

**Conflicting engagements on climate change adaptation in French
private forest: an anthropological perspective**

Marieke BLONDET

Anthropologue, chargée de recherche

LEF, UMR INRA AgroParisTech Nancy

14, rue Girardet

54042 Nancy Cedex

marieke.blondet@nancy.inra.fr

Abstract

The issue of climate change is progressively entering the field of forest management in France and Europe. It poses significant question to forest managers since forestry is made on a very long time scale. Decisions taken today will impact forest for many years and climate change may threaten this long terms investment. According to scientists, beech forest is particularly sensitive to drought and may disappear in the coming years due to global warming. Beech is also one of the protected species in the Annexes of the Habitat Directive.

To face and bring answers to this issue of the future of beech forest before this change in climate conditions various actors from the forest sector, the conservationist organisations and the policy-making sphere are engaging at the national level. Yet they carry different views of the issue. What are at play, there, are competing positions and perceptions toward nature protection, sustainable forest management and biodiversity integrity. Nevertheless, in the field, our research shown that local people barely consider the issue of climate change as clearly relevant for them since they have not noticed worrying enough signs of environmental change in their surrounding at that stage. As a consequence they are not that much engage in adapting to the climate's new conditions such as the various stakeholders at the national level. Our article therefore analyses this issue and the interacting and often conflicting perceptions of this issue by the various social actors at different level of the policy-making process. The problem of beech forest under climate change is, indeed, the arena for power relationships between various political stakeholders that we will describe here. We will then show that this competition could be quite disconnected from the life and views of the people in the field. Environmental change remains an issue for the top national experts and policy makers.

Keywords: climate change, engagement, discourse, power relationship, virtualism

Conflicting engagements on climate change adaptation in French private forest: an anthropological perspective

French foresters are getting more and more aware of climate change, which most likely will impact soon the forest resources they take care of. Due to the long-term ecological cycles in forest ecosystems, forest management is not made on a yearly basis, such as farming, but requires a much longer time of action and anticipation. It may take at least forty to fifty years before a forest manager will harvest wood. Thus the management of the forests needs to take that specificity into account if one wants to have a sustainable forest for future generation. Decisions taken today by forest managers and owners will obviously impact on their future activity and harvests; an impact that will very possibly be also modelled by changing climate conditions. In the frame of climate change and all the related uncertainties about its long terms effects, foresters¹ are getting anxious about their decisions in terms of forest management.

In France, and Western Europe more generally, some specific tree species are particularly threatened by the predicted change of climate: for instance European beech (*Fagus sylvatica*). Most scientists regard beech forests as highly sensitive to climate changes, especially drought. Recent researches have demonstrated a shift of the beech distribution up north and a decline in trees' growth. Beech forests in Europe are also considered as an “umbrella species” – a species that benefits from a large territory that allows the conservation of a great number of other associated species if it would be protected. As a result beech is listed as one of the habitat of common interest in the EU Habitat Directive's Annexes (European Commission 1992). Therefore in the European Union beech forests benefit from a special conservation status under the Natura 2000 network of protected natural sites.

In France, and within that frame, a debate recently started around the possible use of tree plantation to control the impacts of climate change in forest. The idea basically is to seek for more resistant tree species in order to replace the weakest ones such as European beech. These stronger species are often not indigenous species, which may be subject to controversy among actors from the forest sector, the conservationist organisations and the policy-making sphere. At the national level, they all engage into tense discussions and promote different

views and perception of the impact of climate change on forest management generally and beech forest more specifically. However, my field research over one Natura 2000 site in the northeast part of France shown a different perspective. The forest managers I met have a very different view of the issue and argument to justify their choice in management. Generally they only start to notice worrying enough signs of environmental change in their surrounding [that may bring them to consider the issue differently] and many of them barely consider the issue of climate change as being highly relevant for them. As a consequence, they are not as much engaged in adapting their management to the climate's new conditions such as what is debated at the national level.

This article wishes to analyse and confront the interacting and often conflicting perceptions of this issue by the various social actors at different level of the debate. The problem of beech forest under climate change and the introduction of exogenous tree species through plantation is, in my view the arena for power relationships between various political stakeholders at the national level that we will be described here. I will then show that this competition could be quite disconnected from the life and views of the people in the field. The discourse on the use of plantation to fight against climate change will be analysed through the frame of the *virtualism* theory from Carrier and Miller (1998). This theoretical frame was first elaborated to critically analyse modern Economics and later adapted to discuss environmental issues (Carrier & West 2009). It basically says that Economics historically developed abstracted from society and an accurate account of the world. A virtual reality was therefore constructed. This becomes *virtualism* when people take this representation to be prescriptive and seek to make the world to conform to that vision. Ultimately I will show how climate change and plantation are only instruments in a much broader debate.

Frame of the research and methods

The climate change issue is highly debated and controversial. In terms of governance, a long-term perspective is needed but decisions rely on uncertain knowledge about timing and severity of climate change impacts (Vink et al. 2013). Questions link to “world risk society” are also addressed (Beck 1992, 2010). Ulrich Beck analyses the climate change issue in terms of inequalities and power relationship. To him, power relationships are at work to define and specify the risks linked to climate change: if a situation is ‘at-risk’ or not. These power relationships lay on the available knowledge; knowledge that may be contested (Beck 2010). Those issues are also at play in the frame of climate change adaptation in French forest.

A large number of recent scientific researches analyses potential impacts of changing climate conditions on forest ecosystems (Hemery 2008; Allen et al. 2010; Lindner et al. 2010; Milad et al. 2011). Most of them consider that climate change will lead to significant changes in tree species distributions. For instance, scientists have demonstrated that most of the mountainous tree species in Western Europe have already migrated to higher altitudes as a response to climate change stress, while lowland tree species (beech, common or sessile oak) are predicted to retreat in West, Southwest and central France (Cheaib et al. 2012). European beech forest, which is particularly drought sensitive and thus highly susceptible to increasing drought intensity and duration that comes with increasing temperatures, will very likely migrate up north in order to maintain favourable life condition (Bergès et al. 2011; Lenoir et al. 2008). One has also identified a significant decline in the growth of adult beeches and a fall of regeneration at the southern margin of the species distribution (Jump et al. 2006, 2010). This is not to mention increasing trees vulnerability to beetles and diseases often caused too by raising temperature and more regular extreme drought.

Yet, despite of a certain consensus, many uncertainties and disagreements remain related to both the general effects of climate change and the difficulties to precisely predict its effect on tree species distribution and dynamics (Davies et al. 1998; Pearson & Dawson 2003). For instance, some researchers consider we should not generalise these changes under global warming, which may depend on regional and local specificities such as quality of the soil, humidity, etc. (Bruciamacchie, personal communication 2013).

At the same time, and given the long-term ecological cycles in forest ecosystems, current management practices need to be reconsidered. Policy makers are expected to provide with propositions: alternative management practices might be promoted and developed 'ex-ante' to enhance forest adaptive capacities and increase population longevity (Hemery 2008; Lindner et al. 2010; Milad et al. 2011). Although policy makers turn themselves toward scientist to provide relevant responses to climate change adaptation, these scientific options remain based on probabilistic assumptions (Koning et al. 2014) and disagreements among scientists themselves also remain. This obviously increases the forest actors' anxiety and controversial positions.

Several management options may be considered in order to increase tree population longevity. We could improve forest ecosystems resilience by increasing and strengthening genetic diversity in composition of forest ecosystems, or by reducing stand density to increase water availability and thereby reduce drought stress for remaining trees [(this intervention, however, is labour intensive and therefore expensive)]. We may also favour tree species that are more

resistant to heat and drought (Jump et al. 2010, Sjölund and Jump in review). Some more extreme scientists denounce that most of the forestry scenarios to adapt to climate change impacts lead to a strong artificialisation by planting more resistant exogenous tree species mixed with indigenous species in order to ensure wood production under. These researchers denounced the adverse consequences of ecosystems artificialisation, which questions the ecosystem's balance: some exotic species may become invasive and impact on biodiversity. Climate change may play a significant accelerating role in such a trends (Duchiron & Schnitzler 2010). They advocate implementing a forestry using forest capacities to manage stress and disturbance and to respect the natural functioning of ecosystems. In that they recommend forestry similar to that defines by close to nature management.

As we start to see the issue of how to adapt silviculture to climate change is very debated and policy makers are expected to propose solutions and supports to forest managers and owners; this is particularly true around conservation areas where the protected species, such as beech are particularly at risk of population decline. Ultimately this also means that some protected forest areas may see declined the species for which they were originally designated.

In order to investigate this sensitive issue of forestry adaptation to climate change, a research was conducted in the frame of a short-term project – in our case 4 months – funded by Lab of excellence ARBRE.² The present work is based on the systematic cross analysis of data collected through conducting semi-structured interviews. This data collection was made over two phases. First, during fieldwork led in 2011 and 2012 for a previous research programme named *Beech Forest for the Future* (BeFoFu) looking at Natura 2000 practical implementation in beech forest.³ Two sites were selected and 45 interviews conducted. Interviewees included forest managers and owners (private or public), elected representatives, Natura 2000 project leaders, farmers, hunters, environmentalists, public officers, etc. A second round of interviews was realised from September to December 2013 at the national level as well as at the local level of one of the two Natura 2000 sites of the BeFoFu research. 10 interviews were then conducted; 4 at the local level with forest managers from both the private and public sector, and 6 at the national level with scientists, representatives of private forest owners organisation, the National Forest Office (ONF) and the CNPF (National Centre for Forest Ownership). Issues raised addressed the significance of plantation in basic forest management, the interviewees' perception of plantation and introduction of exogenous tree species, their perception of climate change and how they would deal with that in terms of

forest management. Finally in addition to analysing discourse collected through interviews we studied scientific and grey literature discussing the issue of climate change and silviculture.

Perception of climate change in the forest world

Since the Rio Conference in 1992 we know about the need to deal with climate change effects at a much larger level than country per country as those effects are cross boundaries (Leroy et al. 2013: 24). In France, such as in most of the world, the issue of climate change adaptation is nowadays very well known. Forest managers and owners, are also getting more and more sensitive to this issue, however, they are showing nuances in their understanding. In a previous research looking at beech forest conservation over the Natura 2000 network (Koning et al. 2013) my colleagues and I have demonstrated how many people at the local level especially remain somewhat sceptical toward the climate change idea. Our study of the different storylines developed from the level of the European Union policy making spheres down to the local people has demonstrated that although the issue of climate change is considered to be important for forest policy at the European level, only 32 % of the local people questioned considered that climate change is a significant issue for them and forest management. In that research we identified different discourses among themselves a pragmatic discourse, which is the most common discourse met in the field among foresters. Because there are so many uncertainties about the impact of climate change, about whether its effects will be negative or positive, and about the solutions to propose, people usually carry pragmatism. They claim for informed decision-making based on more knowledge and information (Koning et al. 2013: 13).

Informants in the North East part of France made very similar comments to me. For instance, one of them told me:

“Then about Climate Change, I am, I’m much more sceptical. It’s true that, it turned out that we would have a climatic warming at the planet global level. Then it is a bit a pet theme at the moment (private forest management advisor, 2011).”

Most of the persons I met (scientists, foresters, environmentalists) at all level also denounce the great lack of knowledge on how climate change will manifest itself and what could be its consequences. Talking about forestry, no one can really project into the future and know for sure the adaptive effects of changes in management practices, for instance a more dynamic silviculture.

Yet, even if most foresters carry a pragmatic point of view and stress the lack of useful knowledge on future climate change impacts on forests species, they are also aware of the

need to think about that issue and try to identify tools to deal with it in the future. Considering the very long term of forest ecosystems if there are needs to adapt silviculture it needs to be considered as soon as possible. This was the point raised by the project leader in charge of the environment and forest at a Regional Natural Park (PNR):

“About climate change, well I don’t know if at the moment it is really a question elected representatives are asking themselves because the issue of CC is a 50 years from now question, one century roughly? There is an emergency to address the question anyway since predicted changes are getting quite fast. But elected representatives don’t think further than 5 to 10 years from now (...). Foresters are rather the one who will address the question (CM, project leader at a PNR, 2013).”

Yet, among foresters the perception of climate change and its impact is rather vague.

Although they are aware of this worldwide issue, many of them only start to notice some example of tree diebacks but are not able to say for sure that it is due to raising temperatures. In general and especially in the region I conducted my research they are mostly worried about the risk to have more big windstorms in the future. However, since the issue is extremely debated internationally, nationally and even regionally foresters also start to get more aware of this debate. Many practitioner journals for instance offer special issues on climate change and forest. For instance in July 2013 *Forêt entreprise* titled its issue “The challenge for foresters: to adapt to climate change”. The different organisations of the forest world (ONF, CRPF, etc.) also start to organize regular training on climate change and its consequences for forest ecosystem and management. Therefore the awareness is growing as confirmed by one forest management advisor:

“Yes many foresters are getting worried with climate change, there are plenty of examples with oak, actually in the Atlantic oak forest trees already show important diebacks. There were already significant studies on that and important raising awareness. Climate change at the French scale is scary. Yet if we come back to Franche-Comté [French Region] and mountain areas, if there are impacts of climate change, we won’t see them. We will certainly be the last one to see them pass except from extreme phenomena such as in 2003 [extremely powerful windstorm], which will probably repeat themselves (DC, forest management advisor 2013).”

Within that frame, a discussion around one specific option to cope with some of the climate change effects raised recently in France at the national level. The matter is the use of

plantation and changing the tree composition of some of the French forests in order to have more resistant tree species to a changing climate.

Plantation as an option to fight against climate change: reflections from the field

The plantation option was first raised to me by one of the national representatives of private forest owners during an interview we had on a totally different topic.⁴ It was about the Natura 2000 network of protected sites in France, and its future in the frame of climate change. This man clearly told me that his organisation and he were meaning to ask the French government and Ministry for environment to authorize a certain amount of plantation of exogenous tree species in the Natura 2000 protected sites especially in beech forest – trees species, which would be more resistant to raising temperatures et drought and thus more able to cope with changes in climate conditions. The objective was to control the climate change impacts on the long run to offer forest owners better chances to have a sustainable forest resource in the future. In a more recent interview strictly related to our current thesis the same person told me:

“There is one Natura 2000 site called the Sologne [one of the French region] that covers a huge surface. The CRPF [Regional Centre for Private Forest Ownership] fought to have in the forest habitats of that site an introduction up to 20% of a tree species, which is not the target species of the site, but the Minister [for the environment] refused (...). Moreover we are in an area of significant changing climate and if the target species is common oak or sessile oak, we don't know if we would still be able to grow it tomorrow. The oak rotation is a hundred year, the forest owner when planting oaks cannot plant another species therefore he places all his eggs in the same basket (National Representative of private forest owners, 2013).”

He also added, talking about another area of France, the triangle Poitiers-Rennes-Tours, that the common oak forest there also experiences very significant problems of diebacks (in recent years the area has known strong droughts over two or three month a years). Private owners there, if they want to secure their income would have no other solution than to change the tree species since the current one apparently cannot cope with raising temperature. Therefore according to this man, private owners will have to introduce another stronger oak species through planting.

Plantation has always been part of silviculture, being quite a common tool to take care of a tree population and acting with the future of the forest in mind. This is also a quite strong

anthropic action of forest management as mentioned by JK: *“Plantation has nothing to do with nature. It is something purely human. This really is the artificial par excellence (JK, forest manager, 2013).”*

Since 2000, however, the proportion of plantation in silviculture has drastically dropped.⁵ For most of my informants this phenomenon resulted from the end of the FFN, the National Forest Fund. This Fund was established in 1946 to support reforestation (mostly with conifers) and help French forest to gain dynamism.⁶ This fund stopped in 2000 and as a result, as mentioned by one of my informant, there was *“a very strong drop in the planted surfaces because before there was the FFN that disappeared (...) and thus people stopped planted... (CC, Scientists from INRA, 2013).”*

A forest management advisor summarized the situation as such:

“At the time of the FFN, there were a lot of funds as a result a lot of the tree stands have been transformed in France (...). It is true that today aids for planting almost came to zero. There are still few envelopes but for very specific cases (...). The FFN does no longer exist; there are no financial aids anymore (DC, forest management advisor 2013).”

According to one of the first scientists I met to discuss this plantation issue, who is conducting research about that, many stakeholders at the national level have great expectations toward projects researching this issue (a statement that may be questioned as I will discuss later). On the one side, the Ministry for Agriculture is interested in gaining scientific knowledge about plantation, the use of alternative techniques to pesticides, on the adaptation of tree species under various soil and climatic conditions. Researchers are also quite interested in studying options to help forests to adapt to climate change. One of the question asked is the change of species: if one wants to change species – for some more resistant to drought ones for instance – one needs to go through plantation; clear cut the stand of a weakest tree species and replant with another one.

On the other side actors from the timber industry are also expecting a lot from this research. They are mostly interested in making sure they would have the necessary resources for their businesses (pulp, biomass), in other words they want to assure their growing demand in timber of any kind. Several of the people I met explained me that in many cases of medium size forest (less than 10 ha) when someone clear cuts a parcel, one often only replants about 10 to 15 per cent of the surface, which on a very long run will causes a decrease in the amount of available wood for the industry. The last significant interest of plantation is to reconstitute

damaged forest and stands; this could be done through natural regeneration or plantation when regeneration is not possible.

In summary, plantation forestry is an interesting tool in many regards. It is not only useful to the regeneration of damaged stands, but also it supports a growing demand for wood by the timber industry. Finally plantations can play a significant and very interesting role in coping with the climate change effects on forest.

Plantations are also subject to lot of criticism, however, and demonstrate a certain amount of disadvantage. First, to look for the authorisation of a certain proportion of plantation is one thing but it is ignoring that a lot of the skills and knowledge, in many part of France, have already been lost. This is especially true in the East and Northeast part, although this is not so true in the Southwest and especially the Landes. In this research I will briefly discuss this French region since it is highly unusual. Furthermore most of my interviewees are from the Northeast part of France. It is important to note, however, that foresters from the Landes seem to be quite influential in the debate I am discussing here.

Second, plantations present a risk of drastically transforming the stand in terms of tree species and biodiversity composition. Behind the issue of plantation itself, this is the whole question of introducing non native trees species in indigenous species stand and thus of the ecosystem's integrity. On that topic, DC, forest management advisor explained:

“The difficulty does not come from the plantation in itself, it is the transformation of natural stand composed with local species into plantation of so called allochthonous species. When one sets up a plantation of allochthonous, it does not bring the whole diversity that was locally there for a very long time (...). Aside of that actually there is a harder and harder trend about these stands' transformation, the more environmentalist version is a bit hard on (DC, forest management advisor 2013).”

Another related issue is the introduction of invasive species that may colonise whole stands. As mentioned by one of my informant: *“the history of invasive species is that we became aware that exogenous tree species can sometimes have invasive behaviours too to the detriment of the indigenous species (CM, project leader PNR, 2013).”*

These issues were designed among the major hazards linked to CC effects by the latest IPCC reports (IPCC 2014: 85). They also are particularly sensitive in the frame of nature protection such as the Natura 2000. The Habitat Directive (European Commission 1992) at the origin of this network of protected sites contains two lists, one of species, and one of habitats, that are consider as of common interest for the European Union and as such that need to be protected.

They are not only endangered species and habitats, but can also be quite common, yet very representative and thus significant, of the European biodiversity. The species and habitats contains the HD's Annexes are conservation target. The Natura 2000 sites were nominated in accordance with those listed species and habitat, because these areas contain some of them. Climate change, among others is challenging this organisation. The argument raised by private owners at the national level also raised the issue of what will these sites become in the future if climate change will affect the target species and habitats? This debate has not been set up yet and is highly sensitive but is not my object in this paper. Nevertheless, Natura 2000 sites are not closed areas under a strict protection status but are rather places combining conservation and sustainable development. Human beings continue to do their regular activities and exploit the natural resources as long as it is done in a sustainable way and in taking care of the target species and habitats. Forest owners and managers live and work in some Natura 2000 areas and hope to keep on getting an income from the forest in the future. Plantations as argued by the representative of private forest owners then play an active role in this context and in the frame of climate change. If some target tree species do disappear as some scientists predict especially for beech trees, how to ensure forest owners that they will be able to develop their activity in the future if their forest fade away? In other words the future of Natura 2000 and plantations are associated issues. That is why private owners at the national level argue for the introduction of non native tree species in Natura 2000 sites. Another related and significant issue is how to keep the local ecosystem integrity with such an introduction. We may lose biodiversity richness in the process. This is highly debated and many people among foresters are questioning the veracity of ecosystem lose of integrity. Among the critical people are representatives of the private forest owners organisation at the national level as expressed by my informant:

“That is true that between a coppice forest of oak in Limousin and a Douglas fir forest, biodiversity is not the same. But did someone analyse it when it appeared naturally, how does that work? Do we have loss? Do we have transfer? Does another biodiversity appear? (...) With the same tree stand, beech tree and European fir for instance, according to human intervention, biodiversity is completely different from one stand to the other (LB.

Representative of private forest owners organisation, 2013).”

Others stakes and arguments are behind that of ecosystem integrity. It is also a question of the diversity of the ecosystem and their resilience. These stakes are also at the heart of the scientific debate. Questions such as shall we diversify silviculture instead of diversifying tree species to gain diversity or shall we diversify what is already installed, are raised. We will see

later that these discussions also occur among forester and have an impact on their will to develop plantation further.

Foresters on the ground raise one more argument to oppose to plantation, which is their cost.

It is one thing to get legal agreement to plant a certain proportion of non native tree species in protected areas, it is another one to support the cost of such a work.

Plantation is a very complex and costly process in terms of money, time and energy.

According to a professor in forest management (Bruciamacchie, personal communication 2013) it is very difficult to amortize forest plantations on the long run. Not only you have to buy the young plants to a nurseryman; but then you are not even sure your plantation will first grow, second will not suffer from the attack of wild pigs, roe deers or other big game eating the young stems – of course you may decide to build a fence around your plantation to protect it, which also has a cost – and third the young plants are demanding extreme care to make sure they will develop properly (according to forest management criteria) and healthily.

Several forest managers I met in the field confirmed this comment to me. For instance the manager of a forestry group explained: *“when there is a large clear cut [that is a need if one wants to plant]⁷ we cannot obtain trees of quality. They have branches from the bottom up to 20m high. They are very, very branchy (PB, forest manager 2013).”*

JK, another forest manager working for a large private owner (more than 500 ha), a woman, told me about her attempts:

“She planted in the 90s. The big trends then..., after the politics of planting spruce (épicéa) in France we realised they got disease. We swung to 90° saying ‘let’s plant broadleaves. It’s the future; it’s more resistant to diseases’. So Mrs K. (...) planted broadleaves but it appeared today that all of her broadleaves plantations, it’s a total failure. We can no longer find the plants on ¾ of the plantations. Natural regeneration took over the planted broadleaves (JK, forest manager 2013).”

Furthermore, once plantations are set up, one needs again to clean all the other undesirable young plants (hazelnuts tree, ferns, birches etc.). First instance PB, the first of these two foresters told me:

“We had plantations of Douglas fur, following the 1999 windstorm, in a sector where there are ferns of 3 meters high, and we have each year, it’s the third time we planted there. It’s difficult [because] in summer it’s very hot under the ferns and in winter they crushed; the snow, it wiped everything out (...). When there are ferns it’s expensive. Plus we have some roe

deers. We set up protections, some sticks, and we need to clean before the snow otherwise everything is going to be wiped out (PB, forest manager 2013)."

All those actions obviously have a cost. Clearly talking about costs, this forest manager added: *"Regular high forests with plantation is expensive at start, in cleaning and then we need to cull some stems and make thinning [action to lower the stems density in a young forest stand, in French we call it dépressages and éclaircies]. It never ends; we keep on investing (...). Plantations, the installation, it could be 3.000 € per hectare without counting the cleaning."*

My informants also told me that planting requires a lot of workers they can no longer afford. In the past working wages were lower and forest exploitation provided bigger incomes to invest. Furthermore, as already mentioned, the FFN was financially supporting those plantation costs.

The cost effect was, in the field, the former arguments against the large use of tree plantation in forest. Most of my informants acknowledge, however, that they use or would use plantation but only in case of extremely damage stand or to bring the forest to a greater mix of tree species and a more diverse stand. Therefore, most of them would only plants few stems at a time.

JK, the forest manager working for Mrs K and her big private property told me that plantation *"is the solution, let's say, the solution that permits to fix damages at best. If you have wood stands that were dying, that were cut down, thus obviously replant is the only solution if you want to get interesting species. Or if you have an initial stand that is qualitatively poor, it is a solution too, but it's never, it's always a solution (...) of extreme, well, it's the very last solution, the final solution (JK, forest manager 2013)."*

The project leader in charge of the environment and forest at a Regional Natural Park (PNR) told me when I asked what could be those extreme conditions when plantation might be consider as a relevant solution: *"Well, the fail of natural regeneration, or (...), the improvement of the stand composition, meaning either that the rejuvenation is impossible, and so we are using plantation. So this, it is mostly in case of problems with ungulate animals [deers for instance]. Or it could also be plantation with indigenous species, for instance underplanting beech in a spruce plantation in order to progressively recompose more "natural" stands [quotation marks are mine. In the case this man is talking about Spruce, which is a non native species] (...). So this is basically to prepare the return of let's say more*

natural formation when we are facing a poor conservation status (CM, project leader PNR, 2013)."

The cost of plantations is also an economic argument used by the supporters of close to nature forest management. This kind of silviculture is an alternative to regular high forest of a monospecific tree species. The principle is to look for diversity; diversity in tree species, in ages of the trees, in structure of the forest, etc. The idea is basically to follow as much as possible the rules of nature and use it to manage. Uneven age forest or irregular high forest is as one forest manager told me "more conform to nature (PB, forest manager 2013)."

The natural Park mentioned before also explained:

"So what the close to nature silviculture is? It's a silviculture that relies on the potential given by nature (...). Thus natural regeneration is one principle of close to nature silviculture. It is free, and obviously we may use it to keep mixings, if we have more spruces than European firs etc. But in any case, natural regeneration does not cost anything, plantations obviously cost (CM, project leader PNR, 2013)."

It is significant to take that parameter – a different kind of forest management – into consideration because in the frame of climate change it could be an alternative solution to regular high forests, which typically are hectares of lines of the same tree species with little undergrowth. Regular high forest also is the type of forest management usually associated with plantation although it is possible to do regular high forest with natural regeneration. Uneven age forest management offers other options than plantation and another vision of what could be done to adapt forest to changing climate conditions. The same project leader expressed the vision and some methods of close to nature management when I asked him if he had anticipated climate change in his forest management. He said:

"As far as now, to anticipate no. On the other hand to rely on the potentials, how can I say that? We could be very interventionist, we could tell ourselves that..., and we are going to replace [the tree species] by something else. So this is not our strategy (...). Obviously we will have to take [climate change effects] into account but actually there are potentials among the species that are already here, therefore we need to go with this evolution. [For instance] these oaks probably have genetic specificities too that might allow them to cope with additional 2 degrees thus it is part of the species it is important to rely on (...). Therefore we rather are into the "to adapt and work on mixing species". We are into resilience. If we want to rely on the resilience of forest stands I believe there are potentials to exploit with regard to climate change (CM, project leader PNR, 2013)."

We see that this type of forest management seems to also offer possible solution for the foresters to adapt their practices and their forests to a changing climate such as mixing species on the same stand and using natural regeneration of species adapted to the local stand.⁸

The strong position of those forest managers promoting close to nature management and return to more naturalness in the frame of climate change is finally well summarized by the words of JT a forest management advisor for large private forest owners:

“The things we can hear in the field as recommendations, it is sometimes totally exaggerated, meaning to substitute species. (...). But let’s wait! First (...), we should not underestimate microclimatic regional variations etc. Temperatures might globally rise but we might also have compensating phenomena such as more rains in some places, or I don’t know what (...). When you look at the INRA map on the beech development in France that shows it will totally retract itself in the Northeast, still watch out the conclusions! It’s not because we are having beech stand in the West that we have to clear-cut them and replant oak (...). To us the best guarantee for climate change is to mix species, this is, I mean, you don’t put all your eggs in one basket (...). It’s good to talk about that, to warn the private owners, but then, you should not give ready-made solutions and generate some, some... slightly general cooking recipes by saying we need to plant cedar tree there, we need to plant that or that specie or clear cut your forest stand because it is not adapted. Well, one needs, one needs to be a bit careful about those discourses (...). And in any case one needs to be flexible. Well I mean if there is one species that withers a wee faster, then we adapt. There are sanitary fallings and we also have other species (...). But in any case, in terms of actions, of acknowledgement, yes we are probably going toward temperatures, which will be a wee higher, and also, as they say, toward stormy phenomena a bit more regular; but what...? All right, if the discourse while they are experiencing storms such as in the Landes, is: we are going to reduce the production cycles of the forest stand! But wait a minute, watch out such a discourse (JT, forest management advisor, 2011).”

Cross analysis of the top and bottom levels.

Facing these contradictory comments from representatives of the private forest owners at the national level, on the one hand, and from on the ground forest managers on the other hand, we may raise two hypotheses to explain this gap. The first one is that there exists a strong disconnexion from the top and the bottom of the forest world. Such an explanation is a rather “classic” one, however, I would propose as a second hypothesis a more complex option.

Could it be possible to consider that the representatives at the national level of the forest owners have on purpose decided to propose arguments they possibly know they are not really corresponding to their members' stakes in the field? They would have done so in order to take a stand against first the French State and second environmentalists, in a deep and long lasting power relationship; a conflict of interest that would go far beyond the basic issue of planting or not non native trees species and change in the stand's composition.

The project leader at the Regional Natural Park told me for instance:

“I think this may also be because, well I am going to be a bit harsh saying that climate change is one more argument to say that we could favour interesting species to the detriment of native species, which grow slower etc., maybe this is also in the background of all that (...). It is true that yield of a Douglas fir forest is higher than of the European fir, thus someone who invests money can get a yield of 4 to 5 % instead of 3. If ones is an investor, therefore one will choose the 5 % (CM, project leader PNR, 2013).”

I now propose to talk about calculated virtualism to qualify the strategy of the private forest owners' organisation at the national level. The virtualism theory was first developed by Carrier and Miller (1998) to critically discuss neo-liberal economics. It was later adapted by Carrier and West (2009) to address environmental issues, programmes and policies.

How to understand virtualism? People usually approach an issue from a certain constructed perspective that is not neutral because influenced by its sources. This specific perspective constitutes a sort of “virtual reality”. This virtual reality becomes virtualism when people forget that it is a product of a “partial analytical and theoretical perspectives and arguments” and instead will take it for granted and thus try to construct the world around them to conform to that virtual reality (Carrier & West 2009: 7). Those representations also elide aspects of the world around that do not conform to their model. In other words, virtualism is an abstracted and stereotypical vision of reality.⁹ These virtualising representations are expressed through knowledge and power relationships such as described by Foucault (1971). The author analysed the power relationships between various types of discourses; some of them having more authority exert a sort of pressure on others, a constraint power. To many, environmentalism and biodiversity conservation concerns are the perfect scenes of exercises of power (Escobar 1998).

In regard to the private forest owners representatives at the national level, they are using a very powerful thematic – climate change – in order to assert certain of their aptitudes. First they want to demonstrate that foresters do have knowledge and skills to sustainably manage

natural resources in their forest and that they are not just vile developers and producers destroying forest as many people regard them. One of my informants who, however, is not a representative of this organisation but a forest manager advising private owners told me: *“One of our mistakes, I mean for foresters in general, is that all the good things we do for biodiversity, we never knew how to sell them. We never knew how to properly tell [people about that] (DC. Forest manager 2013).”*

Another forest manager talking about the Union position added:

“Politically, it’s well played, it’s a superb playing card! We explained over the last 20 years that we know how to do things, except that we didn’t, we were not listened. Then suddenly global warming and it’s a widespread panic and “well, we may have a solution!” and as a result we are listened to. The project remains exactly the same, only the angle to attack is different, but in fine, that does not change anything? It is not a track. We are not pretending that in an attempt to trap you and do what we want. It’s just that one consequences of our ideas has more rating today before politicians and high-ranking people (JK, forest manager, 2013).”

Second and in the continuation of the former, forest owners’ organisation also want to show they can offer tools to fights against the impact of climate change, that they are participating in this debate; they have thought about a method of risk management: if climate change is going to kill some tree species, shall we be proactive and start working on that issue right now, before it is too late. Shall we plant more resistant tree species, being non native, but at least they will cope with and survive changes in climate condition for future generations.

The third element national representatives of private owners are currently fighting for by defending plantation and change in tree species is less directly related to this specific issue. They are secretly fighting for their property rights, to keep on deciding what to do and how to do on their forest, their property without having to suffer from imposition of measures of climate change mitigation from politicians and environmentalists.

The representative of the private owners Union explained that many of the Union’s members, although they have already changed some of their position, are very much still in the position of defending their property right saying: *“I am on my property, I do what I want, as I want!”* Furthermore, they are also protecting their right to get an income and for some to make a living out of their property as mentioned by another of my informant:

“When people watch how fast the wood market developed over the past year, let’s say the last fifty years, would it be pulp wood or would it be energy wood to become the more important? The will of forest managers therefore is to say: “we will not focus on one tree species only,

we will try to diversify to make sure to have products that would fit the market at the end (CC, INRA Scientist, 2013). ”

Finally, what national private owners representatives also try to fight for is to have their word to say. They want to be part of the discussion and not to see restrictions and rules be imposed upon us. They want to be considered “as intelligent” and pro-active as explain by my informant from the national Union. To him, they are looking for sharing knowledge with policy makers and environmentalists, to make these stakeholders to become aware of private owners constrains and issues. To them, if people explain what they do, they will get to know each other better and thus work together better in this sensitive frame of climate change. This opinion is closely akin to that of B. Latour for whom citizens have a cognitive role into the production of knowledge, which would be the basis for action (Latour 1987). To Latour, in contexts of great uncertainties for scientists – such as climate change – produced knowledge is strong only if it results from co-construction between scientists and laymen; the latter being considered by the author rather as qualified peoples instead of ignorants.

In summary, in actively participating in the debate around climate change adaptation and use of plantation private owners seek to protect their free will. They are doing so even if this may deconnect their discourse from many of the private owners and private forest managers’ daily activities in the field and the expectations these persons could have from their representatives. It looks like national representatives defend strong principles – the first one being private property and associated rights – they fear to see threaten by the political decisions and regulations that may come in the frame of climate change risk management.

Ultimately, we also have to note that these representatives particularly stand up for a certain kind of private owners and a certain kind of sylviculture, the regular high forest. First, if we look at the Union’s members, this only covers fifty thousands people out of the 3.5 millions private owners that France counts.¹⁰ The great majority of these members owns more that 25 hectares and have a regular and pragmatic exploitation of their forest, meaning that they get a regular and significant income out of their property. Furthermore many of these members are also private owners in the Aquitaine region, the Lands area, where the usual mode of management is high forest, clear cut and plantation of Maritime pine as recalled by one representative for the French *Institute for Forest Development* (IDF), which is a branch of the *National Centre for Forest Property* (CNPf) in charge of research and development. This person explained me that resulting from the end of the National Forest Fund (FFN), the number of planted hectares dropt in forest and over the last four years timber industry

representatives started to denounce that foresters did no longer invest in forest plantation and thus that we would lack wood in fifty years from now.¹¹ He added:

“Therefore, there was a move initiated by people from the Aquitaine region, because Aquitaine is all the more a forest coming from plantation of Maritime pine (...). Thus, all started from there, there was this entire move from few big forestry cooperatives, Southwest forest managers and owners who launched a call to the State and the wood industry saying that it was an absolute need to financially support timber industry and plantations (IDF representative 2013). It seems that the discourse carried by the national private owners union also supports this claim and therefore its position is biased since its mainly corresponds to a certain kind of private owners, basically those owning large forest and implementing regular high forest management and plantation.

The regular high forest management type, I have shown, is not commonly shared by foresters. The debate between the supporters of this management type and those of the uneven age forest and close to nature management is actually quite tense and impassioned in France and has been for many years. This opposition not only refers to silviculture technics but also to conflicting notion of aestheticism and philosophy (Boutefeu 2010). In the case of high regular forest, the forester is considered more as an “agronomist” while in case of uneven age forest, the forester is seen as a “gardener”. The former is also often seen as more productive and industrial than the latter. This is not the purpose of this article to discuss this heated debate but it is important to acknowledge that it also participates in the discussions at the national level about authorizing or not of a certain proportion of plantation and, thus possibly changing the local ecosystem composition and richness.

This form of bias in the discourses from private forest owners representatives at the national level can be qualified as virtualism: their particular interest in especially fighting for a certain kind of private owners (usually big property with quite a significant income coming from forest extraction and the use of clear cuts and plantations) makes their discourse virtual because it expresses a specific vision of the world that is considered by the organisation as the way the world is really working. Yet, it puts aside a large proportion of private owners, basically either owning very small properties or managing their forest in a closer to nature way. Thus their discourse clearly ignore that controlling climate change impact on forest by changing tree species and plantation is highly costly, and that only few private owners would be able to afford it without financial supports – in general the big private owners whose

interest seem to be the ones really represented by the organisation. In other words it takes for granted that cost is not an issue and that everyone could plant.

Their discourses also clearly and intentionally ignore that another forest management option exists and also offers alternative options that may be of interest to fight against climate change impacts. That is why I qualify it as calculated virtualism since their stand seems to clearly inscribe itself in the frame of the competition of the two silviculture systems mentioned above.

This situation is problematic because the Union is the main interlocutor of the policy makers in regards to private forest.

Finally, such as what was demonstrated at the EU level; that coalitions based on interests use climate change data in order to pursue and defend their interest (De Koning et al. 2013); in the French forest, the use of the climate change argument and plantation by the private forest owners' organisation at the national level can be understood first as an external fight for power before environmentalists and policy makers, and second as an internal fight for power in terms of forest management preferences; climate change, and more over plantation are only instruments in that debate

Acknowledgments

This work is supported by a grant overseen by the French National Research Agency (ANR) as part of the "Investissements d'Avenir" program (ANR-11-LABX-0002-01, Lab of Excellence ARBRE)"

Thanks to Associate Professors Jacqueline Leckie and Jenny Bryant Tokalau, and to Stephanie Dobson (all from the University of Otago) for their constructive remarks.

List of references

Allen, C.D., Macalady, A.K., Chenchouni, H., Bachelet, D., McDowell, N., Vennetier, M., 2010. "A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests." *Forest Ecology and Management* 259, 660–684.

Beck, U. - 2010. "Climate for Change, or How to Create a Green Modernity?" *Theory, Culture & Society*. SAGE, Vol. 27 (2-3): Los Angeles, London, New Delhi, Singapore: 254-266

- 1992. *Risk Society: Towards a New Modernity*. SAGE New Delhi.

Bergès L., P. Roche & C. Avon. 2011. "Establishment of a National Ecological Network to Conserve Biodiversity. Pros and Cons of ecological Corridor." *Sciences, Eaux et Territoires* n° 3-bis, La revue d'Irstea.

- Boutefeu, B. 2010. "Le forestier de l'ONF, entre technicité et esthétisme." In Vaullauri, D. et al. (eds.). *Biodiversité, naturalité, humanité. Pour inspirer la gestion des forêts.* Edition Lavoisier: Paris: 179-186
- Carrier, James G. & Daniel Miller (eds). 1998. *Virtualism: A new political economy.* Oxford: Berg
- Carrier, J. G. & West, P. (eds.). 2009. *Virtualism, governance and practice: Vision and execution in environmental conservation.* New York: Berghahn Books.
- Chebib, A., V. Badeau, J. Boe, I. Chuine, C. Delire, E. Dufrêne, C. François, E. S. Gritti, M. Legay, C. Pagé, W. Thuillier, N. Viovy & P. Leadley. 2012. "Climate change impacts on tree ranges: model intercomparison facilitates understanding and quantification of uncertainty." *Ecology Letters* 15(6): 533-44
- Forêt entreprise. 2013. *Le défi des forestiers. S'adapter au changement climatique.* Special issue n° 211, July 2013/4. IDF – CNPF: Paris
- Foucault, Michel. 1971. *L'ordre du discours.* Gallimard: Paris
- Escobar, Arturo. 1998. "Whose knowledge? Whose nature? Biodiversity, conservation, and the political ecology of social movements." *Journal of Political Ecology* 5: 53-82
- European Commission. 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1997, p. 7). 1992 L0043 – EN – 01.01.2007 – 005.001 – 1
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0043:20070101:EN:PDF>
 (accessed 5 March, 2013)
- Hemery, G.E., 2008. "Forest management and silvicultural responses to projected climate change impacts on European broadleaved trees and forests." *International Forestry Review* 10, 591–607.
- IPCC. 2014. "Chapter 19. Emergent Risks and Key Vulnerabilities." In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Oppenheimer, M. M. Campos and R. Warren (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA: 1-107
- Jump, A.S., L. Cavin & P. Hunter. 2010. "Monitoring and managing responses to climate change at the retreating range of forest trees." *Journal of Environmental Monitoring*, 12: 1791-1798
- Jump, A.S., J.M. Hunt & J. Penuelas. 2006. "Rapid climatechange-related growth decline at the southern range-edge of *Fagus sylvatica*." *Global Change Biology*, 12: 2163-2174
- Koning, J. de, G. Winket, M. Sotirov, M. **Blondet**, F. Ferranti, M. Geitzenauer & L. Borrass. 2013. "Natura 2000 and climate change – Polarization, uncertainty, and pragmatism in

discourses on forest conservation and management in Europe” *Journal of Environmental Science and Policy*. <http://www.sciencedirect.com/science/article/pii/S1462901113001597>

Koning, J., E. Turnout, G. Winkel, **M. Blondet**, L. Borrás, F. Ferranti, M. Geitzenauer, M. Sotirov & A. Jump. 2014. “Managing climate change. From science-policy to science-management interface.” *Biodiversity and Conservation*, Special Issue

Latour, Bruno. 1987. *Science in action, how to follow scientists and engineers through society*. Harvard University Press: Cambridge, Mass.

Lenoir J., Gégout J.C., Marquet P.A., de Ruffray P., Brisse H., 2008. A Significant Upward Shift in Plant Species Optimum Elevation During the 20th Century. *Science*, vol 320, 1768-1771

Leroy, M., G. Derroire, J. Vendé & T. Leménager. 2013. *La gestion durable des forêts tropicales*. Collection A savoir: Agence Française de Développement: Paris

Lindner, M., Maroschek, M., Netherer, S., Kremer, A., Barbati, A., Garcia-Gonzalo, J., Seidl, R., Delzon, S., Corona, P., Kolströma, M., Lexer, M. J., Marchetti, M., 2010. “Climate change impacts, adaptive capacity, and vulnerability of European forest ecosystems.” *Forest Ecology and Management* 259/4, 698-709.

Milad, M.; Schaich, H.; Bürgi, M. & Konold, W. 2011. “Climate change and nature conservation in Central European forests: A review of consequences, concepts and challenges.” *Forest ecology and management* 261, 829–843.

Sabatier, P. A. 1988. “An advocacy coalition framework of policy change and the role of policy-oriented learning therein.” *Policy Science* 21: Kluwer Academic Publishers, Dordrecht, the Netherlands: 129-168

Vink, M. J., A. Dewulf & C. Termeer. 2013. “The role of knowledge and power in climate change adaptation governance: a systematic literature review.” *Ecology and Society* 18 (4): 46-64. <http://dx.doi.org/10.5751/ES-05897-180446>

¹ When I speak about “forester”, this will encompass all together forest owners private as public, forest managers, representatives of forest owners’ organisations and forest management advisors; in other words all the actors involved in the management and

² The Lab of Excellence ARBRE, funds, among others, short-terms pilot projects, which aims is to investigate research questions and test hypothesis prior to launch a broader project if the initial results look promising.

³ www.befofu.org

⁴ In France, basically three quarter of forest is under private property, which makes private forest owners quite a strong interest group.

⁵ This situation is not valid for the Landes region, Southwest of France, where foresters have developed specific forest management and have a strong tradition of tree plantation since this is the way they usually work. Many people consider that their activity can be related to tree cultivation. Basically they plant trees in line, they use fertilisers, clean the stands, leave the trees grow and when it is time clear cut the whole stand, then they start the cycle again.

⁶ The FFN was supplied with taxes paid by forestry developers and industries of first transformation of wood. From 1947 to 2000 two millions of hectares of trees were planted supported by this fund. This was especially the case in mountainous areas in a political will to restore mountain territory suffering from great erosion phenomena.

⁷ In this quote and the following ones, the words in between brackets are mine. They clarify some of what people told me to ease understanding.

⁸ Some scepticism toward this type of management remains among foresters; some mentioned that close to nature management does not bring any certainty about its success to manage climate change effects. Conversely plantation does not bring such insurance either.

⁹ One example of virtualism may be found in “environmentalism” as defined by Kay Milton (1996) for who the production of a discourse about nature and its elements is culturally constructed. Industrial Western societies, especially North American ones, have a precise theory about nature and its protection what Milton calls “environmentalism”. This theory is characterised by the idea that nature is wild, fragile and needs to be controlled to protect it, and by the awareness of the necessity to protect the environment against the damaging impact of human activity (Milton 1996: 27-28). Environmentalism is a virtualism because many international environmental organisations carry this vision and act to make the world around them to conform this representation although there exist many other way to consider the relationship between human beings and nature than the Western one only.

¹⁰ Information from the website of the French Union for Private forest owners (*Fédération des Forestiers Privés de France*): <http://www.foretpriveefrancaise.com/>

¹¹ In some region such as Alsace-Lorraine big sawmills are financially supporting plantations by providing the forest manager/owner with some funding in order for him to replant the parcel he clear-cuts.