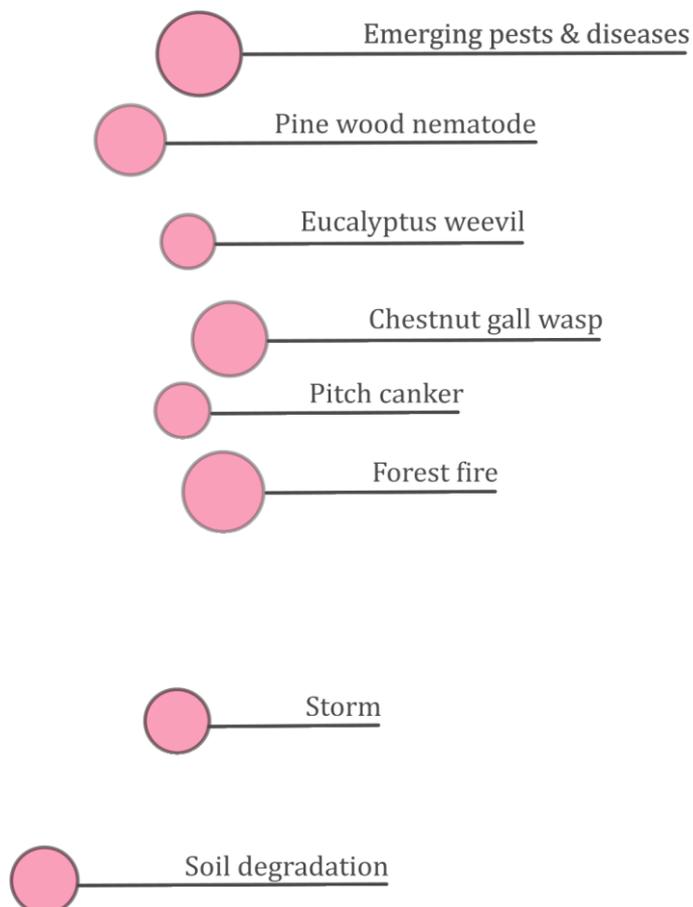


Minutes of the soil degradation risk simulation

Simulation and economic evaluation of the plan to manage soil degradation risk in forestry



**Quinta do Furadouro
(Óbidos) and Vale de
Mouro , Portugal
3-4 December 2018**

Author of the minutes: Ander Arias-González

Reviewers of the minutes: Henk Feith, Manuel Madeira, Nahia Gartzia Bengoetxea, Cristina Fernández, Elena Canga.

Workshop organisers: Manuel Madeira (ISA), Henk Feith, (ALTRI FLORESTAL, S.A), Ander Arias-González (NEIKER), Nahia Gartzia-Bengoetxea (NEIKER), Cristina Fernández (CIF), Elena Canga (CETEMAS),

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Agenda



PROYECTO **PLURIFOR** PROJECT
PLANS TO MANAGE THE RISK OF SOIL DEGRADATION

*SIMULATION AND ECONOMIC EVALUATION OF THE
PLAN TO MANAGE SOIL DEGRADATION RISK IN FORESTRY*

<p>MONDAY-TUESDAY 3 AND 4 DECEMBER 2018</p>	<p>Organiser: Manuel Madeira: Instituto Superior de <u>Agronomia</u> (ISA), +351 21 365 3443, mavmadeira@isa.ulisboa.pt</p> <p>Nahia Gartzia Bengoetxea, NEIKER, +34 94 403 43 21, ngartzia@neiker.eus / basozaintza@neiker.net</p> <p>Ander Arias González, NEIKER, +34 607 418 978, agonzalez@neiker.eus / basozaintza@neiker.net</p> <p>Cristina Fernández, CIF <u>Lourizán</u>, +34 986 80 50 13, cffilgueira@gmail.com</p> <p>Elena Canga, CETEMAS, +34 984 50 00 00, ecanga@cetemas.es</p> <p>Henk Feith, ALTRI FLORESTAL, S.A. +351 249 730 026, henk.feith@altri.pt</p> <p>Language: English-Portuguese-Spanish</p> <p>Venue: ALTRI Regional Office and R&D Centre. Quinta do <u>Furadouro</u>. <u>Óbidos</u>. Portugal</p>
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Simulation of a soil degradation crisis at Altri's Regional Office and R&D Centre.

This simulation will be done during the 3rd and 4th of December in Quinta do Furadouro (Óbidos): Altri established a new eucalypt plantation removing terraces. Unfortunately, at the time these works were done there was a heavy rain events that caused terrible erosion in around 700 ha. Altri lost the green FSC label for 2 years. Technical people from Altri will be involved in the simulation and the tools they developed to minimize the erosion will be presented. Among others, a Master thesis (by a member of ALTRI staff) on soil erosion developed maps of potential erosion as a tool to prevent the risk.

Regarding the invitations of people related to operations (which should be aware of this risk and about the tools that can be used to minimise its impact), after the talking with Henk the idea is to invite people responsible of enterprises related to soil preparation activities (one or two), water resources administration, people related to natural engineering, representative of the Portuguese Soil Partnership, and Agricultural Commission.

	Monday, 3rd of December
11:00-11:30	Arrival to the <u>Altri's</u> Regional Office and R&D Centre and presentation of participants
11:30-12:15	Presentation of different soil risk plans. Presentation of tools for evaluation soil degradation risks: erosion (erosion risk maps, rainfall <u>erosivity</u> maps,...), compaction
12:15-13:00	Development of systems for soil quality evaluation and monitoring in forest plantations
13:00-14:30	Lunch



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14:30-16:00	Tools developed by Altri for erosion risk evaluation and expertise in restoration measures after soil erosion events; importance of these tools and expertise should for risk plan improvement
16:00-17:30	Information about economic losses associated with soil degradation. Presentation on the economical evaluation of the crisis, and requirements for the implementation of the plan
Tuesday, 4 th of December	
9:30-10:00	Visit to the site (Vale Mouro) where the big erosion event occurred. Presentation of the farm
10:00-11:30	Description of the erosion event and measures developed for mitigation
11:30-13:00	Example of the monitoring survey that Altri and ISA have developed and on the one that has been put in force with PLURIFOR
13:00-End	Lunch



Attendees

Attendees

Participants

First name	Last name	Organisation
Manuel	Madeira	ISA
Luis	Leal	Altri Florestal, S.A.
Henk	Feith	Altri Florestal, S.A.
Miguel	Santos	Servisantos
António	Perdigão	Soil Portuguese Partnership
Clara	Araújo	Altri Florestal, S.A.
João	Reis	Altri Florestal, S.A.
Maria de São Luis	Centeno	Dirección Geral de Agricultura y Desarrollo Rural
Luis	Ferreira	Altri Florestal, S.A.
Aldo	Freitas	Ecosalix
Cristiano	Neves	Altri Florestal, S.A.
Raquel	Rosado	Altri Florestal, S.A.
Acácio	Henriques	Altri Florestal, S.A.
Cristina	Fernández	CIF Lourizan
Elena	Canga	CETEMAS
Nahia	Gartzia Bengoetxea	NEIKER
Ander	Arias González	NEIKER

Day 1. Presentations

Altri's presentation

By Luis Leal, Altri Florestal

The presentation was done in Portuguese

Luis Leal presented Altri Florestal S.A and the different branches of business it has. Their main activity is to produce paperpulp but they also have several power plants that produces bioenergy (>100 Mwatts). Altri is also a producer of dissolving pulp, mainly for the Chinese textile industry, and investment in R+D for the new bioeconomy era is also achieved. Another branch of the company is engaged with forest production with stand management, nutrition improvement, modelling, silvicultural forest operations and genetic improvement of *Eucalyptus globulus* and hybrids. They are focused in the following topics: (i) productivity, (ii) wood, fibre, pulp and paper quality, (iii) sustainability and genetic diversity, (iv) environment and (v) cost reduction.



Fig1. Attendees to the first day meeting (Pict. by Ander Arias-González)

Presentation of PLURIFOR soil risk plans and of tools for evaluation soil degradation risks

By Ander Arias González, NEIKER

Content

The presentation was done in Spanish

During the PLURIFOR project partners have developed a plan that has the following focus:

- Water Erosion
- Compaction

- Landslides
- Loss of Organic Matter and Nutrient Depletion
- Biodiversity loss

It also comprises the following technical sections:

- Risk Assessment
- Contingency Plan

For each of these technical sections, partners have developed the following tools and case studies to generate knowledge to improve our understanding and to have some reference values to establish the condition of the soil and to monitor the soil evolution to understand if after forest management it moves towards reference values or it moves away from them.

The following tools and case studies were presented:

- **Detection and Identification: Vulnerability**
 - Water Erosion, Compaction and Landslides Susceptibility from JRC developed maps. Multi-Risk Assessment
 - Asturias and Basque Country are developing new tools with higher resolution
- **Prevention**
 - Effects of forwarding on soil hydrological properties in thinning operation in northern Spain
 - Soil compaction and recovery after 15 years of mechanized final felling and site preparation
- **Surveillance**
 - Forest soil disturbance monitoring protocol. App to gather information easily
 - Establish soil reference sites representative from biogeoclimatic conditions
 - Reference values for soil biodiversity
- **Rehabilitation**
 - Effectiveness of different treatments for post-fire soil losses reduction
 - Connectivity index in the planning for post-fire erosion reduction
 - Pine residues chipping effects on soil compaction and erosion

Development of systems for soil quality evaluation and monitoring in forest plantations

By Manuel Madeira, ISA, Portugal

Content

The presentation was done in Portuguese-

Professor Madeira presented the case study developed by ISA together with Altri in Portugal. The aim for this case study is to develop a system for soil quality monitoring in Forest Plantations. For that soil reference sites representative from biogeoclimatic conditions must be established. Some indicators for soil conditioning at reference values must be gathered. These indicators of soil

conditioning are different nutrient content like nitrogen, phosphorous, calcium, magnesium, potassium, etc. organic matter content, bulk density, and different parameter related with the water holding capacity and water infiltration. These same parameters will be also measured after different silvicultural treatments and it can be concluded that way if these treatments had a negative impact on the soil condition. Before taking the samples an “in situ” assessment of disturbances associated with compaction and erosion should be also performed.

Tools developed by Altri for erosion risk evaluation and expertise in restoration measures after soil erosion events

Evaluation of Soil Erosion Risk

By Clara Araújo, Altri Florestal S.A.

Content

The presentation was done in Portuguese

Clara presented the tool developed by Altri to evaluate the soil erosion risk at stand level. It takes into account: (i) the precipitation, (ii) the topography, (iii) the depth to the impermeable layer, (iv) soil texture, (v) coarse fragments and (vi) soil permeability.

With this tool, they are able to prepare the reforestation project, and identify sensitive points to determine the different strategies for soil preparation to prevent erosion. After these measures are implemented, the soil condition must be monitored to ensure their efficacy and to correct them, if necessary. Altri has also developed a monitoring tool in which different types of erosion is recorded (sheet erosion, rill erosion or gully erosion), the extension and the severity in different parts of the stand such as the planted area, tracks and trails and water courses.

Evaluation of the potential water erosion of the soils to an operational scale with the use of the geographic information system

By Luis Ferreira, Altri Florestal S.A.

Content

The presentation was done in Portuguese

Altri, a major Portuguese wood pulp producer, has a 670 ha forest estate at Vale Mouro, central Portugal, dedicated to eucalyptus plantations. A forest fire burnt 290 ha in 2008. They were salvage logged the following year. Two years after the fire, soil preparation was done during autumn to renew the plantation. The following winter and spring, very heavy rains fell, causing severe erosion on slopes. Mitigation interventions started in March and lasted more than one year. The affected

area was located beside a motorway easily visible, so the company received lots of complains from public. As a result, Altri's FSC certificate was suspended for a long period, thus resulting in negative impacts at commercial level. As organisation, they had to admit that their soil degradation prevention plan did not work well. Public confidence and self-confidence had to be recovered.

Altri adapted the USLE model to the reality of the stand without using the C and P factors in order to model the inherent risk to erosion. They divided the stand in different classes of erosion after the event taking into account the number and size of the rills present. They compared the results from the model with these results and they found good agreement between 2 results highlighting its validity to foresee and to select risky zones in the stand.

Economic assessment

By Henk Feith, Altri Florestal S.A.

With help of the rest of the participants from Altri Florestal Henk Feith filled up the template provided.

Day 2. Field Visit

A field visit was organized to Vale Mouro by Altri to show the place where the big erosion event took place and the rehabilitation and restoration measures taken.

Pictures



Fig 2. Attendees to the field visit (Pict. by Ander Arias-González)



Fig 3. Some rehabilitation measures using eucalypt stumps to fill erosion rills and to prevent further erosion to occur. (Pict. by Ander Arias-González)



Fig 4. Some rehabilitation measures consisting in branches held with sticks and stones to prevent further erosion. (Pict. by Ander Arias-González)



Fig 5. Some environment restauration measures aiming at improving biodiversity in eucalypt plantations consisting in the construction of several ponds as a water source for terrestrial wildlife, amphibian reproduction and invertebrates in general and *Salix* sp. plantation along the watercourse that crosses the stand to improve water quality and to act as an ecological corridor. (Pict. by Ander Arias-González)