

# Forest functions: undervalued or overestimated?<sup>1</sup>

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## Introduction

The title of this paper was chosen because of the difference in the valuation of forest functions by the various interest groups (such as economists, ecologists, foresters, and environmentalists). It generalizes the main question: 'Valuation of forest functions: is a financial yield the only evaluation of forest functions?' (Here, the term 'financial yield' is used in the broadest sense possible, i.e., every valuation of forest functions in monetary units is considered to be a financial yield).

Answers to the questions are given by means of descriptions of forest functions and their valuation. These descriptions are very general and are limited because a more complete review would be impossible within the confines of this paper.

## Forest functions

Many authors, (for instance Jacobs 1976; Sinden 1978), have stated that forests can fulfil a variety of functions to mankind. But the question that immediately arises is: What is a forest function? Van Maaren (1984) clearly defines these so-called forest functions as 'the relationship between the forest resource and social demands towards that resource. (...) These functions are in fact human expectations of what should be supplied by the forest.'

A range of forest functions can be distinguished of which a few examples are presented in Figure 1. They vary from 'living environment of indigenous people' (like Indians and Papuans; Kunststadler et al, 1978) to 'economic reservoir' (forest can, for instance, be conserved as insurance of future income; USDA, 1987), and from "biological balance" (of many human interventions in forests the side effects on the surrounding ecosystems are not fully known, and the [often fragile] biological balance is disturbed; de Beer and McDermott, 1989) to "landscape unit". An important problem, related to these forest functions, is the recognition that there is overlap between all functions of a specific forest and that perception of functions differ by the different interest groups. A total enumeration of forest functions is (virtually) impossible.

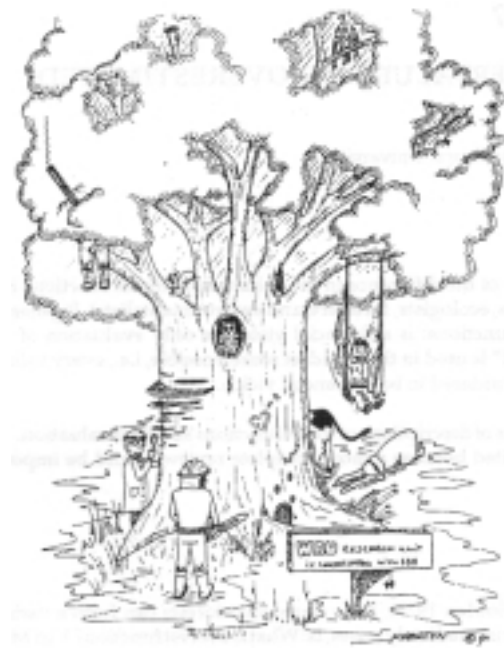


Figure 1. Various functions of a "forest".

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The broad variety that characterizes forest functions is reflected in its classification systems. Various authors have made classifications in forest functions. Among them are divisions into physiological, physical and cultural values (Poore, 1975), into economical importance versus welfare functions (de Leijster, 1977), into production, carrying, information and regulation functions (van der Maarel, 1977), and into production, recreational, ecological and other functions (de Weille et al, 1978). Like forest functions, within each classification system there is overlap between the different categories, and no system is perfect.

There is also the division into tangible and intangible forest functions. Tangible functions are functions that can (directly or indirectly) be valued in (often monetary) units. Intangible functions cannot be valued in these units. Thus, forest functions can be divided into three categories (adapted from von Meijenfeldt, 1980):

1. Tangible functions that are valued by the market;
2. Tangible functions of which, in an indirect way, the value can be calculated;  
and
3. Intangible functions of which a valuation is not (yet) possible.

### **Valuation of forest functions**

Apart from the problems of overlapping and/or unseen forest functions, defining the present forest functions is relatively easy compared with the valuation of these functions. The question is how can the functions of a certain forest be valued in a satisfactory way, and what kind of units should be used in this valuation? To be able to understand this question, three factors should already be clear. First, one must know what valuation of forest functions is, second, which methods are currently used for this valuation and third, what units are used for the valuation of forest functions.

In general, it can be said that in valuation of forest functions certain forest characteristics are valued by a certain person (Kroon, 1991). For instance in a forest in Papua New Guinea, the amount of timber is highly valued by the forest exploiter, while in the same forest just the amount and variety of edible plants and trees is highly valued by an indigenous Papuan. Note different interest groups all have different perceptions on the value of forest (functions).

Several attempts have been made to tackle the problem of valuation of forest functions. In this paper, three of these attempts are briefly described. The first is the Cost Benefit Analysis, the second the Multi-Criteria Evaluation, and the third one is Energetics.

Cost Benefit Analysis (CBA) is a method that uses concepts of business economics. It measures the advantages and disadvantages in terms of (social) gain and losses of different effects in one measurement unit (usually the local currency). In CBA different approaches can be taken. For instance, a social and environmental approach is possible. However, it is merely a type of policy analysis and is limited to a description of the effects of decisions on profit, liquidity, and share of the market (Filius, undated).

Multi-Criteria Analysis (MCE) is a totally different approach. Instead of a special measuring unit, the MCE centralizes the objectives and alternatives of forest functions. It is not expressed in specified units like monetary units, but operates with a sort of ranking. The alternative sets of forest functions of a certain forest are defined and each set is valued according to its functions. The result is that to a specific forest, one set of forest functions will be more attractive than another. The value of a specific set can be expressed based on this ranking (Filius, 1988).

An interesting alternative to the two methods mentioned above, is Energetics (the valuation in energy units). Energy is the most crucial limiting factor in economic production or maintenance of environmental quality (Dasgupta and Pearce, 1978). Therefore, in Energetics, a method presented by Odum, the amounts of energy (mostly in kilojoules) a certain function consumes and produces are calculated (Odum and Pigeon, 1972). This method can have rather different results compared to an expression in financial yield. The method represents the actual amount of energy produced by a certain function and the amounts necessary to realize that forest function, instead of an approach to value the function for a certain interest group.

### **Discussion**

The above-mentioned methods use a monetary, a ranking and an energy unit. There are hardly any problems with the methods in the first category ('tangible functions of which a value is given') and the third category ('intangible functions') of forest functions. This is because it is either possible or impossible to express them in the units chosen. But problems do arise in the category of 'tangible functions of which a value can be calculated'. The main problem is how to calculate these values. Many authors have tried to develop various approaches to calculate such values. For instance, the monetary unit to express forest functions can be based on factors ranging from 'the availability and local market prices for purchasable products' (Caldecott, 1988) to 'the numbers, per cent of community involved in processing and manufacture' (de Beer and McDermott, 1989) and from 'the numbers, per cent of community who collect non-timber forest products' (Marsh and Gait, 1988) to 'the percent of household time budgets spent on these functions' (Connely, 1985).

Considering the diversity of the methods of valuation of forest functions, it is apparent that no unanimous scientific method has yet been developed. At the same time, there seems to be a certain amount of friction between the valuations of forest functions. The different interest groups accuse one another of restricting their valuations to functions pertaining to their own interests by using their own specific methods of valuation and, by doing so, undervaluing the forest as a whole (for instance the ECE Timber Committee versus the environmentalists). The salient point of this dissatisfaction in forest valuation is: The abundance of human factors in the valuation of forests functions. Forest functions are human expectations of what a forest should supply, humans value these functions and the units the values are expressed in are mainly the units of human society. And the variation of human expectations, interests, and opinions is so extensive that friction is well nigh inevitable.

The difficulties arising from the abundance of human factors in the valuation of forest functions results in four main problem areas, namely:

1. The incapability of incorporating all potential forest functions in one valuation;
2. The impossibility of valuing forest functions to a satisfactory degree to a satisfactory degree to suit all interest groups;
3. The variation in the available methods that can be used; and
4. The current valuation in monetary units most used, which cannot be applied to all forest functions.

The impossibility of incorporating all potential forest functions in one valuation is a problem that will probably never be solved. There is often no precise information available about the various functions of a forest. And can we understand the importance of certain forest functions to future generations? Also, the period of time necessary to develop and exploit a forest is so lengthy (mostly more than 40

years) that it is (virtually) impossible to recognize every aspect of the functions of the particular forest. Besides, ideas and values of people might have changed over time.

The valuation of forest functions to a satisfactory degree (for all interest groups), is at least as difficult as incorporating all potential forest functions within a single valuation. This will probably always remain a point of discussion caused by changes over time. It is necessary to come up with a sounder valuation system of the present forest functions. At least a standardization of used units in forest valuation should be achieved to be able to discuss the points of view between the different interest groups.

A more satisfactory and "democratic" approach of forest valuation requires the participation of interest groups involved. The interest groups, who are often more interested in a certain forest function, should get together and try to understand and accept each other's points of view and knowledge of forests. It is very doubtful, however, whether the interest groups have the means and the motivation to do so, especially as it is easier for some of them to use the power they have to influence the valuation of forest functions to their own advantage.

The reason for the variety of methods in valuation of forest functions is because of the difference in potential forest functions, the methods of classifying them, and the methods of valuing them. All this variation makes it very difficult to understand all the possibilities in the valuation of forest functions and to choose the most appropriate one.

The use of monetary units to express the values of forest functions is inappropriate for a satisfactory valuation. It cannot be used to value the intangible functions a forest has and complex calculations have to be made to try to value functions that are not directly priced by their markets. A better way to value forest functions would be to use a unit that is not influenced by human factors, such as the unit of kilojoules used in Energetics. However, monetary units have two important points in their favour, namely the variation of methods. In the valuation of forest functions mentioned above and the convenience of being able to easily integrate the valuation in economics. People tend to use the most familiar ways to value their functions. This last point is of such importance that we will probably continue to use the monetary units for valuation for many years to come.

### **Concluding remarks**

In conclusion, it can be said that generally forests as a whole are underestimated. Some of its functions are not incorporated in a valuation system, some cannot be valued and some others are valued according to methods that are not agreed upon by some interest groups. This is mainly a result of the many human factors that influence the valuation of forest functions, which can be divided into four problem areas, namely the incapability of incorporating all functions a forest has; the impossibility of valuing forest functions to a satisfactory degree (for all interest groups); the amount of variation in the available methods; and the often used valuation in monetary units. These problem areas will probably always remain because of the socio-economic context of the valuation of forest functions. It will be very difficult to reduce the human factors in the valuation of forest functions.

Although the financial yield is not the only way of valuing forest functions, this unit will probably be that most used in the future, because of the many advantages this unit has in the socio-economic context it is placed in. Furthermore, the division in tangible and intangible forest functions seems to be a good one to work with. Although there are methods in the category of tangible forest functions that are not

agreed upon by all interest groups, this classification is the most simple and precise classification possible. It ensures little overlap between the categories and few misunderstandings between the different interest groups.

The valuation of forest functions is so complex that a single person or interest group cannot do it. The sound valuation of present forest functions should be done by a team of (all) interest groups. In this way a more objective point of view towards the valuation of forest functions can be reached. In the process of valuation an important task for the forester can be defined. Because of his/her (general) knowledge of the forest ecosystem, (s)he can inform the different interest groups about the forest ecosystem as a whole, direct them to a more sound valuation of forest functions, and thereby to a better use of the forest. To do so, the forester has to become an intermediary between the different interest groups involved: to become a 'forest politician' instead of a forest manager.

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