**Laboratoire d' Economie Forestière**

INRA
SCIENCE & IMPACT

AgroParisTech
INSTITUT DES SCIENCES ET INDUSTRIES DU VIVANT ET DE L'ENVIRONNEMENT
PARIS INSTITUTE OF TECHNOLOGY FOR LIFE, FOOD AND ENVIRONMENTAL SCIENCES

# Postdoctoral position:
# Modeling design of public/ private partnerships in the context of adaptation to climate change

## 1. Context and project overview

This post-doc position takes place in an ANR[1] project called 'Forwind', a pluridisciplinary one.

Forest management is based on multifunctional considerations and must account for risks from natural hazards such as storms, fire, drought, or insects. The main hazard for forests in Europe is storm damage (Schelhaass et al 2003), with the last decades showing a marked reduction in the return periods of major windstorms in the temperate northern hemisphere (Della Marta and Pinto 2009). Even if forests are also managed for biomass, there is also a demand for conserving existing long rotation semi-natural forests with multipurpose management associated with the development of really innovative management and risk-assessment tools (growth and yield models, micro-economic models). The mitigation of storm risk and damage in forests can be dealt with at different levels, from national policies to local decision of forest owners. The decision of forest owners is strongly governed by economic considerations and by public policies. Insurance could be a means for «soft adaptation» to the risk. Private insurance schemes vary according to countries. In some countries it is possible to buy insurance policies to cover the risk of wind damage to forest (since 1950 in Sweden, also readily available in the UK and the Netherlands). Central Europe is characterized by low coverage with only 7% of the total forest area insured in France. Public financial measures are not an alternative to private insurance systems. Indeed the two solutions are complementary in circumstances when the consequences of the storm damage are high at the regional level (Gardiner et al. 2010). Under French law, storms are not considered to be natural disasters, thus storm damages cannot be directly covered by the State. However indirect costs for the State are high. In 1999 the total cost for the French government was 3 billion € in grants for cleaning and planting (not for reimbursement of losses: Costa et al., 2009). Since 2010, the new regulation in France (code forestier, Article L261-4, 27/07/2010) has set the subscription to a private insurance as a required condition to obtain support for cleaning and regenerating stands after a storm from the State (partially from 2011, totally from 2017). In the short term this measure will reduce the cost of storm damage for the State. It may also increase the number of forest owners covered by insurance, but discourage them from investing to restore forests after storms (Gardiner et al. 2010). The setting of proper bases for insurances of wind hazards is thus becoming crucial. Insurance practices must take into account the forest owner's preferences, the value of the current forest and its vulnerability to risk. The "hard adaptation" involves changing silvicultural and management practices to increase tree firmness and forest resistance. The recent report of Gardiner et al (2010) summarized the state of the art on that topic and provided recommendations concerning forest storm risk management in Europe. The amount and location of storm damages and the vulnerability of forest stands results from a complex interaction between i) the meteorological conditions and ii) stand location, soil type, stand composition, and past forest management. Tree height was in particular shown to have an important influence on vulnerability. On the contrary, the influences of forest operations, species choices or site conditions traditionally studied in forestry were found weak, missing or contradictory (Colin et al. 2009). There is thus a real need to better understand the underlying physical and physiological processes that impact forest vulnerability. The resulting knowledge should be linked to growth and yield models including the influence of silvicultural decisions so as to assess storm risk at the relevant time and space scales of realistic forest management unit (Hanewinkel et al. 2010).

Both hard and soft adaptations are complementary and can occur concurrently. It is thus important for economic models to integrate up-to-date biotechnical knowledge about damage forecast and possible actions of hard adaptation. However the internal consistency of the economic model has to be also improved. For example the reason why so few forest owners are insured today should be considered. And guidelines for restructuring the current forest insurance market should be sketched. Actually, it is a great challenge for targeted research to couple knowledge of forest growth with its environmental drivers in conditions resulting from climate changes (that have therefore never being experimented). By the same token, it is also very challenging to couple forest management with its economic drivers in a complex context where forest owner's preferences are oriented simultaneously by an

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[1] ANR, Agence Nationale de la Recherche, http://www.agence-nationale-recherche.fr/

Laboratoire d'Economie Forestière – UMR AgroParisTech/INRA
AgroParisTech Etablissement issu du rapprochement entre l'Ina P-G, l'Ensia et l'Engref
14, rue Girardet - CS 14216 - 54042 NANCY Cedex
☎ 00 33 (0)3 83 39 68 67 – 📠 00 33 (0)3 83 37 06 45 – 📧 lef@nancy.inra.fr
SIRET: 130 00 285 0000 68 – APE: 803 ZO

increasing range of ecosystem services and a more risky environment. Assessing risk and its consequences on forest production and value of different systems is one major issue of this double challenge. It has been poorly studied globally up to know. In particular the current growth and yield models and management rules in forest science do not include the most up-to-date knowledge in biomechanics and economics.

(*A detailed version of the project proposal is available on request:* anne.stenger@nancy.inra.fr)

## 2. The post doc job description: the public/private partnerships to adapt forest areas

In a Sub task ('Instruments of public policy' (leader A. Stenger)), the objective is to display theoretical predictions on the impact of different types of public policy on forest adaption towards climate change.

The aim is to go deeper into a theoretical model in which different design of public policies will be compared both in terms of forest owner's utility and well-being of the society, taking into account that forests are multifunctional, supplying public goods and services. Adaptation is not exclusively one type of action but really imply different ones at different scales. One interesting aspect would be to analyze whether public adaptations have to be combined or not with private ones in terms of incentives and results. One global objective is to think about how to give incentives to forest owners that make them decide to enlarge their preferences to society's concerns and to climate adaptation in particular. What are the different modes of public-private partnerships for forest faced to adaptation to climate change? What could be the best design in the public-private partnership? Is there a threshold beyond which the public-private is more or less efficient than public (private) behavior? Is there any spatial discrimination to take into account? The provision and the benefits of climate change adaptation can vary according to both the location (geographic and spatial scales) and time (Tompkins and Eakin, 2012). To respond to these questions, some theoretical responses are expected in at least two articles that will have to be published at the end of the contract.

## 3. Required skills
PhD in Economics
Skills in risk/public economics
Knowledge in Modelling (preferably)
Knowledge in environmental economics (forest) and/or insurance/ (preferably)
French and/or English language

## 4. Practical information and contact
Working place: LEF Nancy (North-East France, 1h30 from Paris by train)
Starting date: preferably from autumn 2014 (oct)
Duration: 1 year
CV and cover letters must be sent to anne.stenger@nancy.inra.fr before June 15th.