

# CIRCLE-2 Joint Initiative (JI) on Climate Uncertainties

## *Background Paper*

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Interactions with participants will be accomplished by the use of two channels: i) mailing list and ii) private website (where all documents associated with the JI on Climate Uncertainties are posted). For more information on this initiative or on how to join please contact Ana Rovisco ([acrovisco@fc.ul.pt](mailto:acrovisco@fc.ul.pt)).

*Lisbon, 3 February 2014*

## 1. Background

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Dealing with the large array of uncertainties related to climate and climate change has been acknowledged as a key challenge for adaptation decision-making at all levels. Providing guidance and valuable insights to those users that need to incorporate this issue into their decision-making and/or policy processes (e.g. planning cycles) is quite a challenge. Lessons learnt from practical experience can deliver substantial added-value, but require a specific framing of the geographical and cultural conditions that surround the application of currently available scientific approaches to deal with uncertainty in climate influenced decision-making.

**In accordance with its objectives, CIRCLE-2 identified this issue in its research agenda and has been developing activities aimed at sharing and advancing current scientific knowledge on this topic.**

Firstly, in November 2010, CIRCLE-2 organised a Workshop on “*Dealing with uncertainties in Climate Change Impacts, Vulnerability and Adaptation research*”<sup>1</sup>. Participants at that Workshop recommended four broad areas of cooperation: a) development of guidance and a more systematic methodology on how to deal with uncertainties; b) consolidation of a network of experts on uncertainty management; c) support for research and training activities on uncertainty communication; and d) connecting to policy by engaging providers and users of climate science information. As a result of that Workshop, a short policy brief convening key messages and future needs was produced and directed at both National and European decision-makers<sup>2</sup>.

Based on these recommendations CIRCLE-2 assessed the potential for the development of a Joint Initiative and secured an initial set of necessary financial resources. These have been earmarked by the *Foundation Calouste Gulbenkian (FCG)* and the *Faculty of Sciences - University of Lisbon (FFCUL)*, Portugal. Participation and support was later open to other participants and interested institutions both within as well as outside of the CIRCLE-2 network.

**A Joint Initiative (JI) is here defined as a coordinated transnational funding effort, within the scope of CIRCLE-2, aiming at sharing and advancing scientific knowledge and practice in a given theme.**

Secondly, at the CIRCLE-2 first Annual Progress Meeting<sup>3</sup>, in July 2011, a parallel session on “*Uncertainties in Climate Change Adaptation*” was organised with the objective of further developing the scope of the proposed JI and to ascertain the interest of other CIRCLE-2 participants to take part in this initiative<sup>4</sup>. This APM session demonstrated the relevance and the interest on the topic and its results raised a number of questions that are addressed further down in this paper (see annexes E-F for background notes and full session report).

**Based on this work, a “CIRCLE-2 Joint Initiative on Climate Uncertainties” was developed and had its kick-off meeting on the 24<sup>th</sup> October, in Lisbon. A web conference with interested participants, that were not able to attend the kick-off, took place on the 4<sup>th</sup> of November. Some participants who were not able to attend any of these events have provided feedback by e-mail. A few modifications have been made since then reflecting decisions reached in interactions with network participants in other JI Workshops held.**

**The outcomes of these forums are reflected into this paper.**

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<sup>1</sup> <http://www.circle-era.eu/np4/185.html>

<sup>2</sup> <http://www.circle-era.eu/np4/232.html>

<sup>3</sup> <http://www.circle-era.eu/np4/270.html>

<sup>4</sup> For a list of current participants please refer to annex C

## 2. Objectives

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A general concern seems to be emerging across different forums<sup>5</sup> currently dealing with European and national science-policy nexus on climate adaptation: ***the need to enhance decision-making processes on adaptation by better dealing with and communicating uncertainties in climate knowledge***. While acknowledging the complexity of this thematic and the need to provide added-value over already on-going activities, it has been deemed necessary to develop a focused network, in order to further advance a practical and applied-based approach to the theme.

Therefore, the main objectives of the ***CIRCLE-2 Joint Initiative on Climate Uncertainty*** are:

- a. **To establish a network of renowned excellence, capable of sharing and advancing scientific knowledge and practice on the theme of “*dealing and communicating climate and climate change uncertainties in support of adaptation decision-making*”;**
- b. **To develop and publish these advances in the form of a final publication intended to serve as a ‘*Guide*’ to uncertainty in adaptation decision-making that is able to provide practical case-study examples where dealing with uncertainties was successfully accounted for (or identified but failed).**

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<sup>5</sup> Besides CIRCLE-2 activities, examples of these forums include: EC White Paper processes, e.g., WGKB and the development of a Clearinghouse Mechanism on Adaptation (CHM) - see WUR memo on the issue; EEA/ETC-CCA expert work; EEA/EIONET discussions; several FP7 research projects like MEDITATION and others; research projects and other activities at national level, e.g., UK (UKCIP), Netherlands (RIVM/MNP/PBL) and US (CCSP).

### 3. Activities & Deliverables

The initial discussions about potential activities and deliverables of the CIRCLE-2 JI on Climate Uncertainties took place in various participation forums and have so far translated into a series of possible actions and respective outcomes that should be developed throughout the projects lifetime (April 2014). These are illustrated in Figure 1 with the indication of the respective sections where they are further detailed.

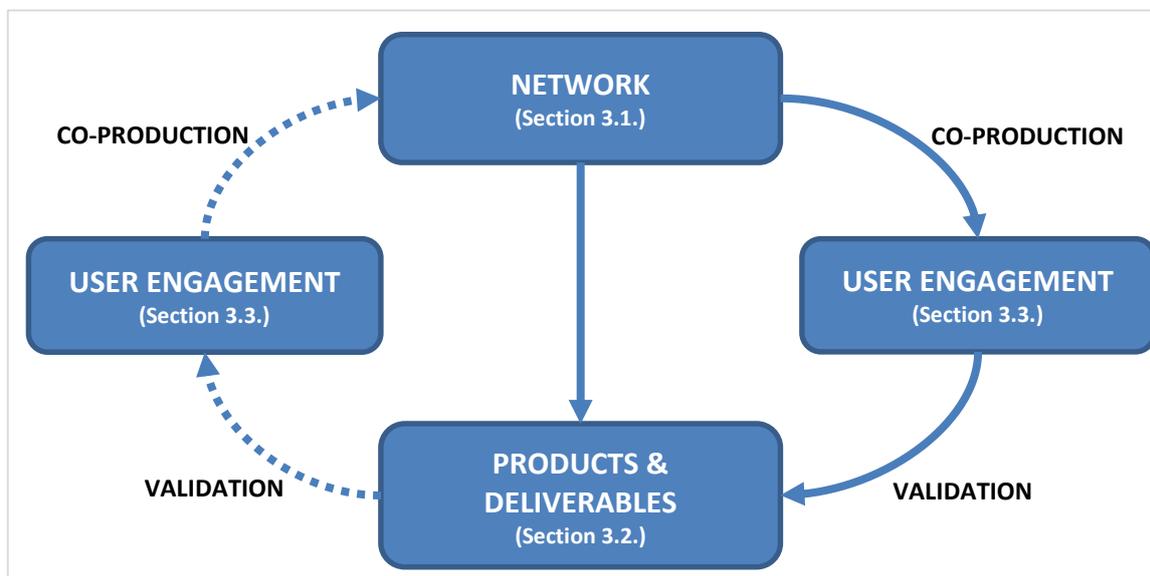


Figure 1 – JI on Climate Uncertainties Activities Diagram.

The above figure demonstrates three key areas for the JI: a scientific network composed by a diverse set of experts (e.g., modellers, economists, policy analysts, among others.) that will be responsible for developing and coordinating the products and deliverables agreed upon (e.g., special issue, policy briefs and guidance on how to deal with uncertainty in adaptation decision-making) as well as ensuring user engagement throughout their development. The next sections provide more thorough descriptions of these key areas and an initial set of resources potentially necessary to involve.

#### 3.1. Network

**DESCRIPTION:** Support the development of a more systematic methodology framework on how to characterize, deal with, incorporate, and communicate uncertainties in climate adaptation decision-making, e.g.,

- coping with lack of knowledge/data,
- framing different types of uncertainties - “cascade of uncertainties”,
- selecting approaches (tools, methods) for planning under uncertainty,
- communicating uncertainty in decision-making (-taking),
- dealing with contested knowledge,
- integrating multi-scale issues,
- other issues ...

The Network’s target audience is the scientific community which means that it is intended to be forum where this community is both a contributor and a user of the outcomes of this forum. Annex A presents an updated list of participants who have decided to join the project so far. The coordination team has set up

efforts along with other participants in order to contact the other suggested names listed, in order to obtain a more diversified class of experts.

### 3.1.1. Links to other initiatives

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**DESCRIPTION:** When possible, connect this JI to EU-wide or other international efforts currently supporting adaptation science where dealing with climate uncertainties is an issue of interest, such as:

- ***EU CLIMATE-ADAPT (Clearinghouse Mechanism (CHM) on adaptation)***

**Saskia Werners** (contractor for the CHM development) presented at the Lisbon Kick-off, the issue of uncertainty guidance in the CHM. The possibility of integrating the case-studies included in the JI final publication, into the CHM, was discussed and it was agreed that further contacts will be made to keep that possibility open. Linking the development of the CHM guidance to the questions addressed in the JI case studies was supported as being a good idea.

- ***Work done by the IPCC Task Group on Data and Scenario Support for Impact and Climate Analysis (TGICA)***

No concrete connection can be established at this moment; however **Suraje Dessai** (Exeter U) will keep following the activities of TGICA and inform the network.

- ***Handbook on Climate Change Adaptation (Earthscan)***

This handbook will be developed by the EAA and **Andrea Prutsch** (responsible editor) will keep the network informed about possible connections.

- ***Work done by contract tenders on the support and development of the EU 2013 Adaptation Strategy***

A set of tender contracts has been recently issued by EU DG CLIMA in order to support the development of a EU 2013 strategy on Adaptation. Among these a selected few may be of interest to connect with, since the issue of dealing with uncertainties has been referred as part of their activities or is related to its scope, namely:

- Adaptation strategies for European cities (CLIMA.C.3/SER/2011/0030);
- Framework contract for services in the field of policy development and assessment in relation to climate change (CLIMA.A.4/FRA/2011/0027);
- Support to the development of the EU strategy for adaptation to climate change (CLIMA.C.3/SER/2011/0026)

**Markus Leitner** (EEA) is involved in one of these tender contracts and will provide the network with more information and potential contacts to the others.

- **UNEP-PROVIA initiative on revising the IPCC/UNEP impact and adaptation assessment guidelines - CIRCLE-2 Task 4.3 (led by Swedish SEPA and SMHI)**

CIRCLE-2 has a specific task that is looking into the PRO-VIA initiative. This task is led by Marianne Lilliesköld (SEPA-Sweden). PRO-VIA had its kick-off meeting on the 19-20 October where it has discussed possible cooperation with SIDA funded experts, and between CIRCLE-2 and PROVIA activities. PROVIA's work plan includes 4 activities, of which Task 4 ("Improve robustness of VIA assessments, by developing revised guidance on research methodology") may be of special interest in terms of cooperation between PROVIA and the JI on Climate Uncertainties. The coordination team will be following PROVIA's work in order to explore possible connections.

- **Transatlantic Uncertainty Colloquium: MAKING ENVIRONMENTAL DECISIONS IN SPITE OF UNCERTAINTY**

This "(...) 18-month project proposes to identify the key challenges for associated research at the interfaces among science, policy, technology, law, and society and, in response to these challenges, to set up and launch the TransAtlantic Uncertainty Colloquium (TAUC), a policy-focused collaborative network constructed around agency-to-agency exchanges."<sup>6</sup>

The coordination team will look, together with Arthur Petersen (PBL) and Jaroslav Mysiak (CMCC) into possible interactions with this initiative.

- **EQUIP: End-to-end quantification of uncertainty for impacts prediction**

EQUIP is a three-year consortium project involving nine research organisations and funded by the Natural Environment Research Council. It is motivated by the need to equip society for climate change by studying and integrating a range of disciplines. Through its work, and interaction with others, EQUIP seeks to improve the use of climate models in order to support decision-making. The JI on Climate Uncertainties was represented by **Tiago Capela Lourenço** in EQUIP's 10<sup>th</sup> -12<sup>th</sup> January of 2012.

**Andy Challinor** is involved in this initiative and will provide the network with more information.

- **Other initiatives**

The JI on Climate Uncertainties has participated in the following events:

- **Knowledge for Climate research programme's Autumn School on *Dealing with uncertainties in research for climate adaptation***<sup>7</sup>: During this course - held in Bunnik, Netherlands during the 8<sup>th</sup>-10<sup>th</sup> of October 2012 - Tiago Capela Lourenço held a two hour session where two of the Final Publication's case-studies were discussed among the participants.
- **CIRCLE-2**: The JI on Climate Uncertainties' developments are regularly presented in CIRCLE-2's consortium meetings.

<sup>6</sup> More info on the original proposal or on this project can be found [here](#) and [here](#), respectively.

<sup>7</sup> More information on this event is available at: <http://s360.sense.nl>.

- **Second Nordic International Conference-Climate Change Adaptation Research Meets Decision-Making:** During this Conference, a presentation<sup>8</sup> on the JI on Climate Uncertainties was given by Ana Rovisco, regarding the analysis of the case-studies received for the Final Publication.

Other, starting or on-going initiatives (such as the US National Assessment of vulnerability, impacts, and adaptation, the EC-JPI Climate, EC-JPI FACCE and Climate-KIC) may have upcoming activities that could be of interest to this CIRCLE-2 JI network. The coordination team will assess the potential for cooperation, but for this will rely on the additional information that can be provided by some of our participants.

### 3.2. Products and deliverables

#### 3.2.1. Special issue in a peer-reviewed journal<sup>9</sup>

**DESCRIPTION:** This deliverable is an example of the duality-purpose of the network: to be both a contributor and a user. The purpose of this special issue is to contribute with scientific insight on dealing and communicating climate and climate change uncertainties in support of adaptation decision-making.

All interactions with the project's participants have found this deliverable to be important. In order to produce this deliverable the JI coordination team decided to set up a scientific committee<sup>10</sup> who is responsible for producing the Special Issue. Information regarding the actions related to the development of this deliverable can be found below and at the project's website<sup>11</sup>.

Stage	Description	Date
1	Call for abstracts	March 12 <sup>th</sup> 2012 – June 7 <sup>th</sup> 2012
2	Communication to submitting authors	June 2012
3	Article submission	October 7 <sup>th</sup> 2012
5	Lisbon Workshop	November 8 <sup>th</sup> -9 <sup>th</sup> 2012
6	Article adjustment (if necessary)	March 15 <sup>th</sup> 2013
7	Special Issue submission in peer-reviewed Journal	April 2013

#### 3.2.2. Short research and policy briefs

**DESCRIPTION:** A series of *short research and policy briefs* on the topics addressed by the network and discussed at the meetings and workshops in relation to **practical case-study examples** and the use of different approaches to climate uncertainties (e.g. *model uncertainties; communicating uncertainties via visualisation tools; science-policy implications of uncertainty management; bridging scale issues in climate adaptation; among others...*). These briefs will be developed according to the evolution of the network discussions and whenever possible foster spin-off publications from the members.

<sup>8</sup> More information on this conference can be found at: <http://www.nordicadaptation2012.net>. The presentation is available at: [http://www.nordicadaptation2012.net/Doc/Oral\\_presentations/2.2.1\\_Rovisco.pdf](http://www.nordicadaptation2012.net/Doc/Oral_presentations/2.2.1_Rovisco.pdf).

<sup>9</sup> As an example, a special issue on "Guidance for Characterizing and Communicating Uncertainty and Confidence in the Intergovernmental Panel on Climate Change", has been recently published in [Climatic Change](#)

<sup>10</sup> Suraje Dessai (Leeds University), Tiago Capela Lourenço (CCIAM - FFCUL), Richard Moss (Joint Global Change Research Institute -- PNNL and University of Maryland), Arthur Petersen (PBL Netherlands Environmental Assessment Agency) and Ana Rovisco (CCIAM - FFCUL).

<sup>11</sup> [http://www.circle-era.eu/np4/P\\_UNCERT.html](http://www.circle-era.eu/np4/P_UNCERT.html)

### 3.2.3. 3.2.3. Final Publication: Adapting to an Uncertain Climate – Lessons from Practice

**DESCRIPTION:** As stated one of the key outcomes of this JI is a final publication in the form of a ‘guidance’ or ‘lessons learnt’ publication (book) on *how to deal with uncertainty in adaptation decision-making* that is able to provide practical case-study examples where dealing with uncertainties was successfully accounted for (or identified but failed). This final publication is targeted at decision-makers (including policy-makers).

This publication has been submitted to Springer and is expected to be published in the Spring of 2014.

### 3.3. User engagement

**DESCRIPTION:** The JI on Climate Uncertainties targets two groups of users: i) the scientific community and ii) decision-makers. Given the differences among them, as well as the activities and deliverables identified, engagement with these users has been identified as being highly beneficial for the development of the products defined in section 3.2.

Figure 1 (section 3) clearly identifies user engagement as a means of obtain both co-production of research questions and outcomes and well as provide validation of the contents included in the proposed products and deliverables, especially in what refers to the final publication.

For example, It is desirable that, to the extent possible, the case studies and extracted ‘guidance’ development with the final publication in mind, are tested and validated in different countries, sectors and scales, to see if it works outside each specific case. Some options may be explored, namely:

- The need for case-specific workshops?
  - Country-specific or transnational? Resources available?
- How to involve actual users including making them active contributors?
  - Reviewers? User group? Online?
- How to best involved non-EU participants? (see annex A for list of potential experts)

This issue has been discussed among the various forums but only in a very preliminary stage. Consensus is that it is necessary to ensure user engagement, be it by means of organizing workshops and/or other initiatives. So far, user engagement has been accomplished during the #2 JI on Climate Uncertainties Workshop<sup>12</sup> where decision-makers from EPAL<sup>13</sup> and APS<sup>14</sup> were invited to participate in a three hour session to have a discussion on what decision-makers would expect to find in the Final Publication.

A similar approach was organised in a session of the ECCA Conference<sup>15,16</sup>, which was dedicated to the presentation and discussion of a draft version of the book *Adapting to an Uncertain Climate – Lessons from Practice* and of a case-study which has dealt with uncertainties in climate and climate change adaptation so as to share experiences from practice. Participants were also asked how they deal with these uncertainties so as to inform the development of the publication by sharing experiences, challenges and lessons learnt. This was accomplished by using the World Café methodology in four different discussion tables.

<sup>12</sup> Information on this workshop is available at: <http://www.circle-era.eu/np4/2Meeting.html>.

<sup>13</sup> EPAL is the largest Portuguese water utility company. More information available at: <http://www.epal.pt/epal/EN/Default.aspx>.

<sup>14</sup> APS is an association of the insurance and reinsurance companies operating in the Portuguese market. More information available at: <http://www.apseguradores.pt/Site/Home.jsf?ErrorMsg=&UserName=Utilizador&UserURL>.

<sup>15</sup> <http://eccaconf.eu/index.php/page/ECCA>

<sup>16</sup> [http://www.circle-era.eu/np4/ECCA\\_Uncertainties.html](http://www.circle-era.eu/np4/ECCA_Uncertainties.html)

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The session was targeted at decision-makers including policy-makers, developers and practitioners at European, National, Regional and local level dealing with climate and climate change adaptation uncertainties.

## 4. Timetable and activities (milestones)

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Date	Action	Objectives
<u>11-12 November 2010:</u>	<u>CIRCLE-2 Uncertainties Workshop, Stockholm, Sweden</u>	<u>See outcomes in annex E</u>
<u>22 June 2011:</u>	<u>CIRCLE-2 Annual Progress Meeting Special Session on Uncertainties, Bologna, Italy</u>	<u>See report in annex F</u>
<u>24 October 2011:</u>	<u>Kick-off Meeting for the CIRCLE-2 Joint Initiative (JI) Uncertainties, Lisbon, Calouste Gulbenkian Foundation - Room 2, Lisbon, Portugal</u>	<u>Agreement on JI operational issues and guidance contents (propose and assess case studies, user's typology, available knowledge, etc.) - <b>zero order draft</b></u>
<u>4 November 2011:</u>	<u>Web Conference for participants that couldn't attend the Kick-off</u>	<u>Same as above</u>
<u>11-12 June 2012:</u>	<u>#2 JI on Climate Uncertainties Workshop, Lisbon, Calouste Gulbenkian Foundation - Room 2, Lisbon, Portugal</u>	<u>Provide feedback on JI operational issues and guidance contents (propose and assess case studies received, table of contents, promote user engagement, etc.)</u>
<u>19 July 2012:</u>	<u>Web Conference for participants that couldn't attend the Kick-off</u>	<u>Same as above</u>
<u>8-9 November 2012:</u>	<u>JI Workshop on Uncertainty and Climate Change Adaptation, Lisbon, Faculty of Sciences of the University of Lisbon, Portugal</u>	<u>Present and discuss papers applying for the JI's Special Issue</u>
<u>11-12 Feb 2013:</u>	<u>#3 JI-Uncertainties Workshop, Lisbon, Portugal</u>	<u>Case-study presentation, discussion and validation <b>mid-term working draft of "guidance book"</b></u>
<u>Mar 2013:</u>	<u>ECCA Conference, Hamburg, Germany</u>	<u>Case-study presentation, discussion and validation (with selected users) - <b>final draft of "guidance book"</b></u>
<u>April 2013:</u>	<u>Special Issue submission in peer-reviewed Journal</u>	<u>Publish Special Issue</u>
<u>Mar 2014 (tbc):</u>	<u>CIRCLE-2 Final Conference – Adaptation Frontiers, Lisbon, Portugal</u>	<u>Presentation of the book <b>Adapting to an Uncertain Climate – Lessons from Practice</b></u>

# Annexes

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**Annex A** - Persons involved / interested in taking part of the network

**Annex B** - Reports from CIRCLE-2 Workshop on “Dealing with uncertainties in Climate Change Impacts, Vulnerability and Adaptation research, Stockholm, Sweden, November 2010

**Annex C** - Report of the parallel session on climate knowledge Uncertainties at the CIRCLE-2 Annual Progress Meeting (APM), July 2011, Bologna, Italy

**Annex A** - Persons involved / interested in taking part of the network

Name	Institution
Tiago Capela Lourenço	Lisbon U
Filipe Duarte Santos	Lisbon U
Ana Rovisco	Lisbon U
David Avelar	Lisbon U
Ana Gomes	Lisbon U
Ana Lopez	LSE   Oxford U
Andrea Knierim	ZALF
Andrea Prutsch	EAA
Andy Challinor	LEEDS U
Anne Bundschuh	ZALF
Annemarie Groot	Wageningen U
Apollonia Miola	Joint Research Centre
Arthur Petersen	PBL
Bruce Beck	Georgia U
Carin Nilsson	SMHI
Chris Weaver	EPA
Claudio Rossi	Sienna U
David Stainforth	LSE
Ghislain Dubois	TEC
Jakob Wachsmuth	Bremen U
Jaroslav Mysiak	CMCC
Jean-Luc Peyron	ECOFOR
Jeroen van der Sluijs	Utrecht U
João Pedro Nunes	Aveiro U
Joseph Daron	Cape Town U
Judy Lawrence	PS Consulting Ld.
Kirsten Hollaender	DLR
Kristie Ebi	IPCC
Leendert van Bree	PBL
Leonard Smith	OCIAM
Linda Joyce	RMRS
Luísa Schmidt	Lisbon U
Manuel Gottschick	Hamburg U
Maria Fuentes	European Commission
Marjolijn Haasnoot	Deltares
Markus Leitner	EAA
Martin Füssel	EEA
Matteo Rini	EC DG CLIMA
Nick Pidgeon	Cardiff U
Paula Harrison	Oxford U
Richard Moss	Maryland U
Richard Pagett	Consultant
Rob Swart	Wageningen U
Roger Street	UKCIP
Sandra Garcia	MINECO
Saskia Werners	Wageningen U
Sergio Castellari	CMCC

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<b>Name</b>	<b>Institution</b>
Steven Loiselle	Sienna U
Suraje Dessai	Leeds U
Susanne Lorenz	Leeds U
Tim Carter	SYKE
Tony Patt	IIASA
Viriato Soromenho-Marques	Lisbon U

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**Annex B** - Reports from CIRCLE-2 Workshop on “Dealing with uncertainties in Climate Change Impacts, Vulnerability and Adaptation research, Stockholm, Sweden, November 2010

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**Agenda and presentations:** <http://www.circle-era.eu/np4/185.html>

**Proceedings:** [http://www.circle-era.eu/np4/%7B\\$clientServletPath%7D/?newsId=194&fileName=CIRCLE\\_2\\_WP4\\_Proceedings\\_Uncertainties.pdf](http://www.circle-era.eu/np4/%7B$clientServletPath%7D/?newsId=194&fileName=CIRCLE_2_WP4_Proceedings_Uncertainties.pdf)

**Policy Brief:** [http://www.circle-era.eu/np4/%7B\\$clientServletPath%7D/?newsId=194&fileName=CIRCLE2\\_WP4\\_Policy\\_brief\\_final.pdf](http://www.circle-era.eu/np4/%7B$clientServletPath%7D/?newsId=194&fileName=CIRCLE2_WP4_Policy_brief_final.pdf)

**Annex C** - Report of the parallel session on climate knowledge Uncertainties at the CIRCLE-2 Annual Progress Meeting (APM), July 2011, Bologna, Italy

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## **CIRCLE-2 Annual Progress Meeting #1 (APM1) and DESIGN Workshop - Report**

### **Parallel session A - UNCERTAINTIES IN CLIMATE CHANGE ADAPTATION**

**Moderators/Rapporteurs:** Tiago Capela Lourenço (FFCUL), Suraje Dessai (Univ. Exeter), Annemarie Groot (WUR)

*This parallel session on day 2 of the CIRCLE-2 Annual Progress Meeting was dedicated to the discussion of a CIRCLE-2 Joint Initiative on Climate Uncertainties.*

The objectives of this session were:

1. To present CIRCLE-2 Joint Initiative (JI) on Climate Uncertainties;
2. To discuss with experts, in order to develop the necessary scientific content and assess policy relevance of this JI;
3. To discuss potential financial funding in addition to already committed support from Portugal (FCG/FFCUL) and the Netherlands (KvK).

Tiago Capela Lourenço moderated the session that has divided in three parts:

- a) A brief exposition<sup>17</sup> by Suraje Dessai on “Climate Adaptation decision-making under uncertainty”;
- b) An explanation of the proposed CIRCLE-2 JI by Tiago Capela Lourenço followed by an open discussion;
- c) Two break-out groups on guiding questions about the JI development, moderated by Suraje Dessai and Annemarie Groot.

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<sup>17</sup> <http://www.circle-era.eu/np4/270.html>

### Part a)

Suraje Dessai presented some of the relations between adaptation as a complex issue in itself and three of the current paradigms of dealing with uncertain risks. He reflected on the types and nature of uncertainties related to climate change science - “cascade of uncertainties” from scenarios of future (distant) societies to (concrete and current) decisions on adaptation options. He noted that uncertainty is a function of prediction lead time and that time scales have to be addressed coherently in order to inform decisions.

He mentioned the relative contributions of different components of uncertainties to climate projections (e.g. timescale, internal variability, C cycle, and structural and parameter uncertainties). He explained the use of end-to-end quantification of uncertainty in probabilistic climate change impact assessments, and noted that uncertainties in socio-economic drivers are so large that they require further work on the development of scenarios. He further mentioned a set of methods and tools that are commonly used to deal with the issue of uncertainties and noted the need for guidance on the use of these tools by decision-makers.

He mentioned that the CIRCLE-2 Workshop on Uncertainties<sup>18</sup> served to identify concrete needs that this JI can help to address:

- Develop guidance on how to deal with and communicate uncertainties (with practical examples);
- Consolidating networking on this issue;
- Stimulate communication and training;
- Connect to policy.

He concluded that because it is rather difficult to communicate uncertainty outside the academia world (i.e. to stake-holders; decision-makers and other users) the development of guidance should also consider this later group of persons and institutions.

### Part b)

After a quick “tour-the-table” where participants introduced themselves sharing their experience or expertise with this issue, Tiago Capela Lourenço gave an overview of the developments of this CIRCLE-2 JI after the Stockholm workshop.

He presented a background paper that was developed and is currently serving as a draft implementation note<sup>19</sup>. He explained that this JI has received the financial support of FCG/FFCUL (Portugal) and KvK/ALTERRA (Netherlands) but that further support is still welcomed. He explained the proposed development of this JI that has the following objectives:

- I. To create a network of renowned excellence, capable of advancing the scientific knowledge production on the topic;
- II. To reply to the challenging climate adaptation research questions faced by researchers, practitioners, decision-makers and other stakeholders;
- III. To support the interaction across this network, fostering clear-cut discussions and interaction with relevant decision-makers and stakeholders;
- IV. To developed and publish these advances in the form of guidance to researchers and policy-makers;
- V. To contribute (if possible) with these results in advance of the IPCC’s Fifth Assessment Report (AR5) and in line with European and national policy on-going processes dealing with climate change.

<sup>18</sup> A CIRCLE-2 workshop on uncertainties was held in Stockholm, on 11-12 November 2010, by the Swedish Meteorological and Hydrological Institute (SMHI) and Knowledge for Climate Research Programme (KvK); The objective was to identify research needs and opportunities for joint research, and to share knowledge on dealing with and communicating climate change uncertainties in support of adaptation policy; More information at <http://www.circle-era.eu/np4/185.html> (agenda; presentations) and <http://www.circle-era.eu/np4/232.html> (outcomes).

<sup>19</sup> [http://siam.fc.ul.pt/CIRCLE-2APM1/Day\\_2/Session\\_A\\_UNCERTAINTIES/FCUL\\_CIRCLE-2\\_Climate\\_Uncertainties\\_ImplementationNote\\_17062011.pdf](http://siam.fc.ul.pt/CIRCLE-2APM1/Day_2/Session_A_UNCERTAINTIES/FCUL_CIRCLE-2_Climate_Uncertainties_ImplementationNote_17062011.pdf)

He further highlighted that the final deliverable of this CIRCLE-2 JI will be the publication of a book on “guidance on how to deal with and communicate uncertainties in climate change” published by FCG in late 2013. He noted that other types of intermediate publications were also possible but dependent on further agreement.

He mentioned that next steps of this JI would be the development of a core writing/network team (i.e. chapter editors) and the launch of the initiative on the 24th October 2011, in Lisbon.

This explanation was followed by a period of open discussion and questions.

Main points raised:

- Guidance yes, but how will it look like? The final book is a good idea but other forms of communication are needed in order to assure its use by policy makers and other decision makers.
- The IPCC involvement should be carefully assessed since its internal mechanisms on uncertainty management are established for now and this guidance has a broader scope.
- This guidance should focus on on-going research on uncertainty management but also on communication and addressing uncertainty in practice
- This guidance should be stakeholder driven, so topics and sectors have to be assessed from a trans-disciplinary perspective (including social sciences).
- The final users should be the decision takers (and those that help them).
- The guidance should be backed up on concrete case-studies and practical examples.
- There is need for a dialogue on uncertainty between policy/decision makers and scientists. The JI should address such a dialogue.
- To produce guidance for stakeholder you need to involve them so this JI (network) should be framed and communicated as a dialogue that supports policy development.
- Language issues and communication of concepts have to be accounted for (including the usage of risk concepts).
- Large academic reviews would not lead to guidance that is helpful for the users and therefore should be avoided.

**Part c)**

After a short coffee-break, session participants were divided in two groups (moderated by Suraje Dessai and Annemarie Groot) and were given the following questions to discuss:

- Is it possible to produce “generic” guidance on uncertainty that is useful across a wide range of countries, stakeholders and sectors?
- How to find, assess and define, concrete and useful case-studies that can be used to frame this guidance?
- How to develop the end-user engagement and involvement?

Results from Group 1:

- Generic guidance was not discussed.
- Best option would be to explore a multi-sectorial approach to the case studies where CC is just a part of the issue; another possibility is to explore also a mix of sectorial oriented case-studies.
- Cases studies should be linked to a specific task at hand for policy makers/other decision makers (reconstruction of a city district, flood protection...)

- The case studies should address different types of uncertainty (for example those types shown in the “cascade of uncertainties”).
- New case studies might be developed for the purpose of the uncertainty guidance; however, existing case studies should be explored as well.
- Book may not be the perfect solution for users and other possibilities should be explored.
- Case studies examples: floods/coastal management and insurance (not consensual).
- G1 did an inventory of projects that can be linked to this CIRCLE-2 JI.
- The UKCIP offered to provide case-studies. Experience with Natura2000 or the Knowledge for Climate programme in the Netherlands could be useful to elaborate.
- The Environment Agency Austria put forward a possible case study on rail way construction in relation to floods.

#### Unresolved issues in G1:

- Can specific uncertainties (in the “cascade”) be explored through case studies? Or does it have to be at a more general level?
- Should the case studies focus on public issues only or on private business as well?

#### Results from Group 2:

- Generic guidance – mix view! Not clear!
- Several case studies offered (mix of local, regional) but mainly sectorial (not multi).
- Stakeholder yes; but researchers also need guidance on how to communicate uncertainties and they shouldn't be left out.

After feedback from the groups a quick summary of ideas was proposed and agreed before getting back to the plenary. Key points agreed:

1. The final outcome in the form of a GUIDANCE BOOK based on case-studies chapters!
2. OTHER FORMS of communicating besides the book shall be explored (policy-briefs, factsheets, papers, others...)
3. This is the ULTIMATE trans-disciplinary issue!! CASE-STUDIES (sectors, users) have to be carefully presented.
4. Each case-study can produce PART of the guidance using the CIRCLE-2 JI to label, compile and communicate the end product.
5. Linking with on-going projects in each case-study would give the necessary support to the BOOK and other formats of GUIDANCE.

#### Finally the participants were asked:

- WHO would be willing to take part and contribute by designing a case-study first concept and take part in the JI? (Tiago Capela Lourenço informed that others not present had already committed).
- WHAT next steps should be taken up to, and in Lisbon (in October)?

#### Results from this inquiry were:

- Volunteers: Roger Street (UK); Suraje Dessai (UK); Annemarie Groot (NL), Jaroslav Mysiak (IT), Claudio Rossi (IT), Jean Luc-Peyron (FR), Sergio Castellari (IT) and Filipe Santos (PT).
- For Lisbon: One or two case studies should be “chosen” as test cases and those stake-holders involved should be taken there.
- For the JI: The goals should be kept realistic and further support and involvement should be sought.

Next steps:

- FFCUL will compile the report from the session, review it with the moderators and send to the participants.
- Further development of the JI implementation note will be made before summer time (August) in parallel with invitations to participate and develop the case studies.
- Invitations to Lisbon will be sent together with the new version of the implementation note.

**Annex - Session A participants**

<b><u>Surname</u></b>	<b><u>Name</u></b>	<b><u>Institution</u></b>	<b><u>Country</u></b>
Capela Lourenco	Tiago	FFCUL	Portugal
Castellari	Sergio	CMCC	Italy
Dessai	Suraje	University of Exeter	UK
Duarte Santos	Filipe	FFCUL	Portugal
Groot	Annemarie	Wageningen UR, Alterra	Netherlands
Hugyecz	Evelin	Ministry of Rural Development	Hungary
Ingram	William	University of Oxford	UK
Kaasa	Stine Madland	Research Council of Norway	Norway
König	Martin	Environment Agency Austria	Austria
Lamon	Lara	CMCC	Italy
Leitner	Markus	Environment Agency Austria	Austria
Meelis	Sirendi	Estonian Science Foundation	Estonia
Mysiak	Jaroslav	CMCC	Italy
Peyron	Jean-Luc	ECOFOR	France
Rossi	Claudio	University of Siena	Italy
Schoonman	Rob	Ministry of Infrastructure and Environment	Netherlands
Sirendi	Meelis	Estonian Science Foundation	Estonia
Street	Roger	UKCIP	UK