

NGO Influence on Forest Legislation: Experiences from Federal Forest Management in the United States

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Boca Raton

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Dissertation.com
Boca Raton, Florida
USA • 2009

ISBN-10: 1-59942-293-X
ISBN-13: 978-1-59942-293-0

Abstract

In the last two decades, a concern on how federal forests in the United States are managed has provoked concerns among different stakeholders, including NGOs.

The purpose of this thesis is to contribute to the understanding of NGO influence on forest management legislation. Eight aspects were selected and compared in different study cases referring to legislative proposals dealing with forest management in order to define success criteria for a legislative initiative. The study indicates that the following criteria are particularly important to fulfill in order to influence forest management legislation:

- The issue to address should be on the political agenda and have high public interest.
- Environmental and social aspects should not be at the expense of economic aspects.
- The legislative initiative should be prepared in multi-stakeholder processes, including local government and organizations.
- The supporters of the initiative should take part in all decision-making processes and advise the Government in aspects related to their areas of expertise.

NGOs would likely improve their chances of influencing forest management legislation if they hold a flexible position regarding legislative proposals containing similar or even less strict measures than their own initiatives, look at market oriented schemes as alternatives to legislation, and maintain good relationships with other major stakeholders.

Executive Summary

In the last two decades, concern has grown on how the U.S. Forest Service is managing U.S. National Forests. Particularly, practices such as clearcutting, and even management techniques, have provoked controversies among environmentalists, scientists, politicians, the industry, and other stakeholders. Recent insect outbreaks and forest fires in the U.S. have further triggered a discussion on how forests should be managed. One important group of stakeholders that for long have been trying to influence these practices, is environmental NGOs. The success of these efforts differs, and it is unclear what the criteria for success really are. The objective of this thesis is thus to contribute to the understanding of NGO influence on U.S. forest legislation.

The thesis is based on the study of two forest legislation acts, and a case involving policy changes in the Pacific Northwest. Information about these acts has been collected through literature reviews, interviews, and meetings.

Stakeholder theory is used to support the analysis of these cases, in order to better understand in what ways stakeholders succeed to influence forest management legislation.

At the beginning, a general background on forestry is provided, in which environmental, social, and economic forest values are considered. This is followed by a brief presentation of controversial forest management techniques. Further background is provided through a summary on U.S. forest legislation, and a presentation of different stakeholders who could influence forest policy. Two forest legislation acts and a case are studied:

- a. Forest policy change in the Pacific Northwest. It describes how an environmental issue such as the endangerment of the spotted owl, influenced forest management practices in the region.
- b. The Act to Save America's Forests. Legislative initiative introduced at the U.S. Congress to protect old growth forest by banning even forest management techniques such as clearcutting.
- c. The Healthy Forest Restoration Act of 2003. Initiative enacted in December 2003, which waives certain requirements for the Forest Service, in order to conduct fuel reduction projects. It also allows stewardship contracting and modifies the appealing process of fuel reduction projects conducted by Federal agencies.

The first case provides a good background on how environmental groups can influence forest policy. The other two acts, the ASAF and the HFI, were selected because they address forest issues in different ways. The former has an approach based on conservation biology, and the latter on solving forestry problems with the help of the forest industry. Different stakeholders support those acts, as they obey to different interests.

After presenting the case and the two acts, the two acts are compared by using eight different success criteria indicators. These so called "indicators" or questions, are extracted from stakeholder theory, and are instrumental in analyzing why one act is more successful than the other. This analysis and comparison also support the understanding of how stakeholders can influence legislation, particularly NGOs' influence on forest management legislation.

Eight indicators were considered to have significant relevance for NGOs in order to influence forest management legislation. Those indicators are:

- 1) Is the issue on the political agenda?
- 2) Is high public interest on the issues addressed by the initiative?
- 3) Are environmental and social aspects at the expense of economic aspects?
- 4) Are the supporters of the initiative taking part in all decision making processes and or advising the Government in aspects related to their area of expertise?
- 5) Is the legislative initiative prepared in multi-stakeholder processes?
- 6) Do the supporters of the legislative initiative have access to decision makers?
- 7) Is any competition among the supporters of the initiative (if any environmental group) and other environmental groups in range or prestige?, and
- 8) Are relations with regulators and environmental groups satisfactory?

From these eight indicators, number 1, 2, 3, 4 and 5 were found to be critical in influencing forest legislation.

Common practices suggest that one of the best ways to be successful in influencing legislation is by gaining support from legislative members (in the House of Representatives or the Senate) as sponsors. However, in reality, this is just one of the many factors that have to be considered throughout the process. The priority of an issue in the political agenda; the involvement of a distinct number of stakeholders in a legislative project; active involvement in the issue; negotiation; and focus on economic aspects, all seem to be highly relevant aspects that need to be taken into account in order to be successful.

With this knowledge in hand, what we can say about the chances for the environmental NGO supported Act to Save America's Forests, and its chances to be passed in Congress. The findings in this thesis tell us that the possibility for the act to be passed in the long term is low. Even if control in Congress would shift from Republican to Democratic majority, the chance of the Act to be passed would not be significantly increased. There is a need to work actively with local groups, especially in the areas where the existence of Old Growth Forest is being threatened. It is also important to consider the possibility of offering objective expertise and advise in different working groups at both Congress, and Agencies dealing with Forestry issues, as well as having a more flexible position, while dealing with Agencies and other stakeholders.

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1. Introduction

The purpose of this thesis is to fulfill the requirements of the Master Program in Environmental Management and Policy at the International Institute of Industrial Environmental Economics at Lund University. The research was done in the period comprised between June and December, 2003. The research tries to contribute to the understanding of how NGOs and other stakeholders can influence the development of forest management legislation. Important variables are identified, in order to know how successful different actors have been while trying to pass forest management law. Then, two different initiatives will be evaluated in the field of forest policy, which will allow to conclude on what variables are the most important on the success of the those initiatives. The intended audience of this research is, on one side, environmental organizations involved in forest policy, as well as legislators supporting such initiatives, and on the other side, the academia, involved in issues related to stakeholders in forest policy, especially NGOs. Additional readers can be Governmental Agencies, and timber industry representatives.

This chapter provides the general framework of the conducted research, and describes the research objective, methodology used, scope, limitations, and how this work differs from previous research done in the field.

1.1 Background

The Forest Service is the largest natural resource agency within the Federal Government in the United States of America (Barton and Fosburgh, 1986). It is in charge of administrating the U.S. National Forest System, which is formed by 191 million acres (77.3 million hectares), an extension that represents twice the size of the State of Texas. (U.S. Department of Agriculture, 2003).

From 1897, the U.S. Congress defined purposes of the U.S. Reserves¹, which were to improve and protect the forest, to secure favorable water flows, and to furnish continuous supply of timber for the use of the citizens of the United States.

The growing pressures on the national forests after World War II to meet competing demands, was one of the reasons that motivated the Forest Service to get an official mandate to have a multiple use management authority (Barton and Fosburgh, 1986). In 1960 Congress passed the Multiple-Use Sustained Yield Act, which established that U.S. National Forests could be administered for outdoor recreation, range, timber, watershed, and fish and wildlife purposes. In 1969, the National Environmental Policy Act was passed, requiring that Federal Agencies analyze in detail the environmental assessment process and the creation of environmental impact statements. The very same year, timber prices increased dramatically, causing a controversy over national forest management. Environmental Non-governmental groups (NGOs) blocked timber proposals supported by the planning requirement. The result concluded in the Forest and Rangeland Renewable Resources Planning Act of 1974, commonly called the Renewable Resources Planning Act, which rules the basis on which the Forest Service works today.

In the last two decades, concern has grown on how the U.S. Forest Service is managing U.S. National Forests. Particularly, practices such as clearcutting, and even management techniques, have provoked controversies among environmentalists, scientists, politicians, the

¹ Predecessors of the Federal Forests.

industry, and other stakeholders. Recent insect outbreaks and forest fires in the U.S. have further triggered a discussion on how forests should be managed.

In order to promote a more sustainable management of the U. S. National Forests, the environmental coalition Save America's Forests, is advocating in Congress to introduce an Act to promote the use of selection management, as the most sustainable technique to manage forests, prohibiting in consequence the use of clearcutting, and even management tools in the National Forest System. At the same time, the President of the United States, Senators, House Representatives, together with local governments, Federal agencies, and the Forest Industry, tried to pass legislation focused on the main problems in the forest, which, on their opinion, are insect infestation, fires, and tree overstock. This second initiative was successful, and consensus on it was reached on November, 20, 2003 by a joint House-Congress Conference Committee. On December 3rd of the same year President Bush signed the Act, in order to become public law.

In general, there are many stakeholders and NGOs involved in forest management legislation for Federal lands in the U.S. Throughout this thesis, the influence of those actors in passing forest management legislation is going to be discussed.

1.2 Objective

The objective of this thesis is to contribute to the understanding of NGO influence on U.S. Forest legislation.

In order to accomplish this objective, the thesis attempts to answer the following research question:

In what ways can an NGO influence the development of new U.S. forest legislation?

This research question has triggered a number of sub-questions, which have guided the research process:

What main forest values are of importance to manage forests in a sustainable way?

In what ways do different forest management practices affect these values?

What legal framework steers and influences forest management practices?

What are the major actors trying to influence the current legal framework?

In what ways do these actors try to influence the existing framework?

How successful have they been in doing so?

Why have they succeeded or failed?

Based on the earlier NGO experiences, what can be said about the attempts to pass the Act to Save America's Forests?

1.3 Thesis outline

This thesis is divided in six main chapters, which are going to be described in the following lines:

1. Background on forestry. This chapter starts describing predominant values in forest, from an environmental, economic, and social perspective. Following this, different forest management techniques are presented, as well as facts on the U.S. Federal Forest System. The information contained in this chapter allows the reader to get an overall idea on the situation of U.S. Forest, as well as the main issues and challenges in the area.
2. Forest legislation in the U.S. This chapter will describe the existing legal framework governing forestry in the United States. In this section, all the different acts and initiatives related to forest policy are mentioned, as well as description on how those laws were made. In addition to this, and in order to understand how the legislative system works in the U.S., a section describing the process of passing a law it is included.
3. Stakeholders influence. In this chapter, the different stakeholders involved in forest policy are mentioned, including how they try to influence policy making. Stakeholder theory, which is going to be the base of the analysis section, is also included. At the end of the chapter, two different models are added, in order to synthesize how forest policy can be changed.
4. Case studies of forest management. In this section mainly two acts are mentioned: the Act to Save America's Forests and the Healthy Forest Restoration Act. Information about their content is included, as well as their main faced problems to be passed. Two additional measures: the Montana Act, and the Roadless Rule are considered, since they are complementary to the area of action of the Act to Save America's Forests. Emphasis is made on how different actors try to influence the forest management framework. Additionally, a case on the Pacific Northwest has been added, which describes how the saving of the Spotted Owl originated major forest policy changes in the region.
5. Analysis. In this part the studied forest management acts are analyzed with support of stakeholder theory to identify success factors in passing a law. This analysis results in a list of criteria, which are presented in the form of eight questions. These questions are then used to revise two of the acts, the ASAF and the HFI, to make a comparative analysis between the two, and see how well they fulfill these criteria.
6. Conclusions. The main research question is answered in this section. General aspects to consider while trying to pass forest management legislation are also mentioned, as well as some recommendations given, together with considerations on the possibility for the Act to Save America's Forests to be passed in future

1.4 Methodology

This thesis is based on the study of a number of legal acts, which can be described as case studies. According to Yin (1994) case studies can be used in many situations, especially when political issues are addressed.

Case studies are preferred in examining contemporary events, and when the relevant behaviors cannot be manipulated. Case studies also add two sources of evidence to the study, which cannot be usually found in other kind of techniques, such as direct observation and direct

interviewing. They also constitute a great opportunity to deal with a variety of evidence, like documents, interviews, and observations, beyond what might be available in a conventional historical study (Yin, 1994)

Yin (1994) says that the decision of opting for multiple-case studies implies considering the fact that every case should serve a specific purpose within the overall scope of inquiry. Even when the methodology used in this thesis was inspired by Yin, due to the conditions of the different legal acts, it has not possible to perform a perfect comparison among them. However, efforts to make them as standard as possible have been done.

The criteria to evaluate the success of the two different legislative initiatives, was based on the literature review. Eight indicators were selected, and compared in two legislative initiatives, supported by stakeholder theory. A summary on that comparison was prepared in the form of a table, and the labels yes, no, or partial were assigned to the different acts, depending on how they fulfilled the set criteria. The aspects not included in the Act to Save America's Forests but fulfilled by the Healthy Forest Restoration Act were considered core indicators, based on the premise that the later has been passed in Congress, and have become public law.

1.5 Data Collection

Data and information was collected in different ways, which will be commented in the next lines:

First of all, the author of this thesis was working in the organization Save America's Forests in Washington, D.C. from June to August, 2003. That time included a process of getting familiar with the organization, and its main projects, especially the Act to Save America's Forests. The period at Save America's Forests, also meant a good possibility to get involved with the Healthy Forest Restoration Act of 2003, and closely watch its progress in Congress. Secondly, background on the issue of forest management, the U.S. National Forest System, the ASAF itself and important players in the field was gathered. This second phase included documentation review, access to archival records, and observation by following up the Healthy Forest Initiative in the U.S. Congress, involving personal attendance to two hearings at the U.S. Senate, and two votes at both, the U.S. House of Representatives and the U.S. Senate.

This allowed the author to define the main issues and objectives. Finally, face-to-face, semi-formal, and semi-structured interviews were conducted. The interviewees included key personnel at the U.S. Department of Agriculture Forest Service, the American Forest and Paper Association, the Association of American Foresters, and the U.S. Department of the Interior. It is necessary to mention that the conducted questions during the interviews were structured. However, due to the input of the interviewees during the interviewing process, additional questions were asked, in order to get a better understanding of the different issues mentioned. For that reason, the interviews are called semi-structured.

1.6 Scope and Limitations

As it was previously mentioned, this thesis will address the controversies involved in passing forest management legislation in the United States. At the same time, it is mainly based on the Act to Save America's Forests and the Healthy Forest Restoration Act. This thesis does not intend to provide a review on the many forest management bills tried to pass at the U.S. Congress. Nevertheless, the aim of it is that by using as study cases two forest management bills, in conjunction with a case study based on literature review, stakeholder theory, and a

background on forestry and legislation, we can increase our understanding of in what way can an NGO influence the development of new U.S. Forest legislation.

There is a considerable number of stakeholders involved in forest legislation in the U.S. However, this thesis does not intend to provide a full explanation on how each of those actors can influence forest legislation. Within the different stakeholders, the research focus is going to be on NGOs.

This thesis differs from other studies in the field of forestry in the U.S. since it is more focused in the Federal level than in State level. Its scope does not aim to address the issues of State or private forest. In addition to that, two factors not supported by literature were empirically found, which have to do with the number of co-sponsors of an Act and the political affiliation of the bill sponsor, and their influence in the success of the initiative.

2. Background on Forestry

The objective of this chapter is to provide background information on different kinds of forest management practices, as well as different forest values, and how those values are related to current forest management. The reason of having this section is to introduce the reader into the field of forest policy, in order to understand the information of the subsequent chapters, where different approaches to manage forests are considered by different stakeholders.

2.1 Forest values

Many of the changes in forest management legislation in the United States are inspired in nature values, which can be divided in environmental, social, and economic values. In the following sub-sections those values will be mentioned, as well as their relevance in forestry policy.

2.1.1 Environmental values

Especially for NGOs, environmental values have been the main reason why they have tried to get stricter regulations, in order to protect two fundamental values: Biodiversity and Old growth forest. As it is going to be commented in other sections of this thesis, the relevance of environmental values has lead to protective measures, which sometimes have been above economic interests.

2.1.1.1 Biodiversity

Biological diversity is defined as “the diversity of life, including the diversity of genes, species, plant, and animal communities, ecosystems, and the interaction of these elements” (McMinn 1991).

The biodiversity issue arises from a concern that the Earth’s species are disappearing, and the possibility that entire ecosystems can be lost. Genes from primitive varieties and wild relatives of domesticated species are used to improve productivity, as well as to enhance tolerance to environmental stress, pests and diseases. Those genes are important for pest control, animals, fungi, and microorganisms. Wild populations provide new sources of medicines, energy, and industrial feedstocks for products such as high quality lubricants (ibid).

McMinn also stresses the importance of large enough areas to allow populations with sufficient gene pools, as a requisite to perpetuate the organisms or ecosystems. In the ecosystem context, it is vital to maintain structure and function as well as taxonomic composition.

The National Research Council Committee on Forestry Research (1990) identified the loss of biological biodiversity as one of the major issues that society faces concerning forests. In addition, The U.S. Environmental Protection Agency also indicated that biological diversity is perceived as a high political priority and scientific issue.

2.1.1.2 Old growth forest

Rapp (2002) claims that there is not a common definition of old growth forest. However, it has some general characteristics like: large live trees, large dead trees, as well as large fallen

trees. There are trees of varying ages, sizes, and species; with a deep complex canopy, and patches of young trees, shrubs, and herbs on the forest floor.

Oliver (1981) gives a similar definition of old growth forest, which is characterized by large, old trees, a relatively open canopy, trees of various heights and diameter, a diverse understory, and large downed logs. In addition to this, other authors like Herbeck and Larsen (1999) say that old growth sites have more than 120 years of age.

Old growth forests come in a wide variety of types with many differing characteristics. The following are generalizations that apply to most old growth forests: Old growth forests are complex, in terms of horizontal and vertical structure, and biodiversity and energy flow. The old-growth forest's structural complexity is the key to its biological diversity, which could not exist in simpler environments. The dominant trees have deep crowns that support a canopy community of small mammals, birds, bats, insects, spiders, mosses, and lichens. Standing and smaller trees of various ages, sizes, and species create a multilayered canopy, which can even reach the forest floor. The forest floor contains fallen trees, and patches of shrubs, plants, mosses, and fungi; and on the ground, it is possible to find spiders, mollusks, soil arthropods as well as reptiles, amphibians, and mammals. Old growth forests supply nesting and roosting habitat for spotted owls, nesting habitat for marbled murrelets (where the forests are close enough to the Pacific coast), truffles for red-backed voles and flying squirrels, including rare molusks such as the Puget oregonian land snail and the warty jumping-slug. In old growth forests, the dominant trees have considerable variation in age because they started growing in different places from several decades after a disturbance that damaged the previous forests or open canopy gaps (Rapp 2002).

The complex structure of old-growth forests is the result of variability. Variable spacing allows some trees the chance to gain diameter rapidly in their early decades, not just height, and to keep more live branches. Patchy mortality makes holes in the developing forest, allowing trees to grow. These trees begin to create a forest of many species, ages, and sizes (Rapp, 2002).

According to the previous authors, there is a relationship between biological diversity and old growth forest. This relationship is based on the premise that old growth forests host an enormous amount of different species. If old growth forests are compared to other kind of forests, such as plantations, the number of species will be much more greater in the former than in the later.

In general, the kind of findings mentioned above create the field of action for stakeholders involved in forest policy, such as NGOs, which use those arguments to support their initiatives and proposals.

2.1.2 Economic values

Despite of the importance of environmental values, as described above, there are also additional values, such as economic values, that can be considered. For example, regarding biodiversity, it can even be considered as a public good, with the difference that cannot be traded in a market system because it is not owned by someone in specific (Kächele and Dabbert, 2002). According to Turner (2002), public goods are nonrival and nonexcludable, which means that it is possible to consume public goods for more than one person, and at the same time, once it exists, it is not possible to stop someone to use it. By being nonexcludable goods, people can refuse to pay them, because they already know that the possibility of getting consuming them exists already.

One of the most relevant aspects to consider in the case of public goods, such as Federal lands, is the trend to prioritize short-term economic gains. This constitutes a difference from stakeholders that have other goals such as social or environmental (Ioannides, 2001). In any case, there is a difficulty to value in monetary terms whether the effects of a certain initiative, such as having stricter forest management policies are going to be positive or negative. From a monetary perspective, in the short term, it might look unreasonable that an environmental policy focused on protecting certain species mandates reducing significantly timber production in the habitat of those species. If wood production represents a high percentage of the total income in a certain region, it can be thought that this mandate would have a negative effect on unemployment rates, regional gross domestic product, or economic growth. However, most of the time, the effects in the long term are not estimated. It can be possible that the extinction of endangered species damages severely an ecosystem, producing its collapse in the long run, which would not only reduce timber production for a while, but would terminate it indefinitely. For that reason, the value of the negative or positive effects of a certain practice, should be consider while having deployment activities.

Miller (2002) identified that discount rates, time preferences, opportunity costs, and governmental economic policies are factors that influence how a resource is used or managed. This involves different aspects in policy making, which entails considering: the value of a certain resource at present time, and comparing it to its future value; the willingness of not having an income for using certain resources at present time, buy having the chance of increasing that income in the future; the cost of investing in something that could have less financial benefits than the original plan; or the consequences of having a certain policy (e.g. a tax incentive increasing the use of a resource, or a restrictive policy limiting timber harvesting).

2.1.3 Social values

Social values also play an important role in forest management. As it is mentioned in the Multiple Use Sustained Act, which will be further considered in the third chapter, National Forests were established to be managed for multiple values, such as outdoor recreation, range, timber, watershed, wildlife and fish (Cashore, 1999). This indicates that not only economic or environmental values are considered in forest policy. It might be possible that a certain area provides considerable economic benefits by having an intensive timber-harvesting program, or that the creation of an ecological reserve for protecting threatened and endangered species can be on the political agenda. However, if the consumers of a public good such a forest are more interested in using this good for recreational purposes that for timber harvesting, or the establishment of an ecological reserve restricting public access, this would have an effect on forest policy, affecting economically and environmentally.

Another point of conflict is the consideration of future generations while making forest policy. Usually the concept of sustainable development, which is defined as: *“the development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987) involves taking into account inter-generational justice while talking about sustainability. It means that sustainable forestry should ensure that future generations would have the necessary forest resources to meet their own needs. In any case, the process of determining the needs of future generation can be very complex and subjective. How can we precisely forecast the prevailing conditions in the future? or how can we know that reducing timber production in a certain percentage and not having a financial benefit as product of this is going to be enough to fulfill the needs of future generations?

Social and environmental values are difficult to evaluate, while compared to economic values. Because of that, economic aspects of a certain policy could have a higher priority than social

or environmental values, but in order to have sustainable forest policy it is necessary to include all of them.

2.2 Forest management practices

There are different ways to manage forests. Floyd (2002) states that for policy makers and regulators there are two kinds of visions of national forests and public lands: ecosystem management and working forest. The first vision stresses the importance of ecological systems and biological biodiversity. Production of some forest products is subject to the maintenance of bio-geo-chemical processes. The second vision is based on the premise that a forest should be managed to meet the economical and social needs of communities, but conserving ecological processes and functions. Even when environmental aspects are considered, it is recognized that human needs cannot be fulfilled without affecting ecosystem integrity.

Based on the previous visions, there are different forest management techniques, which are used to fulfill specific goals. For the purpose of this thesis, just the most controversial practices will be commented.

2.2.1 Clearcutting and post-logging regeneration

Clearcutting is one of the most widely used methods to harvest timber. It is specially used in productive forests, because of its simplicity, low cost as compared to other forest management practices, and the required skill level needed to conduct it. Even when its advantages are considerable, environmental groups and the civil society have challenged its use in both private and public lands, asking for more sustainable alternatives to harvest timber.

The Act to Save America's Forests (ASAF) defines clearcutting as: "An even age logging operation that removes all of the trees over a considerable portion of a stand at one time". In order to understand in a better way the term even age logging operation, we will refer to the definition found in the ASAF of 2000 (H.R.² 5279), introduced in the 107th Congress: "An even age logging operation creates a clearing or opening that exceeds in width in any direction the height of the tallest tree standing within 10 feet outside the edge of the clearing or opening, creates a stand in which the majority of trees are within 10 years of the same age; or cuts or removes more than 20 percent of the basal area of a stand (not including the basal area of any tree of a non-native invasive tree species) within a period of 30 years."

Regarding post-logging regeneration, it is a normal practice in intensive management to create plantations after clearcutting, which can be more productive in the short term than having natural stands (Guldin and Wigley, 1998). Environmentalists have also criticized this practice, mainly because of some impacts associated to this, which include biodiversity loss, increase of fire risk, insect infestation, and diseases.

2.2.2 Selection Management

Selection management is one of the proposed sustainable alternatives to intensive forest management. There are different definitions of selection management, however, for this thesis, we are going to use the term selection management as it is defined on the ASAF. It means a "method of logging that emphasizes the periodic removal of trees, including mature,

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undesirable, and cull trees, in a manner that ensures the maintenance of continuous high forest cover where high forest cover naturally occurs, the maintenance or natural regeneration of all native species in a stand, and the growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products including clean water, rich soil, and native plants and wildlife". The ASAF also makes reference to cutting methods, which can be included in the definition of selection management, which are: individual-tree selection, and group selection.

In Individual tree selection, "individual trees of varying size and age classes are selected and logged in a generally uniform pattern throughout the stand", and in group selection "small groups of trees are selected and logged". (ASAF, H.R. 5279)

In general, selection management is an uneven aged management technique in which the logging that occurs results in a forest of trees that are all different ages and the logging is considerably less than any even management of forests. Even when selection management is generally supported by environmentalist and conservationists, it is not favored by the timber industry and government agencies as a viable substitute of intensive management techniques. Most of the disadvantages of selection management can be related to its high cost, the requirement of special skills to perform it, and its unsuitability for every kind of forests.

2.3 U.S. Federal Forest

The purpose of this section is to provide facts on the U.S. National Forest System. This chapter is linked to the first section in the second chapter from the perspective that it includes information on timber sales and harvesting, protected areas, and economic value of the timber sales, which allows getting an idea on the status of the U.S. forest regarding forest values and management practices. This section also highlights the decline in timber harvesting, which is associated to the intervention of stakeholders such as NGOs, or the financial unsuitability of the timber sale program, which can create doubts on the efficiency of the Forest Service to Manage National Forests.

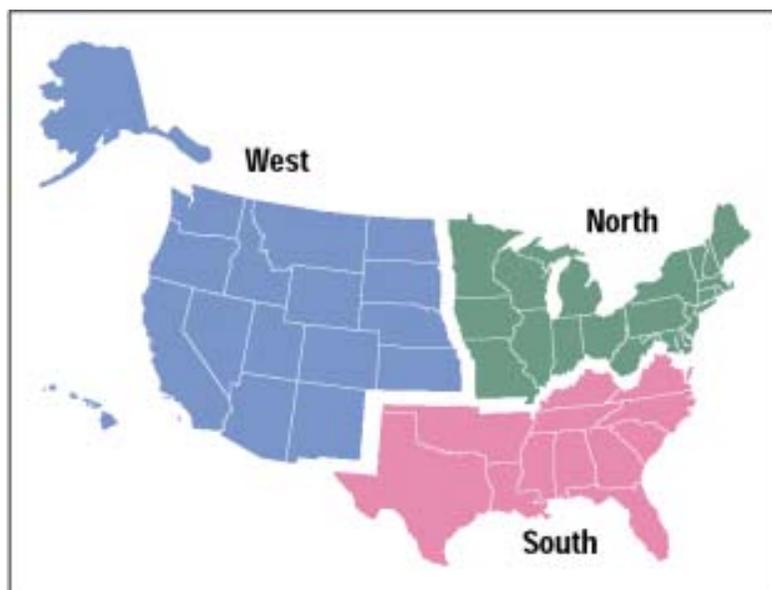
2.3.1 Facts on the U.S. Forest

From a global perspective, U.S. Forests represent 10% of the total Forest land area in the World. It has 7% of inventoried timber, and produces 25% of the timber used for industrial products (U.S. Department of Agriculture, 2001).

At the time of the European settlement, the estimated are of forest land was 423 million hectares, or 46% of the total area. However that area decreased to 307 million hectares by 1907, and today, it is about 302 million hectares or 33% of the total land area of the United States, making the land trend relatively stable during from the last 5 decades (U.S. Department of Agriculture, 2001).

For the purpose of understanding that the U.S. Federal Forest System changes considerably, depending on the geography, the information included in this section is going to be divided in three geographical regions, which are proposed by the US Forest Service in the report U.S. Forest Facts and Historical Trends of June 2001.

Figure 1: Geographical distribution of the U.S.



Source: U.S. Forest Service (2001)

2.3.1.1 Land Distribution

On 1997, the total land and forest area in the United States was 916 million hectares, which are geographically divided as follows: 49% of the Forest in the West, 28% in the South, and 23% in the North (U.S. Department of Agriculture, 2001).

Regarding timber, 68% of the U.S. forest (or 204 million hectares) has been classified as timber land. This land is distributed as follows: 39% in the South, 32% in the East, and finally 29% in the West. From the entire timber land area of the Nation, 55% of the timber is less than 50 years old, and only 6% percent more than 175 years old (U.S. Department of Agriculture, 2001).

While considering the area classified as reserved forest, it only represents about 7% of the entire forest area. 76% of the reserves are found in the West, 14% in the North, and only 10% in the South (U.S. Department of Agriculture, 2001). This area includes State and Federal parks, as well as the denominated wilderness areas.

Finally, there is an area classified as other forest, which accounts 25% of the entire U.S. Forest (U.S. Department of Agriculture, 2001). Most of this area is found in the West, with only a few million hectares in the South and North. It includes slow growing spruce forests of Alaska, as well as pinyon-juniper in the interior West.

2.3.1.2 Forest land ownership

The ownership of the U.S. Forests is divided in private and public, 42% being public, and 58% private. The timber industry owns 9% of the total, and 49% is classified as other private. However, while considering public forest, 59 million hectares are considered National Forest, and 69 million other public. This means that 128 million hectares are public, and from that amount more than the 46% is considered timber land (U.S. Department of Agriculture, 2001). However, it is important to mention that most of the forest is Public in the West, and private in the East.

2.3.2 Management Activity and Trends in Stock volume, mortality, growth, and removals

As it was previously stated above, a high percentage of the U.S. Forest is private. For those lands, regarding forest management, there is not specific information available on the tools or techniques used. According to data from the U.S. Department of Agriculture (2001), it is estimated that only 5 percent of the private landowners in the U.S. have written management plans. However, the percentage is not that relevant, since 39% of the private forest area is covered by plans. In 1996, private forests supplied 89 percent of the timber harvested in the country (U.S. Department of Agriculture, 2001).

Almost 90% of the forest in the Eastern U.S. is naturally grown, while 10% is planted. In the Western U.S., almost 4% is planted, and 96% natural. 58% of the inventory is classified as softwood, and the remaining 42% hardwoods. From that total, most of the softwoods are located in the West, while hardwoods are mostly located in the North and South. Regarding all planted species (hardwood and softwood), an inventory of 23,650 million cubic meters was estimated for 1997. From this number, 666 million cubic meters were classified as growth, 453 as removals, and a mortality of 179 million cubic meters was registered. By comparing the variable growth-removals and mortality; in total, the amount of wood removals plus the volume of dead trees is not greater than the growth forest, which means that the three inventory is not being affected by timber harvesting. However, in the South, this variable is negative, being the number of removals plus mortality higher the number of growth trees for 48 million cubic meters (U.S. Department of Agriculture, 2001).

2.3.2.1 Timber management

One of the foundational objectives of the U.S. National Forest System was to ensure timber supply in America. The timber program is one of the most important programs of the U.S. Forest Service.

According to information from the U.S. Department of Agriculture (2003), the amount of timber harvested on the National Forests have been decreasing. In total, the timber harvested on national forests has decreased from approximately \$143 million dollars in 1998, to only \$43 million dollars in 2002 (U.S. Department of Agriculture, 2003).

Regarding timber sold, there is also an overall decrease, but considerable increases were reported from the fiscal year 2001 to the year 2002. However, in general, the price has decreased from \$137 million dollars in 1998, to only \$46 million in 2002 (U.S. Department of Agriculture, 2003).

Even when comparing the values between the amount of timber sold versus the timber harvested, and apparently is positive, according to information provided by the U.S. General Accounting Office (2001), the timber sales program has experienced losses. In the fiscal year of 1998, it is estimated that the losses accounted \$125.9 million dollars, and \$116 million in

1997. However, on the information provided by that agency, it was stated that the Forest Service has incurred in miscalculations, which made not possible to estimate a reliable cost of the program from the fiscal year 1998 and 1999. Even the Department of Agriculture Inspector General was unable to provide an opinion on the Forest Service's annual financial statements because the financial systems did not produce on time, and the financial management information was not accurate. Mainly for that reason, the General Accounting Office designated the Forest Service financial management as one of the Office's "high risk" areas in January 1999, keeping the same designation in January 2001. (U.S. General Accounting Office, 2001).

2.4 Criticism on U.S. Forest management practices

Federal lands management in the U.S. has been controversial, because of the different interests involved. For example, the timber industry wants the forest service to increase the volume of timber harvested from national forests, while many NGOs and civil society groups advocate for banning or limiting timber volumes if species and ecosystems are threatened as consequence of intensive forest management. Both sides use science based arguments to support their views. The most relevant of them will be described in the following lines.

The timber industry, Federal agencies, as well as some foresters and land owners, support clearcutting. One argument they use to support this method, is that clearcutting imitates the severe natural disasters that occur in nature (Bonnicksen 1994). It is also highlighted that clearcutting has effects on production levels, and studies showing those tendencies have been conducted. For example, a study evaluated 4 replications of 5 treatments (clearcut, shelterwood, group selection, single tree selection, and late-rotation unharvested stands) during the first, third, and fifth years after initial timber harvest. The results indicated that the production in clearcuts and shelterwood cuts was higher than in single tree selection, group selections, and unharvested stands the fifth post-harvest year (Perry, et al 1999).

Despite those supportive statements, there are many scientists and studies that do not agree with the previous arguments. For example, Carey et al (1999) say that the disturbances people create through clearcut logging, slash burning, and planting are much different from natural disturbances such as wildfire, windstorms, floods, droughts, root rot, and insect outbreaks. This is usually because few biological stands such as snags and fallen trees are left, and single tree species planted, spacing trees uniformly and having even-aged inventories. These stands are denser than stands created by nature (Rapp, 2002).

It has been mentioned that without active management of plantations, disturbances such as windstorms, ice storms, root rot, insect infestation, and fire would likely occur (ibid). Duncan (1999) also supports the idea that clearcutting is a highly effective terminator of disease in young forests. However, its is necessary to distinguish that this kind of disturbances are not going to be the same when talking about old growth forests and plantations (Rapp, 2002).

Guldin and Wigley (1998), state that clearcutting produces the greatest possible change in forest conditions that can occur during secondary succession. Removing the biomass of ail trees of commercial size and value, and the mortality or suppression of much of the remaining woody biomass through site preparation (burning, mechanical cutting or removal, and use of herbicides) creates ecological conditions that are simply different from those that existed prior to harvest. Continuous canopy cover is lost, the forest floor is broken up, biogeochemical cycling is completely changed, and solar radiation and other microclimatic effects reach all the way to the forest floor.

There is also a relationship between old growth forest and even aged management techniques, which is explained by Bunell & Kremsater (1990). They state that even aged management may truncate succession and prevent the development of structural characteristics associated with older, mature forests.

As a result of even-aged management, the diverse old-growth forest is eliminated, which provides habitat for a number of species (Perry, 1988). In fact, Harris *et al.* (1982) found as compared to the middle-aged stands, that the very early or very late successional stages (old growth) provided primary habitat for twice as many species. However, although some of the species may use short rotation forests as secondary habitat, they need the older-aged stands to be maintained within the short rotation forest for primary habitat (*ibid*).

Guldin and Wigley (1998) say that plantation establishment, whether on a recently harvested site or an abandoned agricultural field, represents additional change in ecological conditions, because the intention is usually to establish a single dominant woody species, which can have negative ecological consequences.

Fragmentation effects are usually attributed to three factors: forest area, isolation and edge effects. Fragmentation can refer to spatial fragmentation, such as when a new plantation breaks up a continuous forest canopy. It also can refer to discontinuities of vegetation within an area, such as when a mixed species stand is replaced by a stand dominated by one species (Lord and Norton, 1990). It is sometimes argued that plantations reduce the area of native forest, isolate remaining patches of native forest, and create edges, which attract predators and nest parasites; provoking that species associated with native forests might decline in abundance. Such concerns arise because of the common assumption that stand-level habitat quality in plantations and native forests differs greatly for many species (*ibid*). Terborgh (1989) affirms that some plantations have even changed southern U.S. forests into biological deserts. In order to maintain biological diversity, it is necessary to maintain a variety of successional stages (Sharitz, et al 1992), which can not be reached by establishing plantations.

There are many cases of selection management being used in the United States and Canada. The following are a few examples. Merve Wilkinson manages Wildwood Tree Farm on Vancouver Island, Canada, a 137-acre wood lot that produces high-quality saw-timber (Taylor, 1993). Wilkinson does not allow clearcutting, replanting, or fertilizing of Wildwood. Wilkinson selects the trees that he is going to cut and purposefully leaves the biggest and strongest to serve as seed trees. He tries to maintain a forest that has trees that are different ages, different heights, and different species. He only removes trees when they have died, but even then, he leaves many to serve as habitat for wildlife and to eventually replace soil nutrients. Finally, Wilkinson insists that the standing wood volume is the same as when he started and that the timber production is only slightly lower than other tree farms in Washington State.

In Oregon, Orville Camp discovered his own technique of selection management by experimenting on his own property (Camp, 1984). Camp calls his version Natural Selection Forest Management or Natural Selection Harvesting. This version of selection management promotes the removal of weaker members of a population, already determined by nature, and leaving the 'stronger' dominants to grow. The dominant members, which can be more than one species of a tree, will eventually die and be replaced by the next generation of dominant trees. The goal is to provide adequate space or 'territory' for the dominant trees to grow. You can remove diseased trees or mature trees, unless removing them will do more harm than good to the forest. The emphasis is to let the forest act as an ecosystem and decide for itself which trees are weaker.

In Salem, Missouri the Pioneer Forest is a nearly 160,000-acre privately owned forest that has been selectively managed since the 1950s (Pioneer Forest, 2000). Selection management, or single-tree selection harvesting occurs about every 20 years and only removes about 40% of the standing volume. Single-tree selection harvesting attempts to imitate the natural process in which individual trees or a small group of trees die by natural causes. The trees that are removed are the weaker trees based on a few variables that include form, vigor, disease and damage. The trees that are left are the ones best suited for that particular site, have strong physical characteristics, and the greatest potential to grow. The resulting opening after a harvest provides light for seedlings to grow into saplings and limits the competition with other trees for space, water, and soil nutrients. Eventually the understory trees grow into the gap that was created and become large trees. The opportunity for the next generation of trees to grow into the gaps created is critical to the success of the single-tree selection harvesting method.

Regarding selection management, certain authors have expressed their concern about selection management, statements that are used for the supporters of clearcutting and intensive forest management. Whitman et al (1997) says that selection logging must be ecologically sustainable (maintain ecosystem structure and function); as well as silviculturally sustainable (harvest rates, equal regeneration, and growth of a resource). In some kind of forests, such as tropical forests, it has been found that selection logging has negative consequences, because it damages residual stands and the remaining trees, including species of economic importance (Johnson and Cabarle, 1993 cited by Whitman et al). In addition, forest equipment can also affect the forest by compacting soils, thereby reducing seedling recruitment and growth (Reisinger et al 1998)

Regarding those facts on the tropical forest, Whitman et al (1997) recognizes that low intensity selection logging operations did not have a major impact, and that only 12.9% of the logged area was affected by the logging. Referring to soil compaction, it was found that damage is more severe on skid roads or sites where multiple passes occurred, which constitutes the real problem (ibid).

Gullison and Hardner (1993) have studied that damage per tree declines as harvest density increases. It is important to highlight that as mentioned before, the density in artificial stands is higher than in old growth forest, which means that the damage occurred in old growth forest may not be significant.

Other authors like Duncan (1999) mentions that natural landslides in uncut areas are larger, because they move larger masses of material. In the case of southeast Alaska, landslides are likely to be more frequent, although smaller. This change is caused by altered drainage patterns, and decreased soil stability as root systems decay after cutting.

Specifically in Alaska, Duncan (1999) also mentions the fact that in some cases, expensive helicopter logging was the only choice for some treatments, such as the 25 percent single tree selection treatments. However, further in the report (ibid) says that to make it economically viable, high quality trees can be harvested, and poor quality trees left for wildlife habitat. According to that, it would not result in a low quality forest at the end, since many trees would be already growing in the understory prior to partial cutting. Anyway, there are contradictory opinions on this. Whitman et al (1997) states that complete harvest of the largest and probably most fecund trees may have greatly reduced the seed production potential of the residual stand. However, while compared to other methods, it had low impact on the bird community.