



HAL
open science

Extreme climate variability should be considered in forestry-assisted migration

Marta Benito-Garzon, Minh Ha-Duong, Nathalie Frascaria-Lacoste, Fernandez
Fernandez-Manharres

► **To cite this version:**

Marta Benito-Garzon, Minh Ha-Duong, Nathalie Frascaria-Lacoste, Fernandez Fernandez-Manharres. Extreme climate variability should be considered in forestry-assisted migration. *Bioscience*, 2013, 63 (5), pp.317 - 317. <10.1525/bio.2013.63.5.20>. <halshs-00822822>

HAL Id: halshs-00822822

<https://shs.hal.science/halshs-00822822v1>

Submitted on 15 May 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Extreme Climate Variability Should Be Considered in Forestry-assisted Migration

2013-02-21

MARTA BENITO-GARZÓN^{1,2,**}, MINH HA-DUONG¹, NATHALIE FRASCARIA-LACOSTE^{3,4}, JUAN FERNÁNDEZ-MANJARRÉS^{2,3}

¹CNRS, Centre International de Recherche sur l'Environnement et le Développement (CIRED), F-94736, Nogent-sur-Marne Cedex, France, E-mail: marta.benito@gmail.com

²CNRS, Laboratoire d'Ecologie, Systématique et Evolution, UMR 8079 Univ. Paris-Sud, CNRS, F-91405 Orsay Cedex, France, E-mail: haduong@centre-cired.fr

³Univ. Paris-Sud, Laboratoire d'Ecologie, Systématique et Evolution, UMR 8079 CNRS, Univ. Paris-Sud, F-91405 Orsay Cedex, France, E-mail: nathalie.frascaria@u-psud.fr

⁴AgroParisTech, UMR 8079, Orsay, F-91405, France, E-mail: juan.fernandez@u-psud.fr

Recently, Pedlar et al. (2012) stated that assisted migration in forestry (forestry AM) differs from species-rescue-assisted migration (species rescue AM) because the risks of invasiveness, hybridization with local species, and spread of diseases are minimized in managed forests. The rationale behind this assertion for forestry AM is that it involves the translocation of populations within the existing geographic range of the species, whereas species rescue AM involves the introduction of exotic species.

However, while we agree that forestry AM is less risky than species rescue AM for the recipient ecosystem, forestry AM can not only fail but can also incur enormous financial costs. The failure of efforts that involved planting maritime pine (*Pinus pinaster* Ait) trees in Southwest France (Aquitaine) with seeds from more southerly populations from Portugal for production purposes is a textbook case.

The climate variability in Aquitaine includes periods of intense frost that are sufficiently rare (every 10 to 20 years) to be overlooked when establishing tree populations. The frost of the winter of 1985, the most intense frost event since records began with temperatures dropping as low as -22 °C (Boisseaux, 1986), affecting about 350 km² of tree plantations in the region (Doré & Varoquaux, 2006). The highest mortality related to frost was observed in populations harvested from Leiria in Portugal, for which nearby records show that the absolute minimum temperature was only -7.8 °C in the last 60 years. Climate averages over the last 30 years differ only slightly between Leiria and Aquitaine, which would erroneously suggest that samples from Portugal would have survived in the Aquitaine region.

Newly emerging climates (Williams et al. 2007) and the uncertainty related to climate change extreme events (Easterling, 2000) will make the search for southern locations with climatic conditions similar to those of northern populations of trees extremely difficult. Policies of forest adaptation to climate change should account for extreme cold events in the target populations even if climate change will likely decrease the number of extreme cold events

* Corresponding author. Telephone: +33 (0)1 69 15 63 42, Fax: +33 (0)1 69 15 46 97, E-mail: marta.benito@gmail.com

(Easterling, 2000), that remain in our opinion, the hidden element behind the maladaptation of southern populations to northern locations.

References

- Boisseaux T. 1986. Influence de l'origine genetique (landaise ou iberique) des peuplements de pin maritime sur les degats causes par le froid de janvier 1985 au massif forestier aquitain. Ecole National des Ingénierurs des Travaux des Eaux et Forêts.
- Doré C, Varoquaux F. 2006. Histoire et amélioration de cinquante plantes cultivées. Page 840 (Q. Ed., Ed.). Paris.
- Easterling D R 2000. Climate Extremes: Observations, Modeling, and Impacts. *Science* 289:2068–2074.
- Pedlar J H, McKenney DW, Aubin I., Beardmore T, Beaulieu J, Iverson L, O'Neill GA, Winder S, Ste-Marie C. 2012. Placing Forestry in the Assisted Migration Debate. *BioScience* 62:835–842.
- Roussel, G. 2007. Une brève histoire de la recherche forestière en Aquitaine.
- Williams, J. W., S. Jackson, and J. Kutzbach. 2007. Projected distributions of novel and disappearing climates by 2100 AD. *Proceedings of the National Academy of Sciences of the United States of America* 104:5738–42.