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LIFE Project Number  
**LIFE09 ENV/FI/000571**

## **AFTER-LIFE COMMUNICATION PLAN**

Reporting Date  
**31/03/2015**

CLIMFORISK  
**Climate change induced drought effects on  
forest growth and vulnerability**

### Project Data

<b>Project location</b>	Natural Resources Institute Finland, Vantaa
<b>Project start date:</b>	01/01/2011
<b>Project end date:</b>	31/12/2014
<b>Total Project duration (in months)</b>	48 months
<b>Total budget</b>	1 485 782 €
<b>Total eligible budget</b>	1 485 782 €
<b>EU contribution:</b>	741 738€
<b>(%) of total costs</b>	
<b>(%) of eligible costs</b>	49,92%

### Beneficiary Data

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## Project

Climforisk Life+ project (2011-2014) developed and demonstrated a methodology to generate more comprehensive knowledge about the impacts of annual climatic variability and long-term climate change on carbon exchange and vulnerability of Finnish forests. Developed carbon balance and vulnerability models were linked to existing forest and other data. By doing so, the project demonstrated the usefulness of national forest inventory (NFI) data, forest monitoring data (under the ICP, ForestFocus and FutMon programmes), and other data sources, such as production- and soil carbon models in building the knowledge about climate change impacts on forests.

We aimed at:

- creating more comprehensive understanding of spatial distribution of forest biomass and leaf area index by compiling available field data of Finnish forest environment with satellite images.
- to provide predictions of forest carbon and water balances with the compilation of available forest data, climatological data and forest growth models.
- To recognize the features that increase or decrease the probability of different types of forest damages, and to estimate how these features might change in the future.
- To identify areas most sensitive to changes in carbon sinks and in the occurrence of forest damage.

## Key results

In line with the aims of the project, we created

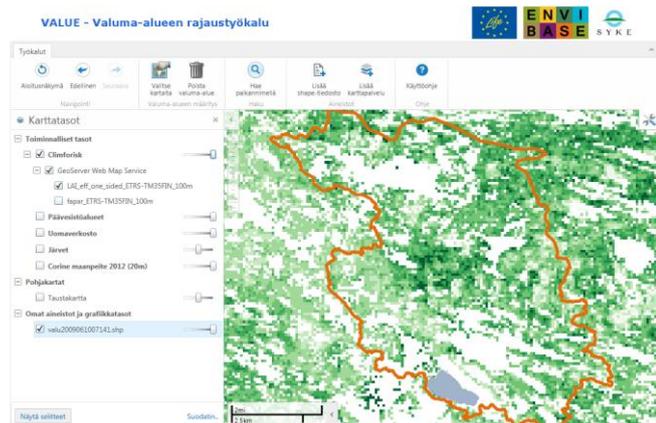
- Input data maps on leaf area index, fraction of absorbed radiation<sup>1</sup>, and drought vulnerability<sup>2</sup> of Finnish forests
- A carbon-water balance model of forest ecosystems calibrated to Finnish conditions<sup>3</sup>, which was tested by comparing to another carbon balance model<sup>4</sup>
- New estimates on the changes of forest productivity in the Finland under climate change, including uncertainties based on 24 emission scenario – climate model combinations<sup>5</sup>
- Enhanced understanding on the critical role of nutrient release for the growth of forest under climate change.
- A novel Bayesian hierarchical model to generate damage probabilities based on scarce data<sup>6</sup>.
- Biotic damage vulnerability maps for two important damage agents in Finland, Pine Sawfly and Scleroderris canker<sup>6</sup>.
- Dissemination-education web pages (<http://www.metla.fi/life/climforisk/webtool/#/fi>) presenting elementary information about carbon balance and vulnerability of forests to damages. Web-pages also present selected climate change map products we created during our projects.
- A novel webservice about pest spring development (<http://www.metla.fi/metinfo/metsienterveys/opas/ls-ennuste.html>). The service provides practical information to forest managers to prepare for loggings and collection of winter harvests/windfalls due to increased probability of damages, so as to minimize damage risks. The web-service uses weather forecast data to update maps about pest spring development.

## After Life Strategy was built in the project

The project structure was initially planned to account for some important aspects of after-life communication, and during the project we reacted to several possibilities that support the valorisation of our results after the project ends.

Many of the experiences we gained from the project will set a basis for further work; methods will be further developed and suited for appropriate purposes and eventually manifested as results of other projects. To support such things, we published our key results in internationally peer-reviewed publication series. Peer-review provides plausibility to our work and lays a basis for continued development and application of our methods elsewhere.

We established web services that allow us to reach wider audiences for our results. Our dissemination-education web pages reach a wider public interested in forests and climate change, while our second service (pest spring development) reaches forest managers and owners actively managing forest resources. The dissemination-education web-pages were crosslinked to Climate Guide portal ([www.ilmasto-opas.fi](http://www.ilmasto-opas.fi)) by updating its carbon balance article (<http://ilmasto-opas.fi/fi/ilmastonmuutos/vaikutukset/-/artikkeli/34335d0b-495f-44c6-8d3f-5e528df49713/metsien-kasvu-ja-hiilitase.html>), which helps readers to find our pages. We integrated the pest spring development service to the official forest information service (MetINFO), which guarantees the use of the results in future, and provides a possibility to disseminate results in timely occasions. Furthermore, this service will be actively advertised as a part of the forest pest extension services (media releases and courses to forest professionals and owners) of the Natural Resources Institute Finland



We disseminated our LAI and fAPAR maps through the internet map application *Value*, developed by the LIFEDATA EU Life+ project, which reads our products from our institute's server. The *Value* tool facilitates the use and combination of large databases and various map products among environmental administration of Finland, and later among the public, free of charge. The tool will be later launched publicly in the web pages of the Finnish Environment Institute (SYKE). **Error! Reference source not found.** shows a screenshot of our products in the value tool.

## Future plans

We plan to engage the expert community to using and further developing our methodologies for carbon balance assessment, and to encourage decision-makers to use our results in policy preparation. We plan the following activities.

### *Further development and use of the methodologies*

We are currently and in near future further developing our modelling methodology in the Monimet Life+ project (2013-2017). This development aims at generating more widely applicable model calibration and applies the model to draw climate change predictions of carbon balances based on new emission scenarios and climate model outputs (CMIP5). Two EU projects (FORMIT and NorthState) and one nationally funded project (CarbArc) are currently using and further developing the modelling methods developed in this project. FORMIT (FOREst management strategies to enhance the MITigation potential of European forests) aims at evaluating the impact of forest management on the carbon budget of European forestry and utilises the PRELES model to project climate change impacts on productivity. North State (Enabling Intelligent GMES Services for Carbon and Water Balance Modeling of Northern Forest Ecosystems) develops methods for utilising satellite data as input to forest models for on-line monitoring of carbon and water exchange in boreal forest ecosystems. CarbArc (Carbon Balance under Changing Processes of Arctic and Subarctic

Cryosphere) is concerned with monitoring seasonal events related to climate change in the arctic and subarctic area.

We have engaged our models in CMIP5 regional forest model comparison lead by Potsdam Institute for Climate Impact Research (PIK). We expect this action to generate further information about the reliability of climate and forests models used in Europe.

We will use the methodologies developed also in new research proposals and plans. The range of proposals varies from applied research to basic research.

### *Education*

The carbon-balance model we created will be also used in education of forestry students in University of Helsinki in future. We will also use our Dissemination-education web pages for these purposes and engage students to further develop the web pages e.g. by making further simulations with the models. Other material produced in the project will also be used in education of university students. For example, we have been asked to give lectures and provide material about LAI and fAPAR maps for remote sensing courses in University of Helsinki.

### *Use of results in policy making*

We plan to further develop forest greenhouse-gas inventories towards spatial carbon balance assessments, drawing from our experiences and works in Climforisk project. This will lead to more accurate forest carbon balance estimation in future, and provide a parallel estimate to the national forest GHG inventory method, which allows assessing methodological uncertainties in the methods.

MELA forest planning system is a simulation system that is used for drawing national and regional scenarios of forest use. Due to this importance, we participated in the efforts of Henvi project in the University of Helsinki, which aimed at creating new tree growth scenarios under climate change which could be linked to the MELA system through simple coefficients. We simulated climate change scenarios for growth of trees and transferred these to growth coefficients. These have recently been implemented in MELA. We have also further informed MELA developers about the need to account for a broader set of climate scenarios in growth scenario assessments, which may direct their development work in future.

### *Maintaining web services*

Our institute is under a web-domain change from [www.metla.fi](http://www.metla.fi) to [www.luke.fi](http://www.luke.fi). We will maintain access to our project web pages and services during this process, and possibly use redirect addresses.

### *Further dissemination*

We will carry on disseminating our results in numerous scientific meetings and other suitable forums.