Making biodiversity a public problem
The case of dead wood in forests

How did the issue of deadwood become an important part of management policies for forest biodiversity? The authors provide a number of answers on the emergence and inclusion of deadwood in management policies.

Over the past 20 years, biodiversity issues have achieved the status of a public problem on the international, European and French levels. Scientists, environmental-protection associations and even "public opinion" have mobilised to put the issues on the political agenda. They have succeeded in light of the commitments undertaken by France for the Convention on biological diversity, Natura 2000 and the Grenelle environmental agreements. But the transition to real action has been confronted with highly diverse reactions from stakeholders in the field. Those reactions range from strong support to rejection.

Why is an issue accepted by some and rejected by others? To answer that question, we will make clear, using as an example the RESINE project on conservation of deadwood (see box 1), what we mean by a "public problem". Then we will see how the biodiversity issue was put together and formulated. Finally, we will isolate a few factors that may influence how the problem is perceived and accepted by forest owners and managers in the field.

Becoming a public problem, the case of deadwood

What is a public problem?

A public problem may be defined as an actual or perceived discrepancy between two situations where one is detrimental to a given social group. In addition to the legitimacy of the problem, there is the question of the social movement that brings the demands to the attention of the public. This approach modifies the topic which is no longer the problem itself, but the manner in which the social stakeholders define and formulate the demands. According to Trom and Zimmerman (2001), a number of waypoints are virtually unavoidable in transforming (institutionalising) a simple "disturbance" into a true public problem. These steps are public criticism of the problem by a group of forerunners, creation of a topical category

1 RESINE, A MULTI-DISCIPLINARY RESEARCH PROJECT

The RESINE (Social perceptions and ecological value of deadwood) project was proposed for the Biodiversity and forest management 2006-2009 research programme financed by the Ecology ministry, the Agriculture and forestry ministry and GIP Ecofor. It was coordinated by the entomologists from the Forest ecosystems research unit at Cemagref in Nogent-sur-Vernisson. The project brought together sociologists from the Agriculture and dynamics of rural areas research unit at Cemagref in Bordeaux, entomologists from the Purpan engineering school and the Entomological study group at the National forestry agency (ONF), and mycologists from the Pharmaceutical and biological sciences school at the University of Lille 2. For the ecologists, the goal was to assess biodiversity related to deadwood.
For the sociologists, it was to understand how the issue of deadwood became a biodiversity issue and to see if forest owners felt concerned by the issue.

For the social part of the study, from 2006 to 2009, we surveyed:

- some 20 institutional and scientific participants, including national forestry and environmental policy makers in the Forestry and Ecology ministries, scientists from INRA (National agronomic research institute) and Cemagref, representatives of environmental-protection associations, etc.;
- some 50 foresters and managers of public and private forests in the Landes region and near Rambouillet.

This field work was filled out with a bibliographic analysis of articles and popularisation documents dealing with the issue of deadwood.

❶ Deadwood on soil in forest of Rambouillet (France).

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proving the existence of the problem, networking of the stakeholders "owning" the problem, awareness raising via the media and by placing the problem on the public agenda, finally stabilisation and acceptance of the problem by a wider group of stakeholders.

Step 1. Dramatising the loss of biodiversity related to deadwood

To draw attention in public debate, the issue of deadwood must stand out from the many other environmental issues such as global warming or the quality of water or landscapes. One strategy is to dramatise and denounce the situation. A denunciation would highlight the lack of means invested, of guidance and of organisation in the policy. Whereas a dramatisation would underscore the "loss" of biodiversity and the foreseeable "extinction" of certain species. Entomologists have shown that 40% of saproxylic Coleoptera species are not only threatened, but that existing populations have been reduced, fragmented and are declining.

Trom and Zimmerman have identified as the vanguard of the denunciators a multitude of associations, what sociologists call "moral entrepreneurs" or the bearers of demands. For deadwood, this message was delivered after 2000 in France by the environmental-protection associations such as the World Wildlife Fund (WWF) on the national level, by a small number of local or regional associations such as REFORA (Rhône-Alpes forest ecological network), and by a few scientists spread among four or five laboratories (Savoy University Alpine ecology lab, CNRS centre for functional and evolutional ecology, National museum of natural history (MNHN), Cemagref). But these isolated groups did not have a sufficiently stabilised and publicised topical category to lend weight to their demands. They had to prove that there was a real biodiversity problem related to deadwood by producing a qualitative and quantitative diagnosis of the situation (see box ❷).

Step 2. Qualifying and quantifying deadwood

The construction of a specific public-problem category such as that for "deadwood" is an essential step according to Micoud (1992), who speaks of "foreshadowing concepts". These categories, still unstable, signal changes in how environmental problems are perceived. During this phase, a multitude of objects and situations are identified, described, classified and presented as remarkable. This requires the deployment of "a group of experts authorised to determine the reality of the situation" (Micoud, 1992).

This work to list living beings underwent an acceleration in the 1990s with the ZNIEFF (high-value ecological zone) inventories and the revision of the lists of protected species. For deadwood, MNHN launched efforts to map saproxylic insects as early as 1992. The creation of these databases with their quantified data contributed to defining and qualifying objects, in this case the species and their habitats. Subcategories for biodiversity were created. In the space of just ten years, the vernacular "deadwood" category was enhanced with an array of new technical terms. This categorical work produced terms such as "hollow trees", "veteran trees", "habitat trees", "woody debris", "snags", "stumps", etc. The same production of categories took place for the fauna and flora associated with deadwood (see photo ❶).

However, confronted with the immensity of life, scientists are obliged to make choices in their inventory work. In France, they focussed on certain taxonomic groups such as saproxylic insects, small mammals (bats) and hole-nesting birds (the woodpecker family). On the other hand, mushrooms and mosses were relatively ignored. Scientists also ranked and focussed on certain species on the basis of the IUCN red lists (International union for the conservation of nature).

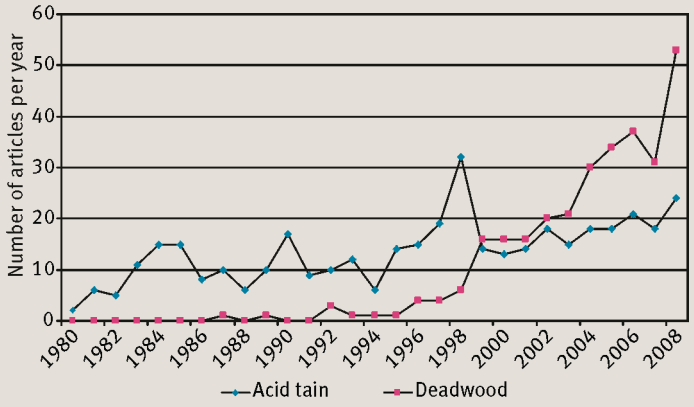
Step 3. Mobilising and setting up networks for foresters

A problem may be identified and objectivised by science, but remain confidential. Scientists therefore brought attention to the topic by publishing their results in scientific journals. Whereas only one to three articles on deadwood were published annually prior to 1998, over ten articles came out each year starting around 2000 with spikes of 30 and even 50 from 2004 to 2008 [1] (see figure ❶).

The audience of the reviewed journals is limited to experts in the field. Before a problem comes to the attention of the media and lands on the public-policy agenda, a significant collective mobilisation is required. Necessary steps include setting up a network of forerunners and then expanding the network to include institutional policy makers. Whereas the "pioneers" objectivise the problem using statistics and inventories, "builders" insert it in public polices using legal means (Trom et Zimmerman, 2001).

In the field, the networks are made up of scientists, representatives of local environmental-protection associations and, occasionally, professional forestry organisations. But how can they convince the public authorities that their problem is in fact a national and not strictly a local issue? Local associations and learned societies have neither the conceptual tools nor sufficient political power. It is only by combining the multitude of individual cases that the issue can shift from being a problem on the local level to the national level. It is on the national level that public recognition of the problem can be manifested by State intervention and the launch of a public action programme. To pull together the work on deadwood, the national network of experts reinforced its position by bringing in public forestry organisations (ONF) and State services (Forest-health department at the Agriculture and forestry ministry), etc. The media high point for the problem was the symposium titled *Deadwood and hollow trees*, organised in Chambéry in 2004 with over 300 participants from very diverse fields.

❶ **Number of articles in the Scopus database on acid rain and deadwood from 1980 to 2008.**



1. The count was carried out on the Scopus scientific bibliography database for the period 1970 to 2008, with queries on the keywords "deadwood" and "coarse woody debris" in the "Title" and "Abstract" sections and in the fields of Agricultural and biological sciences, Environmental sciences and Social sciences.

It must be said however that institutional recognition of the deadwood issue benefited heavily from decisions taken on the European interministerial level. In 2003, the MCPFE (Ministerial conference on the protection of forests in Europe), influenced by the Scandinavian countries, the pioneers in deadwood ecology, turned the topic into an unavoidable indicator for the Member States that had to be taken into account on the national level. Creating a virtually legal standard such as an "indicator" makes the topic a stable and durable part of public environmental and forest policies. However, indicators are a frequent subject of controversy. The National forest inventory (IFN) admits that the volume of deadwood is certainly underestimated in the inventories from 1995

❷ DEADWOOD, FORESTS AND BIODIVERSITY, A CHRONOLOGY

1966 First French scientific publication on the ecology of biodiversity linked to deadwood by R. Dajoz, creation of the term "saproxylic" to qualify deadwood organisms.
1988 Council of Europe recommendations R(88)10 and 11 on "protection of organisms linked to deadwood and their biotopes".
1989 Landmark European report on the value of studying biodiversity linked to deadwood by M.C. Speight and international consecration of the term "saproxylic".
1990 First Ministerial conference on the protection of forests in Europe (MCPFE) in Strasbourg.
1993 Second MCPFE conference in Helsinki, definition of six criteria for sustainable forest management including number four on "conservation of forest-ecosystem biodiversity".
1993 French national policy and instructions by Forestry ministry on taking biodiversity into account in forest management. "Biodiversity" instructions by ONF (French national forestry agency).
1995 First summary on "indicators for sustainable management in French forests" by IFN (National forest inventory). An indicator on deadwood volume was created, even though the parameter was measured since 1984.
1996 First national cartographic inventory of deadwood organisms.
2003 Fourth MCPFE conference in Vienna, 35 Pan-European indicators on sustainable management selected, including one on "volume of deadwood".
2004 French symposium on "Deadwood, a key to living forests", in Chambéry.
2005 Updating of sustainable-management indicators in France by IFN.
2009 Updating of ONF "Biodiversity" instructions. More precise indications on quantity and types of deadwood or hollow trees.

to 2005. Until 2008, the indicator was calculated using survey data unsuitable for a rigorous estimation. That is a fairly general defect in sustainable-management indicators which are often calculated using measurements calibrated for the economic resource (wood) and not for ecosystem monitoring. That being said, the relevance of the deadwood indicator is accepted at the highest institutional levels, even if its application in the field is far from certain.

Step 4. Convincing foresters in the field

Thanks to the efforts to create a category, mobilise and raise awareness, the public problem filters through society, which in turn is positive for the emergence of new "converts". The new thought categories take root in administrative organisations, in documents and in ordinary conversations. They become part of everyday language, are discussed among members of communities and slowly adopted. Finally, they are applied with more or less conviction. The new thought categories sometimes become so "obvious" that they guide action "naturally". At this point, it is possible that the previous obstacle has been "restored to favour". For that to happen, it is necessary to:

- produce "new data" showing that the incriminated factors were accused unjustly. In this case, entomologists showed that saproxylic insects are not dangerous for living trees;
- raise awareness on the new perception of the problem (see photo ❷). For deadwood, the symposium in Chambéry and numerous reports in the forestry technical press accelerated the "return to favour" by making deadwood a "key to living forests" (Vallauri *et al.*, 2005).

Following the establishment of deadwood as an indicator for sustainable management, the topic should now be adopted as a public problem by scientists and institutional environmental stakeholders as well as by those in the field. But is that in fact the case, notably for forest owners?

On the need for co-construction of the problem

Deadwood, a public problem without the public?

Studies run with foresters for the RESINE project showed that the "return to favour" of deadwood is now virtually complete among forestry technicians, but much less so among foresters in the field (Deuffic *et al.*, 2009). Among the four identified groups of forest owners and managers, i.e. G1 entrepreneurial foresters, G2 sylvicultural foresters, G3 remote foresters and G4 environmentalist foresters, the first three had difficulty in seeing that deadwood conservation is an issue for biodiversity. They disregard the environmental arguments put forward by scientists and environmental associations. Their knowledge and interests focus on problems in terms of forestry, management, accounting, etc. Biodiversity issues are far from their daily concerns and are more a part of their personal relationship with nature. They sum up biodiversity with a few names of plants and animals qualified as "*useful*", "*beautiful*", but also as "*pests*". In addition to not particularly fancying biodiversity issues, foresters in groups G1 to G3 signal the need for more precise data on the quantities and, this is new, the qualities of deadwood to be maintained in the framework of a reasonable deadwood policy. They would like to see the indicators discussed on the regional level, taking into account local forest conditions, and not on the European or national level. They stress the need to put into context or even to separate management and conservation. They are not absolutely and systematically opposed to maintaining deadwood on their lots. But they fear an extension of conservation measures to large areas and volumes through projects to senescent tree stands. The three groups also make clear their strong concerns about phytosanitary risks because the flora and particularly the fauna associated with deadwood are still widely perceived as major pests. The functional value of pest predators is all the more a non-issue that the scientists themselves have not truly evaluated their impact. They would also like a functional reason to maintain deadwood in the ecosystem. They are increasingly open to the idea of using deadwood in the fuel-wood industry in spite of the risks for soil fertility and the consequences for biodiversity. And even though the risk of accidents is considered very low, clearing of deadwood would, in their eyes, reduce it to zero. On the other hand, the "environmentalist foresters" in group G4 are obviously more inclined and convinced of the need to conserve deadwood for reasons that are nearly the inverse of the three other groups.

Perception of a public problem and above all acceptance vary strongly from one person to another. Why do some stakeholders appear so unconcerned, even impervious to an environmental issue that is scientifically justified, politically supported as being in the general interest and likely to benefit in certain cases from financial grants?

❷ Information about deadwood in the ornithologic parc of Teich (Gironde, France)

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Back to the formulation of the problem

The "good" reasons, e.g. economic, technical, moral, aesthetic, provided by foresters do not in themselves explain the indifference or even the refusal to participate in efforts said to be in favour of biodiversity. We must go back to the entire process of constructing the problem to understand what is not working.

Who defines and constructs the problem?

Deadwood management became a public problem because it is part of a much larger set of biodiversity issues. We note in our studies that other aspects mobilise foresters to a far greater degree. Diversification of production species, maintaining the understorey, creation of a landscape mosaic spanning the entire forest and enhancing ordinary biodiversity are all topics that have as much, if not more, meaning for them than deadwood.

❸ Deadwood in forest of Rambouillet (France).

The institutional and scientific participants who "carried the ball" are few in number and generally experts. The knowledge they produce requires mastery of a technical jargon to lay out and define the problem (typology of deadwoods, complex classification system for fauna and flora, functional relations between ecosystem compartments, etc.). But for foresters in the field, the topic is limited to simple objects such as "*deadwood*" (see photo ❸), "*pests*", "*fuel wood*", etc. Familiarisation with the complex scientific categories requires time, translation of the terms into a jargon closer to forestry than ecology and, above all, interest on the part of foresters. If deadwood had been a real problem for them, they would have contributed heavily to its definition and participated in the solution right from the initial stages of its construction. But the issue of deadwood was not identified by them or launched at their initiative. Most of the time, private foresters were absent from the process of constructing and discussing the problem. In becoming the main source of legitimacy for biodiversity, the scientific/administrative jargon conferred on those capable of mastering it a privileged position that reinforced their status as the "primary definers" of the problem.

Who or what to believe?

Can a lack of information explain the relative indifference of foresters to deadwood? Most of the foresters questioned for the RESINE project had been exposed to information on biodiversity issues, whether on deadwood, birds, reptiles or forest flora. They are aware that biodiversity is one of the "words that count" in the public debate. They acknowledge that the decision to take action, i.e. preserve biodiversity in general and deadwood in particular, has been made. But that does not mean that they approve the decision. An "environmentalist" forester (G4 group) was even of the opinion that there was too much talk about biodiversity issues, saying "*It irritates me that the subject has become so fashionable because it should always have been part of forestry work*". Awareness raising can thus cut both ways. It can enhance the available information for the concerned public and it can irritate people. A woman in the G2 group had the impression that the information served to criticise her more than to encourage her to pursue efforts, saying *"We did not wait for them to come along to tell us. We used common sense to maintain* [biodiversity]". The problem for foresters is not to know "what to believe", but "who to believe". So they form an opinion within the limited framework of the family, neighbours, the small group of forest owners and, of course, their technical advisor.

As observers of the debate, informed sources or analysts of difficult issues, advisors provide reliable, relevant and comprehensible information. They contribute to guiding the decisions of foresters who obtain from their advisor at least a partial explanation, even if diverse and often contradictory arguments intervene. The final decision is often the result of a mixture of beliefs and motivations that would appear rational from the point of view of the forester, but not necessarily from that of an external observer. The collective beliefs weigh all the more heavily on foresters that they are shared by the other members of the local network who represent the forester's main source of information. In the end, the fores-

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❹ The stag-beetle (*Lucanus cervus*), a protected species, feeds on wood as the most of coleoptera, this species is in sharp decline in the european forests.

ter often agrees with the dominant opinion of the local group. He follows the opinion of the leader or of the person acknowledged for the clarity of their analysis or judgement.

Though not experts in managing public opinion, certain forest owners are aware that dramatisation, denunciation and generalisation are common techniques used to make a problem become more visible for the public. That causes distrust and can even negate alarmist messages on the extinction of species or concerning lists of protected species (see photo ❹). They have expressed doubts on the need to preserve certain species, e.g. the great Capricorn beetle in the Landes region, that is abundant in their region, but is considered rare nationally and in Europe.

Generally speaking, there is a risk that scientific and institutional stakeholders will control the access to the public arena and define among themselves the problem at hand.

Solutions explored by the RESINE project

To avoid control of the debate by the experts, the problem must be defined with the local stakeholders. In the RESINE project, this risk was avoided in part by enabling the local stakeholders to express themselves on the topic during field surveys and to raise issues with the ecologists (Deuffic *et al.*, 2009). The sociologists thus served to relay the questions of the people in the field. The ecologists provided information in response to the questions (Bouget, 2009), it being understood that considerable knowledge-production and extension efforts remained for the forestry advisors. The team was also driven by the desire to produce knowledge in view of future action, but without directly adopting a decision-aid approach. The sociologists and ecologists thus focussed on the conditions enabling the negotiated production of standards for deadwood management. The goal was not to justify social choices, e.g. conservation measures for deadwood, on the basis of ecological data alone, but to include economic and social (limiting) factors. Another lesson of the RESINE project is the importance of bringing stakeholders from the field as early as possible into the process of defining management standards. The need for multi-disciplinarity may encourage discussions between scientists, but it must not hinder dialogue with stakeholders in the field.

The production of stable and reliable data is a means to objectivise the problem. But when experiments produce divergent or mixed results as was the case for certain aspects of the RESINE project, it is more difficult to convince sceptics that the scientists are correct. In a fluid social context and where there are no scientific certainties, the relations between foresters, scientists and even simple citizens can take on new forms. One of the solutions proposed by the ecologists in the RESINE team is adaptive management. This is a technique to develop knowledge via the management process itself. A certain type, called "active" adaptive management, includes variations in management techniques. Instead of implementing an "optimum" technique, different techniques deemed theoretically interesting are set up and evaluated. This type of management has been tested a number of times, most often outside of Europe. There are numerous failures due to the difficulties involved in setting up the new procedure, e.g. participants not sharing information on goals, insufficient resources for the project, cultural and social differences between participants. This technique nonetheless offers many potential advantages, including the development of knowledge better suited to the managed system because based on that system, better transfer and acceptance of research results by managers and, in return, better integration of the local knowledge of the managers by researchers.

Conclusion

The goal of turning an issue into a public problem is to see it expand beyond the limited circle of experts. In this light, the use of excessive language and generalisations should be understood simply as interruptions in the normal manner of addressing an issue. The creation of stable indicators for deadwood, the establishment of minimum thresholds and the issuance of management rules or good practices may lead us to believe that the issue is closed. But a problem can spring back in a new guise. New questions on creating old-growth and senescent tree stands, on the quality of deadwood and on the use of residues for the fuel-wood industry may be seen as a renewal and continuation of the debate on the role of deadwood in forests. It remains to be seen if the stakeholders in the field will be brought in earlier in the process of defining these new issues. ■

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A rotten pine on soil.