,* precipitation, *sea surface temperature* and *wind storms*, have been indicated during the workshop. As confirmed also in the on line questionnaire, stakeholders express high interest in capacity building activity not only directly linked with climate parameters. For instance they indicate education campaigns, spraying programmes to eradicate mosquito, and so on. In this sector, the seasonal information should have a good level of certainty, allowing knowing the probability of exceeding a particular threshold and hence take the most appropriate decisions. In this regard, the role of media is considered important, as

they can convey the right messages on what people need to do. Also a better collaboration between producers and users was considered crucial.

Contrary to the initial expectation *downscaling* was not necessarily high on the stakeholder agenda. Stakeholders would prefer to invest resources in improving the large scale drivers rather than increasing the granularity of the data.

While seasonal predictions are interesting and potentially useful and while many sectors use them there is still a huge need for education and training. This was one of the priorities identified by the users. Direct access to expert, for instance sector specific workshops or seminars, is seen as a vital way of providing this basic training.

Even among some of the users of seasonal prediction there is somehow a misconception on the level of certainty they need to make decision. E.g. “we need 95% confidence” to make a decision.

It is important to notice that some *gaps* indicated by stakeholders are only *perceived gaps*, as the information is in fact already available, such as: high frequency information, daily time series to feed impact models; interpretation of confidence levels, model outputs not bias-corrected.

Some gaps indicated by stakeholders can be easily taken into account within the EUPORIAS project, such as: tailored products and parameters at important stages of crop development, four-six months seasonal forecasts, statistical dynamical downscaling to local level taking into account fine scale topography differences, integration with other food security relevant info for decision making, customized forecasts for user or business application, interface with existing (early warning) systems, etc.

Among these gaps, it is relevant for EUPORIAS to define four/five priorities together with other project Work Packages in the next two/three months and organise future research activity in this direction.

ANNEXES:

Spreadsheets links (1-6)

1. http://bit.ly/matrix_water
2. http://bit.ly/matrix_health
3. http://bit.ly/matrix_agriculture
4. http://bit.ly/matrix_insurance
5. http://bit.ly/matrix_transport
6. http://bit.ly/matrix_energy

Annex 7: Complete list of replies questions 1-2

QUESTION 1: What are the critical activities or decisions in your business that are affected by climate?

- *Drought, water use in agriculture and other activities, irrigation, city planning, renewables;*
- *Estimation of renewable energy quantity, Energy prices and commodities prices;*
- *All of them: Operational management of the power system, from day +1 to 3 years;*
- *ALL Horizons;*
- *Decision making processes for short-term planning (prepositioning of food stocks and logistical services), and long term planning (resilience building activities and creation of livelihood assets);*
- *education campaigns - spraying programmes to eradicate mosquito, insecticide treated bed net distribution (answers based on experience working with Ministry of Health in tropical countries;*
- *Index Insurance Product Design, - Food Assistance Intervention Design including Preparedness (contingency plans, corporate, community levels etc), Prevention Activities, - Definition of Country Level intervention strategies (strategic level with host governments), - Corporate strategic plan/vision;*
- *Max. possible loading capacity based on forecasted waterlevels at critical locations;*
- *Forest operation planning - logging, transport, silviculture, ...*
- *Choosing suitable reforestation material (varieties, species)*
- *Forecast pest outbreaks Indices needed: - Temperature e.g. frost, - Soil moisture (precipitation, evaporation), - Biological threshold values - Extreme values (max., min.); Buying of retrocession insurance cover -*
- *Providing (re)-insurance*
- *Providing primary insurance cover (property and crop)*
- *Grape and wine production, Logistics, Environmental management / Sustainable management Sales and marketing;*
- *Site planning of wind or solar project operational planning of wind or solar project - balancing grid, insuring risk;*
- *Yield estimates, i.e. seasonal-scale climatological factors that could impose a risk or an opportunity for crop yields in a specific region;*

- *Operational management: Hydro production in dry years, especially if they are consecutive. Very hot days and the impact of water temperature at rivers (example: bigger than 28ºC – water, 40ºC – air temperature). Number of days with very extreme wind (example: bigger than 120 km/h);*
- *Research - impact modelling of climate impact on the risk of damage to forest ecosystems*

QUESTION 2: How are these [activities] affected?

- *agriculture and renewables are directly dependent on weather and climate on a daily to seasonal time scale, city planning more interested to decadal climatic scale*
- *Financial risk (profit and losses)*
- *Energy supply, outages*
- *Power demand and production are affected by climate variability. The conjunction of several parameters / impacts CAN have very negative effects, for instance: low temperature (high demand) + low level of water available for hydro power production*
- *Financial risk. Safety risk, As an example, a regional drought could trigger a humanitarian crisis which would affect decisions about where to preposition food, how many beneficiaries to assist, how to support governments,*
- *increased commodity prices through forecasted yield reductions due to weather impacts along the cropping season,*
- *loss of life/economic cost loss of working days/cost of hospitalisation,*
- *available water levels in the next days/weeks*
- *Possible low flow / high flow situations in the future,*
- *Increased efficiency, decreased costs and risks if accurate predictions are available, losses due to (extreme) weather events,*
- *Vineyards are meant to have a productive average life of 40 to 50 years. Choice of grape varieties, rootstocks, irrigation systems design and sizing, cultural practices and so on are all affected.*
- *Wineries, storage and bottling facilities, water treatment plants, offices are also affected.*
- *Planning of logistics is affected in terms of extreme event probabilities, options between sea and land transportation, transport infra-strutcures, need for climatized containers, etc. All the supply chain can be affected by extreme or abnormal events, causing high losses in terms of profit and market share.*
- *Planning for grape and wine procurement is greatly affected by weather. Good crops lower prices, short ones raie them.*
- *Environmental planning, carbon and water footprint, sizing of water treatment systems, maintenance planning and budgeting, viability assessment of alternative energy systems are all affected by the level of knowledge and forecast of weather.*
- *Sales and marketing campaigns can also be greatly affected. Wines are seasonal: reds and Port in cool weather, white and rosé wines in warm weather. The way spirits are promoted also changes: straight liquor in cool weather, cocktails and mixers in warm weather,*
- *poor site selection results in poor ROI and vice versa*
- *poor planning results in inefficient use of energy resources = loss of money, risk of blackout*
- *Above normal or too below normal temperature and/or precipitation at specific phases in a plant's growth cycle can reduce (or also enhance!) expected yields,*
- *Financial risk,*

- *drought stress, flooding, temperature backlashes (frost damage), wind storms*

Annex 8: Complete list of replies of question 3: What near term benefits or future opportunities can you envision through access to S2D information?

- *better use of resources, higher security levels, better management,*
- *Efficiency in operational activities*
- *Improve operational management on monthly to seasonal time scales,*
- *operational efficiency and better planning,*
- *Long term resilience, moving from managing disasters to managing risks cost-effective decision making*
- *1-3 monthly forecasts: improved crop yield forecasts, anticipation of sowing conditions and frost kill risk able to allocate scarce resources in space with several months lead time*
- *Moving from managing disasters to managing risk*
- *helps understand risk short to long term*
- *helps reduce basis risk in index insurance design*
- *improve cost-efficiency and effectiveness... convincing donors to invest in preparedness and prevention rather than response only*
- *helps building resilience*
- *opportunity to increase user capacity*
- *Estimation of future water levels / runoff situations for decision making. Planning of ship capacities, optimizing stock management, be prepared for extreme low flow events (reducing economic risks).*
- *optimization of reinsurance protection (mid-term)*
- *optimization of insurance risk portfolio (mainly strategic , decadal)*
- *Resilience of business, increased earnings, sustainable growth, longer planning times, going from disaster to risk management.*
- *improve confidence in DMP for 4. Potential business opportunities in operational climate services to expand current weather forecasting for solar and wind, and insurance covers*
- *Reliable seasonal forecasts could help to obtain more reliable yield estimates. And more reliable yield estimates would allow to better anticipate supply and demand of a crop and thus to obtain better estimates of food availability, food need, and food prices.*
- *Improving operational efficiency.*
- *Reducing risk*
- *early warning systems - countermeasures of forest pests*
- *improved planning of management actions (harvesting, planting)*

Programme

EUPORIAS First Stakeholders Workshop

ENEA Headquarters
22-23rd January 2013
Lungotevere Thaon di Revel, 76
00196 Rome, Italy

Tuesday	**Activity**
12:30	*Arrival, registration and coffee break*
13:00	**Welcome and introduction to the workshop** Paolo Ruti, ENEA
13:15	**EUPORIAS and the role of stakeholders** Carlo Buontempo, Met Office
13:25	**Seasonal predictions** Jean-Pierre Ceron, Meteo France
13:50	**Getting the most out of EUPORIAS** Expectations and answers
14:00	*Lunch*
15:00	**Stakeholder applications - EDF** Current application of seasonal and decadal (S2D) climate forecasts
15:20	**Stakeholder landscape and the use of seasonal and decadal (S2D) climate forecasts** Carlo Buontempo
15:35	**Group work sessions** 1. What are the critical factors or decisions in any business or service that could be affected by climate? 2. How can climate affect business or services? 3. What innovation opportunities can you envision through access to S2D information? 4. Mapping the gaps - what is the information we are not supplying? 5. What are the barriers in using S2D climate forecasts?
17:40	*Coffee break*
17:50	**Identifying vulnerabilities through the decision making process**
18:20	**Plenary**
18:35	*Close*
Evening	
20:30-23:00	**Dinner and talk on decadal predictions**
Wednesday	
09:00	**Introduction to Wednesday sessions**
09:10	**Group work sessions** 1. What are the critical factors or decisions in your business that could be affected by climate? 2. What are the key areas of your sector that are influenced by climate? 3. How does climate influence these factors or business decisions? 4. Which decision making processes in your sector could benefit from S2D information? 5. How can S2D forecasting inform your decision making processes - what information or parameters would you like to have?
10:10	**Plenary and next steps**
11:00 – 11.30	*Coffee and close*

Participants List

This is the complete list of participants to the First Stakeholders Workshop – Rome. January 2013 (Legend: The yellow colour indicates the members of Euporias Staff and/or ENEA observers.)

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