General information

Description	Wind damage risk model for forests in France
Geographical area	France, with a special focus on Nouvelle-Aquitaine
Group of tree species	*Pinus sylvestris* (données espagnoles) *Pinus laricio* (données espagnoles) *Pinus contorta* (données du Royaume-Uni) *Larix decidua* (données du Royaume-Uni) *Larix kaempferi* (données espagnoles) *Larix maschlinsii* (données du Royaume-Uni) *Pseudotsuga menziesii* (données espagnoles) *Picea abies* (données espagnoles) *Picea sitchensis* (données du Royaume-Uni) *Abies procera* (données du Royaume-Uni) *Abies grandis* (données du Royaume-Uni) *Tsuga heterophylla* (données du Royaume-Uni) *Betula spp.* (données finlandais) *Fagus spp.* (données françaises) *Quercus spp.* (données françaises) *Pinus pinaster* (données françaises) *Pinus radiata* (données espagnoles) *Eucalyptus globulus* (données espagnoles) *Eucalyptus nitens* (données espagnoles) *Chamaecyparis lawsoniana* (données espagnoles)
Date	March 2017
Authors (affiliation)	Barry Gardiner (EFI), Christopher Poette (EFI), Tommaso Locatelli (Forest Research), Celine Meredieu (INRA)
Contact e-mail	barry.gardiner@efi.int
Tool type	Model
Tool format	Stand-alone software
Language	English
Risk management plans to which the tools can be added	Plan national de gestion de crise tempête pour la filière forêt-bois
Risk management plans link	https://plurifor.efi.int/wp-content/uploads/WP2/plans/Storm-plan_FR.pdf
This tool is...	☒ an improved tool
Original tool of which this one is an improvement	Hale, S., Nicoll, B., Gardiner, B., (2015) ForestGALES - A wind risk decision support tool for forest management in Britain: User Manual, Version 2.5. Forestry Commission, Edinburgh, UK https://www.forestry.gov.uk/forestgales

Topic

Risk	Storm		
Risk component	☐ hazard	☐ impact	☒ vulnerability
Risk area	Risk assessment		
Risk phase	Prevention		

Risk phase (alternative terms)	Preparedness
Level	Regional
Sendai priorities	☒ Priority 1: Understanding disaster risk ☐ Priority 2: Strengthening disaster risk governance to manage disaster risk ☐ Priority 3: Investing in disaster risk reduction for resilience ☐ Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction
Contribution to Sendai targets	☐ Reduce global disaster mortality ☐ Reduce the number of affected people ☒ Reduce the direct disaster economic loss ☐ Reduce disaster damage to critical infrastructure ☐ Increase the number of national and local disaster risk reduction strategies ☐ Enhance international cooperation to developing countries ☒ Increase availability of and access to multi-hazard early warning systems and disaster risk information and assessment

Description and analysis

Summary
This tool is a stand-alone computer model designed for use on PC or Apple computers. It allows calculation of the vulnerability and risk of damage to forest stands from storms for key species in the region as a function of species, age, stand management, and location
Place in national/regional policy
At present it is not integrated in regional policy and is mainly being used for research. However, the tool is being used to develop vulnerability and risk maps for regional policy making.
Goals and achievements
This is the first integrated storm risk model for France. It incorporates data on tree pulling in France, Northern Spain, United Kingdom and Finland together with a wind climate map for France, and growth models for the main tree species growing in France.
Stakeholders involved
A seminar was given to forest representatives from the regional body responsible for forestry (DRAAF), representatives of forestry owners and managers (CRPF), and representatives responsible for forest health (CAISSE PHYTO FORÊT) to introduce the tool.
Implementation stage
Model is being revised based on feedback from the seminar. It will then be made available to any interested parties. At this stage there is no immediate plan to incorporate this version of the model directly into official planning systems but rather to use the model to make risk maps for incorporation in GIS for planning purposes.

State of technical knowledge
The tool is state-of-the-art for forest risk calculation in France. However, there are still a number of improvements that would be beneficial: 1) tree pulling with oak, 2) better growth models for the region to replace growth models developed in other countries (see section on "Group of tree species" above), 3) further validation of the model against a damage data set for species other than *Pinus pinaster*. The model has been validated for *Pinus pinaster* growing in Nouvelle-Aquitaine (see Kamimura, K., Gardiner, B., Dupont, S., Guyon, D., Meredieu, C., 2016. Mechanistic and statistical approaches to predicting wind damage to individual maritime pine (Pinus pinaster) trees in forests. Can. J. For. Res. 100, 88–100.)

Regulatory and/or socio-economic contexts
At present little regulatory context but potentially important socio-economic benefits by helping forest managers and owners to make silvicultural decisions to mitigate the risk of wind damage

Impacts of the tool

To date very little impact because the tool has not been widely adopted. Efforts will be made to increase the impact by improving the model interface and organising further workshops.

Implementation requirements and durability

Description of the implementation steps
1. Model development
2. Workshop with key stakeholders
3. Revision of model based on stakeholder feedback (in progress)
4. Model available to download (in progress)

Governance
- EFI PFF will be responsible for model development, improvement and availability
- EFI PFF will be responsible for implementation and training in France

Regulatory framework
The tool is advisory only to assist forest managers. There is no regulatory framework at present.

Human resources requirements
Good collaboration between EFI and the main stakeholder groups will allow long-term implementation beyond the end of the project. For successful implementation it will require further one or two day workshops. Such workshops should be organised once or twice a year in Nouvelle-Aquitaine. However, for full implementation there is a need to translate the Help Manuals into French and this would require a translator for approximately 2-3 weeks and some software programming from EFI.

Financial requirements
Low level of financial requirement for basic installation because the tool is freely available and can be installed by anyone on a personal computer. However, for a fully effective implementation it will be necessary to translate the Help manuals into French and this additional cost is not currently included in the project.

Technical requirements
Windows® operating system (Windows® 3 to 10) and 30 MB of available hard-disk space. Can also run on Apple OS (if software such as Bootcamp, VMWare Fusion or Parallels Desktop 6 for Mac has been installed to allow the computer either to boot in Windows mode or for Windows to run in parallel)

Priorities identified for successful implementation of the tool (political, technical, human, financial…) The priorities are promotion of the tool within the forestry sector in Nouvelle-Aquitaine, updating of the model to incorporate user comments and criticisms and translation of all relevant material into French. There is also a need for the forest authorities to encourage use of such a tool within the region.
Challenges or risk factors (legal, financial, safety…) expected during the implementation and solutions proposed The main challenge is to change the way that forest managers and owners evaluate risk. For a rare (but important) hazard like storms it is difficult to persuade people to utilise such models. In addition the role of forestry associations in promoting the tool is very important because of the large number of small-scale private forest owners in the region.
Additional and non-formal experiences to help the implementation of good practice

SWOT analysis

Strengths	Weaknesses
• Scientifically based and tested tool for evaluating storm risk • Easy to update with new knowledge	• Model is stand alone and not integrated in the current management systems used in the region
Opportunities	**Threats**
• Possible to reduce the financial impact of storms on forestry in Nouvelle-Aquitaine. • Allows foresters to evaluate the impact of different species choice and management options	• Difficulties in persuading people to use the tool because of inherent reluctance to add additional work to busy jobs.

Lessons learnt

Evaluation process, if exists (internal or external) Verbal feedback from participants at the first seminar demonstrating the tool. Ongoing evaluation by developer to improve model performance and to compare predictions against known damage.
Assessment of results (quantitative and qualitative) and comparison with main goals Model meets the original goals but needs improvement in order to make it easier to use and more directly relevant to foresters in Nouvelle-Aquitaine
Negative aspects identified Interface needs improvement and Help Manual needs to be translated into French
Unexpected consequences (short- / mid- / long-term) and corrective measures implemented None so far

Access to complete tool

Files	ForetTempete11_27032018.exe
Web links	https://www.dropbox.com/s/wvtnd2w79rvxs4f/ForetTempete11_27032018.exe?dl=0