

Joint CLIPC - EEA meeting 13th to 14th May Copenhagen
Venue: EEA facilities at Copenhagen (Adress: Kongens Nytorv 6,
1050 Copenhagen K)

Workshop report

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Background

The CLIPC project will provide access to climate information of direct relevance to a wide variety of users, from scientists to policy makers and private sector decision makers. Information will include data from satellite and in-situ observations, climate models and re-analyses, transformed data products and climate change impact indicators.

This particular workshop focused on criteria to be used for evaluating and screening climate and climate impact indicators to be included in the CLIPC toolbox. An agreement on criteria is a required outcome of deliverable D7.1: *A review of climate impact indicators across specific themes and description of strengths, weaknesses and technical requirements*. In addition, the workshop discussed the envisioned functionalities of the CLIPC toolbox using as a starting point the identification of key users/user groups undertaken in D2.1: *Synthesis of user requirements from past efforts and user involvement strategy on providing climate (impact) data*.

In developing requirements for CLIPC indicators the workshop reflected on ongoing and planned activities by the European Environmental Agency (EEA), the Joint Research Center (JRC), Copernicus Climate Services and the IPCC Task Group on data and scenario support for Impact and Climate Analysis (TGICA) and the IPCC Data Distribution Center (DDC) in order to make sure that both functionalities and data/indicator requirements can be harmonized with those developed elsewhere. The work will also reflect on related and relevant EU-projects projects such as CLIMSAVE, IMPRESSIONS and other pre-operational Copernicus projects

addressing projections of climate change (and impacts). Experiences of indicator development and presentation will be fully used to avoid duplication of work.

This report is organized in the order in which the topics were dealt with at the workshop. The first half was devoted to the general expectations and ways of developing and using criteria for indicators of climate change and impacts of climate change. The second half of the workshop was devoted to a discussion on functionalities of the toolbox.

The Objectives of the workshop

The objectives of the workshop were to

- 1) Discuss and agree on criteria to screen, evaluate and assess the strengths and weaknesses of climate and climate impact indicators and underlying data to be included in the CLIPC toolbox.
- 2) Discuss the functionalities of the CLIPC toolbox and how it will bring added value relative to other indicators and indicator tools.

To achieve its objectives the workshop was initiated with presentation from different perspectives on what CLIPC could achieve with respect to indicators of climate change.

The EEA's expectations on the CLIPC indicator toolbox

André Jol, EEA

The EEA's expectations were presented by André Jol who noted that the new multiannual work programme 2014-2018 guides EEA's activities and focal areas. Among these societal transitions have received particular attention and will be central in the work. In the State of the Environment Report of 2015 climate change will be one thematic issue. The portal Climate-ADAPT includes indicator information mainly from EEA (report on CC impacts, published in 2012) and maps (map viewer) and by 2016 climate indicators are expected to be updated closely linked with a new report due in 2016, building on the content and experiences with the 2012 report. This provides opportunities to link directly with the work in CLIPC. The Tier 1 indicators are fairly well placed and operational, but there is great interest in achieving progress in Tier 2 and Tier 3 indicators.

Climate-ADAPT is central for the EEA and it will link to work of JRC on CC impacts and adaptation and in the future also to the Copernicus climate services. On June 23 a expert meeting will be held on climate adaptation portals as part of EEA's work with member countries.

He summarised the main expectations from EEA towards the CLIP-C project :

- Contribute to the EEA climate change impact indicators (on EEA web site) and 2016 indicator-based assessment report
- Contribute to Climate-ADAPT (e.g. map viewer)
- Help define the future linkages between the Copernicus climate change service and Climate-ADAPT
- Make effective use of linkages between CLIPC consortium and ETC CCA lead and partner organisations

Participation by EEA in CLIPC advisory group and expert group meetings

Overview of the CLIPC project

Martin Juckes, CLIPC/STFC

Martin Juckes provided an overview of the CLIPC. He noted that CLIPC can be seen as a prototype for part of the future activities of the Copernicus Climate Change Services. The CLIPC will follow the Earth System Grid Federation (ESGF; <http://esgf.org/>) that develops, deploys and maintains software infrastructure for the management, dissemination, and analysis of model output and observational data. Another important connection is the IS-ENES climate4impact portal (<http://climate4impact.eu/impactportal/general/index.jsp>), which is oriented towards climate change impact modellers, impact and adaptation consultants, and other experts using climate change data. Specific goals are to provide

- harmonized access to data from many sources
- information on data value and limitations
- indices of climate change & impacts
- a knowledge base of authoritative information
- a toolkit to update indices and indicators

ClipC makes assessment and data available for assessments but will not make its own assessment. A brief discussion noted the need to be clear about distinctions between indicators and indices.

The TGICA and the DDC: How to guarantee a consistent set of up-to-date scenarios for use in climate impacts assessments: Relevance for indicators of climate change?

Tim Carter, SYKE

Tim Carter described The Task Group on Scenarios for Climate and Impact Assessment (TGCIA) and the Data Distribution Centre (DDC) noting that TGICA covers all WGs and that the information needs are catered for through the DDC, for which rigorous quality control has been set up. An important task is to provide technical guidelines, interpretation of data, with all guidance rigorously peer reviewed and transparent criteria for linking data sets. TGICA has Inter-Sectoral Impact Model Intercomparison Project (ISI-MIP) on its agenda, but DDC not yet covered impact model information.

Tim Carter noted that the interest in data is expanding as the expert community is widening; also utilities and other users are increasingly requesting information, but users may not find the data sufficiently detailed. The link to Copernicus Climate services will thus be important for a wider user community.

The possibilities to share insights on user needs and user surveys were discussed, along with possibilities for organizing a meeting partly joint TGICA – CLIPC meeting for southern Europe.

JRC's strategy regarding climate change impact data and services: Prospects and developments

Nadine Gobron, CLIPC/JRC

JRC's current work on climate change impact data were presented by Nadine Gobron who noted that JRC's key areas include

- development of the knowledge base Climate-ADAPT
- Estimating costs of future climate change
- Developing coherent integrated assessments

JRC is, in particular, the key map provider for Climate-ADAPT. New tools are also being developed including time series based on earth observation data.

JRC has carried out the Peseta II project (<http://ftp.jrc.es/EURdoc/JRC87011.pdf>), which has led to additional work on climate change impacts to be carried out in 2014-2015 on topics such as

- costs of droughts
- impacts in coastal areas
- impact on ecosystems & services
- global impacts with implications for Europe

On earth observations development work continues on

- Mitigation and adaptation
- Quality control

For quality control the project: QA4ECV – quality control for ECV (<http://www.qa4ecv.eu/>) attempts to bridge the gap between end-users of satellite data and the satellite data products by developing an internationally acceptable Quality Assurance (QA) framework that provides understandable and traceable quality information for satellite data used in currently evolving climate and air quality services.

General indicator requirements and the experience of using criteria to evaluate indicators by the EEA with special attention to climate and climate impact indicators

Hans-Martin Füssel, EEA

Hans-Martin Füssel presented the EEA approach to indicators and the requirements that emerge from the chosen approach. In the context of climate change key interests are to

- 1) present climate change– providing the general context
- 2) present climate related hazards
- 3) assess the impacts of climate change on society, human health and ecosystems
- 4) assess the effectiveness of climate risk management (with a focus on adaptation)

This leads to demands on spatial coverage and resolution. The spatial coverage should be as wide as possible (taking into account the EEA member countries), and the resolution sufficient to identify relevant changes. In addition indicators should be relevant for EU policies. Indicators should thus meet the following criteria.

- 1) Thematic and policy relevance
- 2) Full geographic coverage of relevant variables
- 3) Appropriate geographical aggregation
- 4) Long time series
- 5) Reliable data series
- 6) Clear methodology

As far as possible indicators should provide observations of historical development, projections for future development, and information on uncertainties.

In 2016-2017 the EU is likely to revise its adaptation strategy leading to specific demands in the accompanying 'impact assessment' of the strategy according to EU procedures for all new proposed policies. The planned 2016 EEA report on CC impacts will be one input to this 'impact assessment'.

It will be beneficial for CLIPC to further explore work that has been going on in projects such as Impact2c, Pesetall/III and to reflect on the question of attribution to climate change in considering indicators. He also stressed the importance of narratives that are an integral part of the EEA indicators.

For the development of indicators the EEA sees a need to link with many expert communities and to consider users involved in country level risk assessments. For future work it will be relevant to consider possibilities to expand the number of indicators and develop links to future Copernicus climate services. There is also ongoing development between JRC and EEA to ensure consistent approaches in their assessments and indicators, including easier access to data.

Development is also going on under Eurocordex regarding high resolution data with different bias correction methods but at the same time introducing some new uncertainties in bias correction.

Finally in the discussion it was noted that going through the past indicators and earlier data with a new framework can provide useful additional information.

A first set of criteria for CLIPC indicators: Example of how the CLIPC criteria could work in practice

Luis Costa, CLIPC/PIK

Luis Costa presented the application of the preliminary criteria for indicators. The main idea is to have a systematic framework that can be used to arrive at clear conclusions in D 7.1 on strengths and weaknesses of climate and climate impact indicators and underlying data. The aim is to provide a proof of concept of indicator criteria. A general starting point is the grouping of indicators into three tiers and the grouping of the criteria into two main groups: Scientific adequacy and feasibility and Usability, relevance and scope of use. In addition there is a consideration of impact functions which can be seen to relate indicators of different tiers to one another, or be used to develop new composite indicators.

General discussion on criteria

The discussion raised as a particular issue the link between the impact functions and the criteria and how to deal with that link. The need to consider some form of a numerical scale for the criteria was also raised.

In CLIPC there will be a need to consider possibilities to combine indicators thereby possible producing new indicators. It was, however, noted, that these user driven combinations should

not be considered as “indicators” in the sense of those that have been evaluated using the criteria.

For the input variables there is a need to achieve specificity with standard reference names ensuring traceability and transparency. The criteria to be stressed in particular are those that related to the quality of underlying data [thresholds, standard disclaimer, benchmarks and “references to authoritative sources”]. It was noted that verifiability should be emphasized for impact indicators and also the recognition of limits impact/indicator functions with respect to time interval and geographical region especially in the context of impact functions which have been developed for specific locations with specific data. The (limits of) transferability should be flagged through criteria. Based on criteria a distinction can be made between research/exploratory work that may contribute to future indicators as opposed to “real indicators” that fulfill selection criteria.

Priority users/user groups for CLIPC and what preliminary demands they may put on data and impact indicators to be provided

Annemarie Groot, CLIPC/Alterra

Annemarie Groot presented the priority user groups and the user consultation strategies and user requirements that have been employed in other projects. She concluded that a pragmatic approach is needed in selecting priority user groups. Potential users can be placed in three circles dependent on the involvement in the CLIPC project and related projects. The inner circle consist of those already involved in projects of CLIPC partners, the second of users already involved in other similar European and national projects and finally the potential users of interest recognised by various partners but not necessary involved in any projects that has direct links with CLIPC. The user needs can be specified by identifying four categories, according to expected requirements and capabilities to handle climate change information:

- A. Climate Scientists
- B. Biophysical impact researchers
- C. Boundary workers (or intermediary organizations) and socio-economic impact researchers
- D. Societal end-users

The conclusion had been reached that the focus in identifying user need should on the first three categories.

Brainstorming envisioned key features the CLIPC toolbox

Mikael Hildén (facilitator), CLIPC/SYKE

Using the priority user groups as guideline the workshop discussed what functionalities should be developed in CLIPC for the toolbox.

The discussion identified a number of general requirements and technical features that should be considered in developing the toolbox. In addition key features for the specific user groups were identified.

General requirements

User friendliness should be a basic starting point. Users could achieve guidance by registering according to the focus of their interest and the expressed interest would guide the user to relevant parts of the toolbox. There should also be opportunities for providing feed-back.

One way of guiding users is to take policy needs as a base for supporting the users' selection of topics in the toolbox; for example energy/bioenergy; climate data/impacts. The specific entry points should be supported by transparent meta-data explaining the base for the work.

The credibility of the contents of the toolbox needs to be ensured through

- appropriate quality control and quality control procedures, including bench marking of quality with other related services and products
- verifiability of information and data provided
- disclaimers on data/indicators as appropriate

The toolbox should preferably include exploratory tools for analyzing the indicators that would allow comparison of indicators: across topics; across different time intervals and across different areas. It could also allow users to bring in their "own" data to compare with what is available in the toolbox. This will require standards for data input and comparison but also disclaimers on the use of data for such comparisons. A distinction has to be made between 'indicators that have been approved by the project to be included in the portal based on QA/QC procedures and "User indicators & indexes", which are only exploratory products, not "approved indicators" even if they use information and data included in the toolbox.

In order to guide users there is a need to reflect on what limitations should be built into the toolbox that would stop users from creating combinations and analyses that are scientifically unjustified and potentially misleading. This is closely related to the question on what post processing opportunities CLIPC will provide. With extensive post processing opportunities there is a need for built in "warnings" on combinations of data or explanations for recommended combinations.

Different types of tools have different demands in this respect. Thus visualisations can be largely predefined giving users "controlled" ability to modify data through spatial and temporal aggregation. Opportunities for statistical analysis and overlay of, for example, uncertainties are more challenging in that they require the user to be experienced and aware of caveats.

The toolbox should provide free and open access to the available material and ensure its traceability and transparency. A review team is needed for checking all data and indicators that are proposed to be included in the toolbox.

Technical requirements

The amount of data and type of indicators should be taken into account in selecting server for the toolbox. The server must be able to cope with numerous simultaneous users requesting downloads of indicator information and data.

Registration of users according to needs could also lead to different user interfaces which are based on user profiles/areas of interest. There could also be a system for flexible data discovery

(search function) but also (partly) predefined selection of products and indicators from the portal which the user can reach by specifying broad themes (see general requirements, user friendliness).

A help desk function should be included in the design of the portal. This could also include a general wish list for the management of tool box, and information on updates and new developments. Informing regular users can be considered. For example MyOcean regularly sends out information on new developments and products to registered users.

The toolbox should be able to automatically inform users of processes, in particular, it could provide information on processing time for “heavy requests” involving large amounts of data.

Specific characteristics serving particular user groups

Climate scientists

Need for specific and detailed data; will wish to have maximum options to explore data further by analysing it using different user driven tools for treating the data, including scatter plots, free choice of timelines and other technical treatment. Flexibility with many choices in examining the data is a key to usefulness from the climate scientists point of view.

Climate scientists are also likely to wish opportunities that allow sharing of files, and the extraction of subsets of data for areas & issues

Impact scientists

Impact scientists are likely to benefit from partly predefined analyses of particular data and indicators, and to wish to have explanations and visualisations of climate data (tier 1) indicators in particular. They could also wish to see pointers to similar/related data starting from some topic. This can be achieved by clearly labelling specific information according to areas/topics of interest.

Impact scientists are dependent on good metadata when reporting analyses involving the combination of different indicators to get insights into tier 2 and 3 of the indicators, and should also be required to contribute to the development of metadata.

Impact research will have a particular interest in considerations of links between impacts and adaptation action, and how to monitor measures improving adaptation or adaptive capacity. Therefore indicators or tools that allows the exploration of the available information in the light of, for example, the EU-adaptation strategy at tier 2 and 3, will be of particular interest for impact scientists.

Intermediaries

Intermediaries are particularly likely to benefit from a toolbox that provides as many finalized products as possible. This means for example

- Predefined maps/graphs of specific indicators with explanations and interpretations of plots provided.

- Predefined time slices (with possibilities for users to easily adjust them to their own preferences; or with time sliders to view changes over time)
- Possibilities to zoom different geographical levels: Regional (NUTS3), national, European wide aggregation
- Predefined aggregations of indicators developed by experts; possibly allowing users to define weights by users;
- Some (limited) possibilities for developing “indicators on the fly” to allow exploratory work with respect to relationships between indicators.
- Vivid examples based on/linked with the indicators, narratives and success stories and interesting cases

Intermediaries are also likely to benefit from information of (causal) links between indicators, but also from social/cognitive links (“those who viewed this also looked for...”) and indicators that can guide and inform steps towards adaptation.

Processes for user engagement

The workshop noted that there is a special need to develop processes for user engagement in the toolbox. An important function will be to include features that engage users, allowing them to make their feedback visible and to directing and guide user feedback with, for example FAQs.

CLIPC should link with activities such as CharmE that has focused on how to allow users to view or create annotations that describe how climate data has been used and what has been learned. For CLIPC the analogue is to describe the use impact data and indicators.

The point noted under general and technical requirements concerning category specific user registration can provide different entry points that take user need into account, and in so doing guiding users to key topics of her/his interest, and providing specific avenues for engagement.

In the discussion it was noted that the EIONET is a specific forum where the CLIPC can be marketed in particular to “intermediaries”, but it will require concrete examples of what the toolbox can provide.¹

Next steps

It was noted that CLIPC can be seen as a prototype for services that Copernicus will develop further. Particular attention will have to be devoted to QA/QC procedures. There is thus a need to organize meetings between CLIPC and organisations with relevant tasks in Copernicus where the contents of climate services and the links to the development of CLIPC can be discussed further. Relevant discussion partners are also the other pre-operational climate change service projects², in particular those developing projections and/or predictions and that already have experience of user involvement activities. Lessons learnt should be assessed from these activities in order to be more focused and effective in CLIPC (and for the CCCS as a

¹ CLIPC was presented at the annual EIONET workshop on CC IVA held 24 June, EEA, Copenhagen. Interested countries were asked to contact CLIPC.

² <http://www.copernicus.eu/pages-principales/projects/other-fp7-projects/climate-change/>

whole). There are also opportunities to identify and talk with EU-wide 'sectoral' organisations that maintain many relevant indicators including WHO, ECDC, ISDR but also those related to water and ecosystem issues. EEA can facilitate, through networks and systems managed by EEA colleagues, including WISE and BISE such discussions.

There is also a need to initiate the processes for integration /convergence between CLIPC and EEA activities. This will call for user meeting and smaller specific meetings on necessary steps in 2015 to track progress in CLIPC and to identify opportunities for establishing more formal links between CLIPC and the EEA Climate-ADAPT and indicator work.

There will also be a need to consider widely links to different activities that are potentially relevant for the production of indicators, for example the ISI-MIP (<http://www.isi-mip.org/>) which brings together impact models across sectors and scales to create consistent and comprehensive projections of the impacts of different levels of climate change. Also the outcomes of several finalized EU-projects such as CLIMSAVE and ongoing EU projects such as ToPDAd, IMPRESSIONS and BASE need to be considered.

List of participants

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