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Planning for Tomorrow, Today

How (Dutch) Forest and Nature Management Organizations Cope with Uncertainty

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Martine Burger

Education is the passport to the future,
for tomorrow belongs to those who prepare for it today

Malcolm X (1925-1965)
Advocate for the rights of African Americans

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Summary

Planning is an essential part of everyday life and a necessity for any organization. Planning is used to, among other things, guide activities within the organization, to ensure that the future is taken into account and as a way of communicating the objectives to other parties. The same goes for forest and nature management organizations. But in contrast to organizations in other sectors, the forest and nature sector has a unique character; it is characterized by long time horizons and an ever changing environment, which leads to high levels of uncertainty in managing and planning this environment. Uncertainty is inherent in forestry and planning is said to be the way to cope with this uncertainty. However, the use of planning has been discussed for decades. Uncertainties lead to predictions and predictions might simply be wrong. The long time periods in forestry means that wrong decisions that are made today influence what happens for generations to come. Furthermore, plans are thought to be useless if the (uncertain) future is not taken into account. This gives rise to the question if and how forest and nature management organizations take uncertainty into account while planning strategically (i.e. planning for the long term).

This exploratory study was focused on a number of Dutch forest and nature management organizations. Ten different organizations were analyzed, ranging from private organizations to governmental ones. The aim was to see if these organizations experience uncertainty and how it is taken into account in their planning practices, by investigating which type of planning is used. The theoretical basis of this study was formed by the categorization of planning as proposed by Mintzberg and Lampel (1999). Their study suggests that strategic planning can be divided into ten different approaches they call 'planning schools'. Each planning school has its own characteristics and theoretical foundations. For every organization, the person who was responsible for planning (or very knowledgeable on the subject) was interviewed in a semi-structured manner, to investigate if the organization applied one of the ten planning schools in order to cope with uncertainty. The transcripts of these interviews were analyzed through the use of a qualitative deductive category application. The research was also used to get an overview of the different planning practices as applied by forest and management organizations across the Netherlands.

The study showed that the organizations did not experience uncertainty very much. However, a number of strategies that are used, are mentioned in literature to be strategies for coping with uncertainty. Tactics like these include applying adaptive management strategies, reducing uncertainty by collecting additional information by e.g. improving knowledge through monitoring and reducing uncertainty by shortening time-horizons which improves the predictability of future events. The strategy that is used for coping with uncertainty is not directly linked to their planning practices. Organizations with similar strategies apply different planning practices. This means that most organizations indeed cope with uncertainty, often without them even being aware of it.

Traditionally, forest and nature management planning is said to have a rational approach. This study has empirically showed that amongst the interviewed organizations, planning is mostly approached in a (close to) natural way, or by applying a combination of rational and natural strategies: an 'in-between' approach. The findings also showed that some of the organizations do not plan for the long range at all, while this is said to be essential for forest and nature management. Furthermore, there is a great variety within and in between the different organizations concerning their planning practices. Plans range from short-term to long-term plans, from planning as being an explicit focus to something that 'is done on the side', from one person being responsible to a gathering of different expertises. This diversity leads to the conclusion that forest and nature management organizations in the Netherlands cannot clearly be divided into a number of planning schools. Different elements of the planning schools are apparent and no trends seem to be present. Every organization has characteristics of more than one planning school. This research therefore shows that the planning schools are an interesting categorization, but that it is not unambiguous. Also, it is concluded that forest and nature management in the Netherlands cannot be characterized by one planning practice.

Preface

Adventure is just bad planning

Roald Amundsen (1872-1928)
Norwegian explorer of the polar regions; first man to reach the South Pole

Although this thesis was well planned, it was still quite the adventure for me. It challenged me, it tired me, it pushed me, it annoyed me and now; it makes me proud. Luckily, it was not an adventure that I had to take up all on my own and I am glad that this Preface gives me the chance to thank everyone who has contributed to this thesis, in whatever shape or form.

First and foremost, I would like to let my supervisor, Marjanke Hoogstra, know how much I appreciate(d) her guidance along the way. Without her assistance, support, patience, valuable discussions and the tips that followed from them, this thesis would not be what it is today. Also, I must not forget Freerk Wiersum, who supervised my thesis for the short time that Marjanke was not available. We did not get the chance to work together for a long time, but I have learned from you nevertheless.

Then, I would like to thank the people who made room in their busy schedule and made it possible for me to interview them. Without you, this thesis would not even be read right now. I very much enjoyed your enthusiasm and willingness to provide me with as much information as possible.

Thankfully, the last six months of my study were not only occupied with this research. The balance between working hard and playing hard was excellently restored by my friends and family, who were not only there to support me, but also to help me relax and have a good time (without stressing out about my thesis). Without decreasing anyone's importance to me, I would have to say the biggest thank you to André, my best buddy of all times. I am crazy about you. You were there for me all the way, even during the (very) cranky phases of this thesis. Thank you for making me believe in myself and the work that I have done.

In random order, special thanks to everyone else behind the scenes. Thanks to Aad and Ditta –for letting me stay with you and especially to Ditta for making me eat in time! Ome Henkie, tante Gaby, Carla (ft Lucas) and Eric, thanks for the good times during the bad times and for making me laugh until my stomach ached. Thanks to Joop and Ria, for your endless support and showing interest in what I was doing. Also, lots of love to my Canadian adoptive parents Mark and Patti and the rest of my Canadian family and friends in Powell River for their best wishes through cards, e-mails and crazy gifts. Last but not least, I thank my (not so) little sister (anymore) Laura and my parents for giving me all that I have and making me all that I am.

1 Introduction

This preliminary chapter explains the basic principles of this study. It starts off with the background of the study on which all theory and practice is based. It continues in the second paragraph with a description of the problem at hand. The last paragraph concerns the research objective and research questions behind this study.

1.1 Background

Whether it's the time to wake up, what to eat for dinner or the perfect wedding day; people plan. As Crane *et al.* (1936) put it, to mankind, planning is a necessity. "Every man looks ahead and attempts to organize for tomorrow," whether the future concerns the next day or the next generation (Crane *et al.*, 1936: 61). The reasons to plan are numerous and differ per situation. Some plan more ahead than others, some plan more precise than others (Mintzberg, 1994). According to Craver (1973), we plan for the future simply because it enables us to choose what we want our future to be. But planning is not restricted to everyday life; it is also an important process in any organization (Duerr, 1960). As George (1972) points out; what breathing is for living human, is planning for every managerial act. Organizations also have various reasons to plan. According to Mintzberg (1994; 2000), organizations mainly plan to coordinate their activities, to ensure that the future is taken into account, to be 'rational' and to control their activities. The differences between people in the way they plan is, logically, also noticeable between organizations, no matter the type of enterprise. For some, the planning horizon is not too far away, which makes it easier to see what is ahead. For others, plans have to be made far ahead which makes planners susceptible to the inevitable: uncertainty (Duerr, 1960). It is an unavoidable problem for every decision, no matter the type of business for which the decision has to be made (Crane *et al.*, 1936; Argote, 1982; Lipshitz and Strauss, 1997).

Forest and nature management organizations are no exception; the use of natural resources is particularly a subject of planning (Cushman Coyly, 1936). Nearly every decision that a forest and nature manager has to make involves uncertainty to some degree. The main reason for this uncertainty is because in forest and nature planning, time horizons of up to fifty years are no peculiarity (Kangas *et al.*, 2001). Strategic plans (also long-range plans) are typically prepared to cover these longer time periods (Kangas *et al*., 2001; Mintzberg, 2000; Grant, 2003). Because of the long rotations of several tree species, forest management planning can involve decades and even generations (Kangas and Kangas, 2005). Therefore most decisions that are made in forestry span multiple decades (Convery, 1973; Alig *et al.*, 1998). No other industrial or land-based process deals with such long time-horizons (Hoogstra, 2008). The professional forest manager is therefore typically considered to be a long range planner (Duerr, 1960), which means they have to find a way to cope with the uncertainties that are faced. Uncertainty is said to be inherent in forestry (Convery, 1973). According to Duerr (1969), uncertainty has even produced and shaped the forestry profession as we know it today. Because forest and nature management actions can have long-lasting effects on economic, ecological and socio-cultural factors, it is important for management planning of forest and nature areas to take all concerns into consideration before any management scheme is implemented (Murray and Church, 1995). Furthermore, planning is said to only be effective when it is fitted to the specific situation in which it is used (Bryson and Delbecq, 1979; Christensen, 1985). In other words, complete knowledge is necessary. However, planning for the long range means dealing with knowledge gaps about developments in the future. For many environmental problems, the scientific uncertainty is substantial (Holmberg and Robèrt, 2000). Nothing about or in the future is evident, the future is an unknowable fact and therefore uncertain (Weber, 2000; Hoogstra, 2008). As Abbott (2005) says it, the future does not exist, so it cannot be known.

1.2 Problem Statement

Uncertainty often arises when decisions have to be made about the allocation of resources and natural resources are no exception (Wesseler *et al.*, 2008). Uncertainty leads to making predictions about the unknown future. This is what planning is all about. According to Duerr (1960), planning means looking ahead and in a way, forecasting what is going to happen. Previously, decision makers relied on the past to predict the trends of the future. Now, the past offers little guidance (Menke, 1979). The future is "the great unknown", it has always been complex and indeterminate (Abbott, 2005: 237). Forecasting is used to generate a systematic and consistent set of assumptions. These assumptions are then used to judge alternative policy options to the organization's objectives (Fildes *et al.*, 1978). Prediction and planning for the long term is difficult however, and the outcomes are uncertain (Abbott, 2005). It is also questioned whether humans have the ability to make meaningful predictions about the (far) future (Hoogstra, 2008). According to Mintzberg (1994), forecasting what is ahead is simply impossible. The main issue with uncertainty in planning is that any given prediction might simply be wrong, while making the right decisions is more important in forestry than in most other operations (Fitzsimmons, 2006). A wrong decision early in the rotation period cannot be put right for many years, it might not even be recognized (Williams, 1981). What adds to the problem is that decisions on forest and nature management that are made today influence what will happen for generations to come.

The long time horizons and the ever changing (natural) environment cause substantial uncertainty within forest and nature management. The long planning horizons are the most important source (Hoogstra and Schanz, 2008). Forest and nature management involves effects and consequences that are intrinsically long-term (Jepson, 2001). Additionally, most systems are poorly understood due to their complexity and unpredictability (Ascough *et al*., 2008; Maier *et al*., 2008). According to Sigel *et al*. (2010), the problem of uncertainty is particularly severe in environmental decision-making due to the overwhelming diversity of nature, the numerous dynamic natural processes involved and the complex interactions between nature and human beings. The environment changes continuously and living systems are in a constant struggle to develop, change and respond to disturbance (Rees, 1995; Jepson, 2001). Effective strategic planning is complicated by these unpredictable discontinuities in the environment (Bourgeois, 1985). In order to manage public lands and resources, knowledge about ecosystems, activities and patterns of resource use are required (Kessler *et al.*, 1992). However, the environmental problems that need to be solved are not all that consistent or clear presented (Hudson *et al.*, 1979), which makes planning even more difficult. Despite the difficulty of planning for an ever changing environment, Brews and Purohit (2007) showed that in stable environments, less planning is carried out than in unstable environments, which proves that planning is very important for managing forest and nature areas.

Strategic planners are said to be facilitators of decision making in all levels and functions of an organization, which emphasizes the importance of planning for any enterprise (Bryson, 1988). Economics is a basis for policy, decision making is based on (economic) planning (Duerr, 1960). But if planning is not precise, how precise and relevant are the decisions that follow? The risk of looking far ahead is the probability of unforeseeable change in the circumstances surrounding the organization. Strategic planning is more difficult in such changing environments, because it requires strategies that are flexible and creative (Grant, 2003). According to Hamel (1996), these characteristics are seldom present in planning. Strategic planning is more likely to be a ritual that assumes that the future will be more or less similar to the present (Hamel, 1996).

Planning can help reduce the risk of the many uncertainties that arise, but it cannot eliminate it entirely (Duerr, 1960). This last statement by Duerr (1960) illustrates the discussion about planning that has arisen over the last decades. The theoretical foundations of planning have increasingly been criticized. Mintzberg (2000) concluded that planning does not necessarily pay off. Planning could even be unrealistic and wasteful if uncertainty is ignored and the future is only interpreted as an extrapolation of the past and present. This could threaten the organization because the presence of plans might cause a false assumption of certainty and security (Hoogstra

and Schanz, 2008). Lundgren's (1984) ideas are similar; when planning does not acknowledge the uncertain future, it does not deal with reality anymore but with a false impression of reality (Lundgren, 1984). An important part of planning is that it is used to not only discover uncertainties, but also to assess and address them (Christensen, 1985). However, according to Ascough *et al*. (2008), the public, industry and government generally do not acknowledge the fact that it is important to address uncertainty and account for it during their efforts to protect, improve and manage environmental resources. This causes them to fail to achieve their goals. Menke (1979) claims that people, and therefore planners, have the natural tendency to ignore or eliminate uncertainty entirely, which can have a negative impact on planning and consequently, on the operations of the organization. Then the question arises if and how forest and nature management organizations take the uncertain future into account when making plans. Furthermore, the value of planning is discussed. There are those who state that planning has the advantages of e.g. enabling continuity within the organization and dealing with challenges such as uncertainties about the future and environmental instability (Bryson, 1988; Mintzberg, 2000; Brews and Purohit, 2007). On the other hand, it is doubted if planning is really that profitable because of, among other things, the large amount of voids and unknowns that impede proper planning (Crane *et al.*, 1936; Seeley, 1962; Godschalk *et al.*, 2009).

1.3 Research objectives and research questions

This study is set up to see if and how forest and nature organizations take uncertainty into consideration while planning strategically. Uncertainty arises because of the long term horizons that define forest and nature management planning. Previous studies have mainly focused on how decisions are influenced by uncertainty. This study will emphasize on how forest and nature managers cope with the uncertainty that is caused by the long time horizons for which they have to plan, by investigating which type of planning is used. This will give insight in both the strategies that are used to deal with an uncertain future and the strategies of forest and nature management as a whole. It might even stimulate future research on strategic management in the forest sector.

The research will therefore focus on the central question:

How do forest and nature management organizations deal with uncertainty in their planning?

Sub questions that are asked are:

- How do different forest and nature management organizations plan?
- How is uncertainty incorporated in their planning?
- Do forest and nature management organizations plan in order to cope with uncertainty or are there other reasons behind their approach to planning?

1.4 Structure of the Report

This thesis consists of six chapters. After this introductory chapter, which presents the motivation for this research together with its objectives and research questions, the report continues with an overview of the relevant theories for this study. Chapter 2 describes the theoretical framework and gives an overview of the three main elements of this research: the concepts of planning, uncertainty and planning schools, and the links between them.

Chapter 3 introduces the research methodology used in this research by elaborating on the method of data collection and analysis. Then, chapter 4 provides the results of this study and covers the three concepts of planning, uncertainty and planning schools. The report continues with a general discussion of these results in chapter 5. The last chapter (6) presents a number of conclusions and attempts to answer the central question of this research based on what was learned in the preceding chapters.

2 Theoretical Background

This chapter continues with defining the theoretical basis of this study. First, the concept of planning is explained and defined. It also concerns the discussion on the usefulness of planning by elaborating on the advantages and disadvantages of planning, as proposed in literature. The second paragraph will elaborate on the concept of uncertainty; what is uncertainty exactly, the different types of uncertainty and how, in theory, organizations deal with uncertainty. The last paragraph combines the concepts of uncertainty and strategic planning. First, the different levels of planning are explained. This chapter ends with an explanation of the ten planning schools by Mintzberg and Lampel (1999) that integrates different planning practices with uncertainty.

2.1 Planning

Plans are nothing; planning is everything

Dwight D. Eisenhower (1890-1969)
34th President of the United States of America and five-star general in the US army; responsible for planning and supervising the successful invasion of France and Germany in 1944-45 during World War II

2.1.1 What is Planning?

According to Seeley (1962), any definition of planning must be clear enough to give guidance, but vague enough to allow a flexible interpretation that fits the context it is used in. Even though he hesitates to state his own definition, he describes planning as *referring to future events*. The present can only be experienced, the past can be remembered, verified or disapproved, but only the future is for planning. This focus on the future is present in most of the definitions of planning. As Mintzberg (2000) points out, some people think of planning as simply taking the future into account. However, this simple definition does not consider the fact that almost all organizational decision-making takes the future into account. Others consider planning to be a way of *controlling* the future instead of just thinking about it or acting on it. Abbott (2005), for example, states that planning is about *changing* the (expected) future. The planning process then consists of exploring different futures. Through preparing and implementing a plan, the links between the present and a desired future can be influenced. The same thought was expressed by Ozbekhan (1969: 152), by stating that the purpose of planning is "to create controlled change in the environment".

Hudson *et al.* (1979) add the focus of programming. They define planning as foreseeing the formulation and implementation of programs and policies. Van Nest Black (1936) is a bit more elaborate and claims that planning involves every form of foresight, all sorts of programming and every type of preparing for social and economic betterment. Planning is looking forward and selecting elements from the past that are useful in analyzing existing conditions from a future point of view (Abbott, 2005). Simpson (1998) however, does not share this perspective on the future. According to him, planning is not about projections or forecasting, but about ideas and innovation. Rice (1983) also deviates from an explicit focus on the future and states that "all decisions are made with forethought" and eventually lead to a plan. There is more to planning than just looking at and preparing for future events (Rice, 1983).

Other factors that are often mentioned in definitions of planning are decision-making on the one hand, and the uncertainty that might arise because of trying to predict future events on the other hand. Planning is for example defined by Menke (1979) as a network of decisions. It is meant to produce specified results through the direction of the intent, the guidance of the preparation of change, and the programming of designed actions. Koontz (1958) states something similar and mentions that planning is deciding. According to Bryson (1988), planning aims at helping organizations to effectively respond to any new situation that occurs. Without it, organizations would not be able to make decisions when faced with challenges. Bryson (1988: 74) therefore defines planning as "a disciplined effort to produce fundamental decisions and actions" that shape the direction and nature of the activities. Abbott (2005) states that planning is a form of decision-making that involves complex situations and longer time frames, which adds uncertainty to the mix. As Christensen (1985) points out, one of the most, if not the most, important tasks in planning is recognizing, assessing and addressing uncertainty. Planning therefore concerns understanding and managing uncertainty. Essentially, planning means *controlling uncertainty* (Christensen, 1985). The process of planning involves exploring alternative futures on desirability and feasibility, while these futures are uncertain. This creates process uncertainties for the people and organizations involved (Abbott, 2005). Friend and Jessop (1969: 97) even defined planning as "a process of decision-making under uncertainty". This study will investigate if in practice, uncertainty is indeed a large part of planning for forest and nature management.

Considering the different definitions and descriptions, a number of elements that are presented in these definitions are important for this study. First, Abbott's (2005) description is relevant. Planning means looking forward and the process consists of exploring different futures. It is a form of decision-making that deals with complex situations and longer time frames. Koontz (1958) also stresses the interesting fact that planning is deciding. Christensen's (1985) view needs to be included as well, as it explains how uncertainty comes into play in the planning process and that this process is used to control uncertainty. In summary, this study makes use of the following elements of planning:

1. Focus on the future
2. Focus on decision-making
3. The future brings uncertainty
4. Planning is used to control this uncertainty

This results in the following definition of planning, as used in this study:

Planning is a way of decision-making that is focused on coping with the (uncertain) future

It describes what goals need to be achieved within a certain timeframe and how to reach these goals in that particular period. Considering this definition, the conclusion is that coping with uncertainty is the essence of planning.

2.1.2 Pros and Cons

Planning is said to be beneficial in a number of ways (Bryson, 1988; Mintzberg, 1994b; Kangas *et al.*, 2001). However, there are even more studies that doubt if planning is really that favorable. Some studies doubt if planning is useful (e.g. Crane *et al*., 1936; Seeley, 1962). Several others mention various difficulties when it comes to planning (e.g. Lipshitz and Strauss, 1997; Fitzsimmons, 2006). Also, there are studies that bring up some of the pitfalls of planning (Mintzberg, 1994a; Simpson, 1998). This paragraph highlights the pros, but also the doubts, difficulties and disadvantages of planning practices.

Advantages of Planning

Though planning is not that easy, especially considering all types of uncertainty that might come into play, there are some researchers that focus on the positive side of planning processes. According to Bryson (1988),

(strategic) planning enables governments, public agencies and non-profit organizations to successfully deal with the many challenges that they face. Furthermore, he names a number of benefits of strategic planning, as mentioned by several government and non-profit organizations in the US. According to this list, planning helps them (1) to clarify future direction, (2) make today's decisions in light of their future consequences, (3) develop a comprehensible and defensible basis for decision making, (4) solve major organizational problems, (5) improve performance and (6) to effectively deal with rapidly changing circumstances. There is no guarantee that planning indeed produces these benefits. However, if key leaders and decision makers are motivated and willing to invest the necessary time, attention and resources, these benefits are more likely to appear (Bryson, 1988).

Godschalk *et al.* (2009) also mention that foresight-based actions produce more benefits and induce fewer costs than responding afterwards, which involves more expensive repair or reconstruction costs. What these benefits are exactly is not made explicit. According to Ramírez-Sanz *et al.* (2000), appropriate land use planning makes it possible to synchronize the exploitation and use of natural resources with nature conservation. Another benefit is that planning is an important mechanism to cope with environmental instability (FAO, 1993). Also, planning appears to increase as environmental instability increases, because the need for planning is less in stable environments through a suitable status quo or a lesser need for adjustments (Brews and Purohit, 2007). According to Kangas *et al.* (2001), forest management planning is important for several things. First, it is a tool to provide an advisory service. Second, it is important for public participation in forestry-related decision making. Additionally, it has been used to make sure that forest owners comply with the (governmental) policy.

In contrast with the earlier mentioned problem of planning for the uncertain future, Fitzsimmons (2006) claims that there are several benefits of prediction in planning. First, prediction makes assumptions, key variables and the relevant causal relationships explicit. The second benefit follows from the first, as making these factors explicit, produces a transparent and sometimes even firm basis for making choices. Third, predictions enhance strategic flexibility. Because the decision-maker deals with a transparent and disciplined process, the decision-maker is more sensitive to changes in the environment, which makes him more aware that there could be a need for adjusting the plans (Fitzsimmons, 2006).

Jepson (2001) also provided support for the benefits of planning, and states that planning fulfills an important position within the sustainability debate. Because of the direct and fundamental interactivity of the process, it enables the integration of the natural and social sciences by relating conditions within society with the condition of the natural environment (di Castri and Hadley, 1986; Jepson, 2001). Another study that identifies planning as beneficial is that of Langley (1988). He identifies four roles or planning with their own benefits. In the public relations role, formal (strategic) planning is used to impress or influence outsiders. The second role, the information role, produces input for management decisions. Increasing organizational commitment through the involvement of all organizational levels, is established by the group therapy role of formal planning. Lastly, the direction and control role provides plans that guide future decisions and activities toward some consistent purpose (Langley, 1988).

Mintzberg (1994b; 2000) mentions a number of roles of planning, which make planning a beneficial process. The first role that planning fulfills is that of strategic programming. In this role, planning is carried out to make sure that the strategies that result from it are more than mere extrapolations from the past, or copies from other organizations. Furthermore, plans can be used as media for communication. As Mintzberg explains it, plans are used for coordination of the organization by pulling everyone in the same direction, for promoting the efforts of insiders and to seek support by informing important outsiders. The third role of planning is that of control devices. In this way, plans specify what behaviors are expected of particular departments and individuals in order to realize strategy. Also, they provide feedback by comparing these expectations with actual performance.

Rather than stating a benefit, others mention that planning is a necessity. It is better to be uncertainly right in time that precisely right too late (Neumayer, 1998). The management of coral reefs is an example of this statement in practice. Given the urgency of protecting what is left, is it better to act today with incomplete knowledge than to wait for detailed understanding that might come too late (McCook *et al*., 2009).

Challenges and Disadvantages of Planning

Crane *et al.* (1936) were one of the first to express the doubt if planning is useful. According to them, there are too many unknowns and too many large voids in any view of the future. Furthermore, mankind's capabilities of planning in advance are severely restricted. They state that planning is limited by the unknowns on the one hand, and the mental capacities of the planners to think ahead on the other hand. In her study, Christensen (1985) also questions if planners are able to plan responsibly if the means are unreliable and the contexts in which they work are ever changing and influenced by conflicting goals.

A number of studies doubt the concept of planning due to the uncertainties related to the future. Godschalk *et al.* (2009) connect this doubt to uncertainty about future disasters. The probabilities of such events are unknown, but they are reckoned over many decades. In order to plan for the future, one needs to foresee and assess the consequences of current actions in the future. However, this knowledge is hard to generate (Seeley, 1962). Forest and nature management is often concerned with making decisions while there is not enough information to decide on, or to predict the consequences for the ever changing environment in the future (Osman, 2010). The need for quick responses makes it even more difficult. Osman (2010) claims that this situation causes people to rely on biases to cope with these difficulties. Biases are assumptions that people make about the behavior of the environment. These are then used to reduce uncertainty through the use of hypotheses for testing or predicting outcomes that are likely to occur (DiFonzo and Bordia, 1997; Shanteau and Stewart, 1992). However, while these biases offer a basis on which action plans can be designed, it causes individuals to form less accurate representations of the environment. Prolonged reliance on biases might even lead to poor task knowledge and poor control.

Moyer (1984) introduces a number of reasons why planning for the long term is difficult and often leads to mistakes. First, the analyses and measurements of the forecasters might be too focused on the surface factors, which means that important underlying forces are ignored. Also, assumptions during forecasting confound the results. Forecasters tend to use the same assumptions, figures and theories time after time, while each situation is unique. Furthermore, forecasting might be impeded by other time factors such as the forecaster's time horizon. The longer the period between the production of a forecast and its target date, the bigger the chance that major 'trend determining' factors influence the situation. Also, bias may cause forecast error.

Ignoring uncertainty

This study suggests that the core of planning is that uncertainty should be taken into consideration when plans are designed. However, a number of studies mention that in practice, this is not always the case. People even tend to ignore uncertainty. According to Hogarth and Kunreuther (1995), people make decisions without information on the probabilities and utilities or potential outcomes. In other words, they make decisions in ignorance and without taking into account the uncertainties that are associated with their decisions. This is in line with Dewey's (1929) statement, put forward by Abbott (2005), which says that people have a fear of uncertainty that causes them to try and get rid of it. They have a tendency to jump to conclusions and seek simple solutions to their problems. Cyert and March (1963) even claim that if organizations want to achieve a reasonable manageable decision situation, they will have to develop plans that are not dependent on the prediction of uncertain future events. Quétier *et al.* (2009) relate this to forest and nature management by mentioning the study of Price (1989), who claims that foresters ignore the future because of the big uncertainties that comes with it.

Planning challenges

Planning appears to be a difficult venture and there are several reasons for this. The uncertainty that comes into play is the most obvious one. It is highly problematic to apply uncertainty into planning because you cannot plan for the unknown (Fitzsimmons, 2006). Furthermore, it is said that uncertainty is impossible to eliminate entirely (Abbott, 2005; Kato and Ahern, 2008). Still, there are a number of ways that can be used to reduce uncertainty. However, these methods also have their own challenges. Monitoring is proposed to be a way of reducing uncertainty (Kato and Ahern, 2008). However, it is often not practiced. Each planning situation is unique, which means that it takes time for data to accumulate. Furthermore, monitoring is time-consuming and the costs are often higher than expected beforehand (Kato and Ahern, 2008). The use of models is also suggested as a method of reducing (the influence of) uncertainty. However, even the best models have uncertainty in their predictions (Jokinen *et al.*, 2009). Also, even the best computation methods and optimization techniques cannot eliminate the problems and risks of forecasting (Leskinen and Kangas, 1998).

Another issue that involves reducing uncertainty is put forward by Lipshitz and Strauss (1997). Collecting additional information is one way of reducing uncertainty. However, in the real world, this is often problematic because in many cases, information is simply unavailable. In other cases information can be ambiguous or misleading to the point of being worthless (Feldman and March, 1981; Grandori, 1984). According to Freeman and Zeitouni (2003), the acquisition of information does not change uncertainty. Especially in environmental management, where the complexity of the ecological interactions that underlie environmental change challenges the management practices. This limits our ability to learn and understand, but also to predict more accurately. Abbott (2005) relates uncertainty to disagreement and claims that high levels of process uncertainty decrease the likelihood of gaining agreement. Trying to reduce and resolve uncertainty might be necessary for conflict resolution. So planning is not only impeded by uncertainty, but also by the fact that uncertainty can cause disagreement between the involved stakeholders.

It is also mentioned that the dilemma of planning is recognizing uncertainty (Fitzsimmons, 2006). The chance of being wrong while predicting the future is immense. Also, being too confident in ones predictions can lead to good preparations for the wrong future. However, resisting prediction often damages the rational foundations for making strategic choices and causes people to spread out their resources in an insufficient way. In trying to be flexible, people end up being well prepared for nothing. This contradiction makes that predictions need to be well thought of and robust across multiple alternative futures, while at the same time, still designed in such a way that they meet the challenges of the most likely future events (Fitzsimmons, 2006).

Kato and Ahern (2008) focused on landscape planning and explain why this type of planning is difficult. In this discipline, few science-based guidelines exist. It takes years for scientific knowledge to establish and landscape planners often do not have time to wait for the recommendations that follow from scientific research. Another reason why planning is difficult, is because it is hard to design a plan. As Seeley (1962) explains it, planning too immediate and constrained can cause effects to be cancelled out by uncontrolled variables (including the planning of others). At the same time, planning more removed and expanded increases the probability that its effects will be different from anything anticipated and the direction of the plans can be far removed from anything desired. Planning can also be hindered by limited resources. Where large bureaucratic organizations aim at controlling uncertainty by measurement and calculation, individuals in everyday life do not have the time, resources, nor the tendency to use such approaches (Alaszewski and Coxon, 2009).

Plans are designed to manage a certain situation, a particular system. However, many important decisions that are made today alter the state of the system, which changes the situation that is faced tomorrow. This feedback between the system and our decisions hinders the planning practice because decisions that are made today, based on the system as we know it today, can alter the system in such a way that our decisions are in no way relevant to the situation that is created (Sterman and Sweeney, 2005).

Disadvantages of planning

Besides the difficulties that are related to planning, there are a number of disadvantages mentioned as well. Planning is in a way, dealing with uncertainty. However, uncertainty sometimes causes people to plan short-term. Due to limited resources and uncertain futures, it might be rational to focus on the immediate risks instead of the uncertain dangers in the more distant future (Zinn, 2008). Fitzimmons (2006) claims that focusing on uncertainty generates flexibility, but at unknown cost, which can challenge the ability of making strategic choices. Furthermore, planning is often a reoccurring management practice, with a certain frequency. Simpson (1998) questions the routine of planning that often returns every year. There are several reasons why organizations should not plan annually. Besides the fact that routine processes produce routine results, planning involves the use of a tremendous amount of resources (e.g. working hours, time, money). Also, plans should be designed to last longer than the time frame it is established for.

Mintzberg (1994a; 2000) also mentions a number of pitfalls and fallacies of planning. Besides the commitment pitfall, the change pitfall and the politics pitfall, planning involves the fallacies of predetermination, detachment and formalization. The Commitment pitfall is mainly about the question whether management is indeed committed to planning, which is often not the case. Furthermore, planning can lead to outcomes that alter the system for which plans are made. The purpose of planning is to set the organization on a particular course of action, in a flexible way. However plans need to be inflexible to be effective. These issues form the Change pitfall. The third pitfall (the Politics pitfall) involves the climate of political activity which disturbs the orderly world of planning. Planning is typically described as an objective process, but planners are biased about planning itself and about their influence on strategy making. The fallacy of Predetermination concerns the fact that forecasting challenges the establishment of proper plans. Furthermore, plans need to be efficiently communicated between the different levels of an organization. However, this is often not the case and planners are frequently remote from the senior managers. The fallacy of Detachment represents this misconception. Lastly, the fallacy of Formalization involves the failure of forming plans altogether, including the failure of forecasting, programming to provide creativity, of the use of data and of scheduling to cope with the dynamics of the system.

2.2 Uncertainty

Uncertainty is the only certainty there is

John Allen Paulos
Professor of mathematics who gained fame as a writer and speaker on mathematics and the importance of mathematical literacy

2.2.1 What is uncertainty?

Coping with uncertainty is the essence of planning. The term uncertainty is used widely, but similar to the concept of planning, its definition remains vague. Ask ten people what they think uncertainty is and you will get ten different perceptions and descriptions of the same concept. This is reflected in the (scientific) literature; although a lot of definitions and descriptions seem similar, almost all of them differ in one way or another. Its definition depends on the context and the discipline it is used for (Ascough *et al.*, 2008). Most researchers focus on uncertainty related to (a lack of) knowledge. Simply put, uncertainty means that there is incomplete knowledge about a particular subject, it arises if something is unknown or cannot be known (Abbott, 2005; Ascough *et al*., 2008). According to Mack (1971:1), uncertainty is a counterpart of knowledge and she defines it as “the gap between what is known and what needs to be known to make correct decisions”. Anderson *et al.*

(1981) describe uncertainty in terms of knowledge about the probability that certain states of nature (will) occur. Neumayer (1998) adds that the resulting payoffs of the possible states are unknown too.

Weber (1997) adds time as an influential variable on knowledge, and relates this to uncertainty. Through time, knowledge can be known, unknown or unknowable. Known knowledge is all that is recorded and retrievable. Existing data and information that was not recorded, or that was lost after recording, falls under the category of unknown knowledge. Lastly, the unknowable is all of the non-existing information – it simply has not occurred yet. Going back to the timeline, Weber (1997) links time and knowledge as follows: Known and unknown knowledge lies in the past and the present. Logically, the unknowable exists only in the future. Because of this link between time and knowledge, uncertainty can be seen as the unknown, but mostly as the unknowable.

A number of scientists also consider uncertainty to be a subjective phenomenon. Sigel *et al.* (2010) combine the personal, subjective nature of uncertainty with the focus on knowledge and state that an individual is uncertain if *he* lacks *confidence* about his knowledge in relation to a specific question. This confidence can range between 'being certain' to 'admitting to know nothing (useful)' (figure 1). Therefore, uncertainty can be described as a spectrum between two extremes. They state that the 'spectrum of uncertainty' lies between a state of certainty on one side and lack of knowledge on the other. However, the transition between these three elements is continuous. In reality, it is close to impossible to clearly distinguish certainty from uncertainty and lack of knowledge. Still, it shows that uncertainty (including certainty and lack of knowledge) is characterized by individual beliefs and assumptions, and therefore a concept that can be interpreted in many ways and forms.

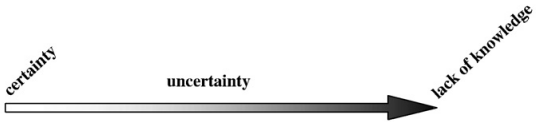

Figure 1: The uncertainty range (Sigel et al., 2010)

Another definition that describes uncertainty in the light of both personal feelings and knowledge is made by Abbott (2005:238), who states that uncertainty is "a perceived lack of knowledge" by either an individual or a group. Lipshitz *et al*. (2007) describe uncertainty as a subjective feeling, even though objective conditions often cause it (e.g. the rate at which environmental conditions change). Weber (1997) also puts subjectivity forward as an important part of uncertainty. He claims that this subjectivity is represented by the interpretation and evaluation that is carried out by decision-makers, in the various mechanisms that are used in decision-making.

Furthermore, it is important to stress the distinction between 'risk' and 'uncertainty'. Risk and uncertainty are often used intertwined. Zinn (2009) for example, states that uncertainty arises if the risks are increasingly unknown, which defines uncertainty as accumulated risk. According to Aslaszewski and Coxon (2009), the concept of risk describes both the threat posed by uncertainty as the response to such threats. However, albeit closely linked, risk and uncertainty are two different concepts (Knight, 1921). The difference lies within the probabilities of future events. Risk is present in casinos and stock markets; the future outcomes are unknown, but probabilities can be estimated. Conditions of uncertainty arise if there is no basis for estimating probabilities (Fitzsimmons, 2006; Sigel *et al.*, 2010). Essentially, risk is susceptible to measurement, the term 'uncertainty' is used for cases that are typically non-quantitative (Knight, 1921).

In this study, the definition of uncertainty as described by Abbott (2005) and Ascough *et al.* (2008) is used. According to Abbott (2005), people and organizations often become aware of this uncertainty when they have to make decisions or when they have to take action about the future. Something is unknown or cannot be known, which can lead to doubts in the decision-making process. Uncertainty is therefore seen as a knowledge gap. Furthermore, uncertainty is experienced by an individual, which makes it subjective. Therefore, this study will investigate if people close to the planning practices within the studied organizations experience uncertainty.

2.2.2 Types of Uncertainty

Searching through literature results in various and numerous definitions of uncertainty. The same goes for types of uncertainty. These types can potentially be divided into several categories (figure 2). Uncertainty-types related to knowledge are the most apparent. *Knowledge uncertainty* (also described as *epistemic uncertainty*) refers to incomplete knowledge of a situation (Bedford and Cooke, 2001; Regan *et al*., 2002; Ascough *et al.*, 2008; Nuttle *et al.*, 2009). According to Ascough *et al*. (2008), it is characterized by process understanding and model factors, which makes it possible to divide knowledge uncertainty into four subcategories. *Process, process understanding* or *phenomenological uncertainty* arises because the scientific understanding of complex processes that underlie the situation is limited (Ascough *et al*., 2008; Kato and Ahern, 2008; Sigel *et al.*, 2010). *Parameter* or *data uncertainty* is the type of uncertainty that is mostly described in literature (Funtowicz and Ravetz, 1990; Bedford and Cooke, 2001; Ascough *et al*., 2008; Maier *et al*., 2008). This kind of uncertainty follows from all sorts of measurement errors, methods of data collection and the presentation of the data. Uncertainty can also arise through the selection of variables in models, the way these variables relate to real life situations and the mathematical instruments and equations that are used to represent the physical and biological world (*model structure uncertainty*). Models provide a representation of the real world, though in a simplified manner, on which decisions about the future are to be made. The structure of these models is therefore a major source of uncertainty (Huijbregts *et al*., 2001; Walker *et al.*, 2003; Ascough *et al*., 2008). Furthermore, *technical uncertainty* is a result of hidden flaws and errors in the technical equipment that is used (Walker *et al*., 2003). The last three categories combined represent *model output uncertainty*, which is caused by the inconsistency between the true value of an outcome and the model predicted value. It is therefore sometimes refered to as prediction error (Ascough *et al*., 2008).

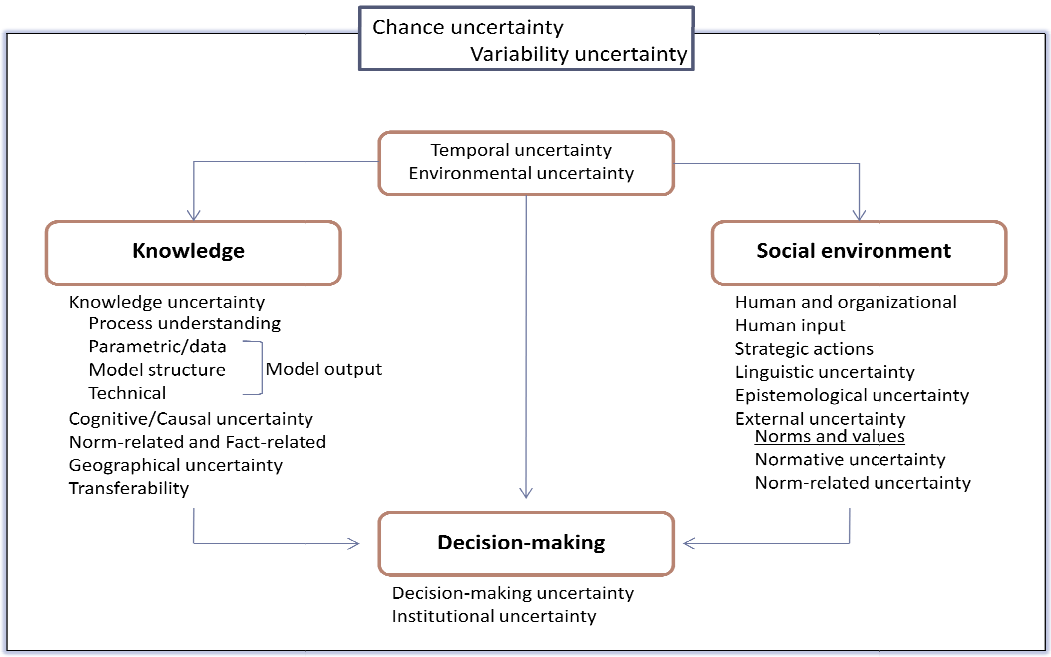

Figure 2: The uncertainty environment

Sigel *et al.* (2010) state that uncertainty is always related to knowledge. They distinguish two forms of knowledge that are very meaningful for decision-making: knowledge about facts and knowledge about norms and values. *Fact-related uncertainty* arises when an individual lacks confidence about his knowledge concerning facts. *Norm-related uncertainty* arises when an individual lacks confidence about his knowledge of norms and

values, or about the interpretation of them. However, these two types can be intertwined and their definitions seem incomplete. Just because a person feels confident about his knowledge on a particular subject, does not mean that this information is indeed accurate, or that other people feel confident about the knowledge as well.

However, these are not the only types that can be ascribed to the knowledge-related types of uncertainty. *Transferability uncertainty* is the uncertainty that follows from the synthesis of data across disciplines and scales (Kato and Ahern, 2008). *Geographical* or *spatial uncertainty* is caused by the uniqueness of each geographical area, and the uncertainties that follow from these unique characteristics. *Cognitive* or *causal uncertainty* relates to inadequate or unpredictable information about the basic causal relationships and effects of a particular issue (Granberg *et al*., 2008; Abbott, 2005). Weber (1984) makes another distinction between two types of uncertainty that relate to knowledge. Managers have to deal with a gap between what they want to achieve and what they already have or expect to achieve. Uncertainty then arises because the destination of their actions is unclear. Second, there can be uncertainty about the actions that need to be undertaken to close this gap.

Another group of uncertainty-types is that of the social environment, which is compiled of several types that have human influences written all over it. Within the social environment, there are two types that are linked to norms and values. Besides the earlier mentioned *norm-related uncertainty*, Granberg *et al*. (2008) describe *normative uncertainty.* This means that the choice between (societal) goals (e.g. human health and biodiversity) is not guided because of a non-shared set of norms and values. The first type within the framework of the social environment is *human input uncertainty*, described by Kato and Ahern (2008) and Maier *et al.* (2008). This represents the uncertainty that follows from the unpredictability of the behavior of people and organizations in the future (*strategic uncertainty* (Granberg *et al.*, 2008)), but also the uncertainty that might follow from personal characteristics and opinions which can influence an individual's motivation or capability to get involved. Abbott (2005) calls this type of uncertainty *human and organizational uncertainty*. The two types of knowledge-related uncertainty, as described by Sigel *et al*. (2010), are also placed into this category, because of the focus on the individual. Then, there are two types that strongly refer to the personal interpretation of several issues. *Linguistic uncertainty* is defined as the uncertainty that follows from the fact that language is context dependent, sometimes vague and ambiguous, and the interpretation of what is said might differ from what is meant. *Epistemological uncertainty* is said to be similar to *knowledge* and *epistemic uncertainty* (Ascough *et al.*, 2008). However, Sigel *et al*. (2010) describe this type as the uncertainty that is represented by the cognitive abilities of a person to perceive and interpret the present phenomena. The last type in this category is related to the social environment as a whole. *External uncertainty* arises because of the wider social environment and how this environment will relate to the situation and how it will influence the situation (Abbott, 2005).

The last box in this framework is comprised of the uncertainties that relate to decision-making. *Decision-making uncertainty* arises when quantifying or comparing social objectives is delayed or blocked because of controversy or uncertainty about how to do it. It can also relate to the interpretation and communication of model predictions, especially concerning future actions (Ascough *et al.*, 2008). The second one, *institutional uncertainty,* follows from the fact that decision-making takes place in different places and at different levels (Granberg *et al.*, 2008).

Furthermore, there are four types of uncertainty that do not fit into any box. These types are more general and widespread. Therefore in this figure, they enclose all other types mentioned above. Above all others, *variability uncertainty* and *chance uncertainty* are important. *Variability uncertainty* (also *objective* or *random uncertainty,*) emerges through the inherent variability that is present in any system. It is characterized by the components of natural, human, institutional and technological variability (Walker *et al.*, 2003; Ascough *et al.*, 2008). *Chance uncertainty* arises from unforeseeable chance events that affect the situation (Abbott, 2005). These two types are especially relevant in the light of forest and nature conservation. Both are very much present in the natural environment, because of the unpredictable change that occurs in natural systems, and through the natural variability that gives rise to the enormous variety of organisms, even within the same

species. When adding the factor time, as in looking into the future, *temporal uncertainty* and *environmental uncertainty* come into play. The definitions of these types are similar, but they are mentioned separately because different studies proposed these types. *Temporal uncertainty* arises because the future is unknowable and therefore uncertain (Weber, 1997; Huijbregts *et al.*, 2001; Kato and Ahern, 2008). *Environmental uncertainty* is defined as enclosing all the uncertainties about the expected future, experienced by everyone (Abbott, 2005).

Within forest and nature management, the different types of uncertainty are categorized as well. Price's (1989) categories are considered to represent a general classification of main aspects in decision-making in forestry. This differentiation is, very practical, based on the source. The natural environment (1) is the most important category. Most of the natural components are beyond human control, which induces uncertainty. Also, technological advances (2) such as the use of new machinery that enable activities that were impossible before (e.g. helicopters for logging) bring about uncertainty in the management of natural resources. Then, (3) human behavior causes an unpredictable social setting and the unpredictability of (4) markets contribute as well. Lastly, the political environment (5) has a strong influence in natural resource management due to its changing course and unpredictability.

The framework as mentioned in this part represents some, but not all of the uncertainties that are important for this study. It is mainly used to shed some light on the numerous different types of uncertainty that are present. Also, it shows that there are a lot of ways in which planners are susceptible to uncertainty and they might not even be aware of it.

2.2.3 Sources of Uncertainty

If one wants to reduce uncertainty, it is important to know where it originates from (Sigel *et al.*, 2010). Future developments are one of the most important and obvious sources of uncertainty (Eriksson, 2006; Hoogstra, 2008). In relation to forest management, price movements and technological change are unpredictable events that might influence future actions (Leskinen and Kangas, 1998). For example, Wilson and Baker (2001) mention uncertainty concerning future markets (demand), objectives, regulations and labor availability. The long time horizons involved in forest planning make it even more difficult (Convery, 1973; Wilson and Baker, 2001; Kangas and Kangas, 2005). Uncertainty also arises through the dynamics of the natural environment itself, such as the risk of damage by forest fires and wind throws (Eriksson, 2006; Heinonen *et al.,* 2009), or simply the fact that the environment changes continuously (Bourgeois, 1985; Jepson, 2001). Weber (1997) also stresses the influence of uncertainty due to the unknowable future, which is uncertain for all decision-makers, whatever type of business they are in. For forest and nature management, the future is a major source of uncertainty because of its long time horizons. A longer time frame means a higher level of uncertainty due to an increased number of variables that interact through time (Leskinen and Kangas, 1998; Hoogstra, 2008). Weikard (2003) mentions several other kinds of uncertainties that decision makers in nature management face. First, uncertainty arises because it cannot be known for certain that an ecosystem will maintain its features over time, i.e. remains stable. Then, he also mentions that disasters (both natural and man-made) can influence the ecosystems conditions. Lastly, limited information about an ecosystem can cause uncertainty about for example the number of species in a particular ecosystem.

Uncertainty about the future is not the only relevant source of uncertainty. Another important source of uncertainty is knowledge, or a lack thereof. The uncertainty that is related to incomplete knowledge is often referred to as *epistemic uncertainty* (Bedford and Cooke, 2001; Regan *et al.,* 2002; Ascough *et al.,* 2008). Information about the past and present might be incomplete or uncertain. This includes information about occurrences in the past, events in the current environment and about the views and intentions of other individuals or groups (Abbott, 2005). Nuttle *et al.* (2009) have studied ecological modeling and claim that there

is a lot of uncertainty in the understanding of causes, effects and the relation between the two, due to incomplete, qualitative and fuzzy ecological knowledge that is often presented verbally or in a diagram. They mention six sources of this knowledge-related uncertainty within ecological models. It arises through the system structure, quantity vagueness, unknown processes, unknown functional relationships, uncertain simulation outcomes and uncertainty about the explanation of outcomes (Nuttle *et al.,* 2009).

Quétier *et al.* (2009) suggest three sources of uncertainty that are not related to knowledge. They differ between uncertainties related to the impact of change on ecosystems and two more socially colored sources. According to them, uncertainty also arises through the way ecosystems are valued and what they call social adaptation. This means that the relationships between ecosystem properties and ecosystem services is important. Social adaptation focuses on the question which ecosystem services will be of importance to certain (groups of) stakeholders in the future. Lastly, Sigel *et al.* (2010) distinguish between fundamental and practical causes of uncertainty. Fundamental causes are subdivided into phenomenological uncertainty and epistemological uncertainty. Sigel *et al.* (2010) use the example of weather forecasts to explain these concepts. There is uncertainty in weather forecasts due to (1) the unpredictable nature of the processes in the atmosphere (phenomenological cause) and (2) the models are not sufficient to provide precise descriptions of the relevant processes (epistemological cause). Practical causes are most relevant for decision-making. These causes are represented by the reasons why it is not possible in practice to generate 'certain' knowledge.

There are different categorizations of both the different types of uncertainty and the sources of these uncertainties. Some of these differentiations overlap. This study investigates if uncertainty is experienced by the people that are responsible for planning. This means that the type of uncertainty or its origin is less important for this research, the focus is on the fact whether uncertainties are experienced or not. It was mentioned here to give an insight into the many ways in which uncertainty can influence the planning process.

2.2.4 Coping with Uncertainty

The problem with uncertainty

Uncertainty is said to be an obstacle to effective decision-making (Corbin, 1980; Orasanu and Connolly, 1993; Lipshitz and Strauss, 1997; Osman, 2010). The management of natural resources is a difficult venture because of the high levels of uncertainty in combination with the irreversibility of changes. Ecologists and decision makers need to make predictions and understand systems. However, many environmental processes are not fully understood because of incomplete knowledge (Osman, 2010). Furthermore, these processes involve stochastic elements (i.e. the behavior of the process is unpredictable) and the consequences of exploiting environmental resources are often unpredictable as well (Freeman and Zeitouni, 2003; Nuttle *et al.*, 2009). Today, one of the most pressing environmental issues that deals with uncertainty is climate change (Neumayer, 1998). Scientists have made predictions, there is *some knowledge* about the climatic consequences of global warming, we can *imagine* that the world is going to change because of it, and there is *some idea* about the probability of certain states of the world. However, nothing is known for certain (IPCC, 1996).

In contrast to this, Daniels (2009) claims that it is not uncertainty that makes decision-making hard. According to him, scientists have access to the most advanced methods and technologies, which eliminates scientific uncertainty. The understanding of for example biology, hydrology and the human impact on the environment is extensive through methods like computer modeling and remote sensing. For Daniels (2009), it is not scientific uncertainty that is the biggest problem environmental planning faces, but a lack of political will.

It seems that Daniels is alone in this. Several studies mention uncertainty, mainly caused by the unknown future and long time perspectives, as an important hurdle (e.g. Craver, 1973; Mintzberg, 2000; Hoogstra, 2008; Kato and Ahern, 2008; Osman, 2010). As to be expected, this study also considers uncertainty to be a problem. It can result in inefficiency due to the unpredictability of the future that might influence decision-making. Not only is the future unknown, it is also unknown if the strategies that are agreed upon are the right ones for that particular situation.

The importance of coping with uncertainty

Several scientists indicate that it is important to deal with uncertainty. Lipshitz and Strauss (1997) confirm this by stating that coping with uncertainty lies at the heart of making a decision, because uncertainty blocks or delays decision makers to take action. Maier *et al.* (2008) agree and claim that uncertainties about all factors of the decision-making process need to be taken into account explicitly. In practice, decision makers often have to decide if they will make a decision based on their actual (uncertain) knowledge, or if they first have to try and reduce this uncertainty (Sigel *et al.,* 2010). Either way, not taking uncertainty into account can cause a lot of trouble. Not understanding and dealing with uncertainty is costly, due to less desirable or unforeseen outcomes, lost opportunities or negative impacts (Mack, 1971; Abbott, 2005).

Strategies for coping with uncertainty

There are several studies that propose strategies for dealing with uncertainty. One of these strategies is that of adaptive management, presented by Holling (1978), which is used to deal with the complexities involved in ecosystem management. Originally developed to deal with the inherent uncertainty in complex systems, this management approach embraces uncertainty and manages adaptively. It involves the confrontation and minimization of uncertainty through the (re)assessment of how feasible and effective planning decisions really are. Furthermore, it focuses on the risks that are present in each stage of the planning process and it acknowledges a lack of understanding complex and dynamic ecosystem processes (de Boo and Wiersum, 2002; Kato and Ahern, 2008). Uncertainty challenges and complicates the planning process, but it also stimulates the appliance of the adaptive approach to planning (Kato and Ahern, 2008).

Most approaches include the collection of information and understanding of either the system or the uncertainty that is present in that system. Zinn (2008) mentions three strategies to manage uncertainty; two 'ideal' types, rational and irrational decision making, and a third one that is a mixture of the former two. Rational strategies involve decisions that are made based on (scientific) knowledge. Irrational decision making is influenced by personal context, feelings or beliefs and includes using trust, intuition or emotion. According to Alaszewksi and Coxon (2009), the risk approach is a proper way of managing the concerns that are caused by uncertainty. This approach is supposed to enable the management and control of uncertainty through measurements and calculations by using statistics and probabilities. Smithson (1989) proposes a three-step approach to manage uncertainty. First, it is important to make sure that decision makers are well aware of the situation by ensuring all necessary information and understanding is present. Then, as much control or predictability as possible needs to be achieved through learning and responding to the environment in a proper manner. Finally, if the so-called ignorance cannot be reduced, uncertainty needs to be handled statistically. According to Allaire and Firsirotu (1989), environmental uncertainty is often handled through a number of "power responses". These include the shaping and controlling of external events, passing the risk on to others, and administering competition.

Lipshitz and Strauss (1997) distinguish three basic approaches to cope with uncertainty. One can *reduce* uncertainty, *acknowledge* uncertainty, or *suppress* it. Tactics to *reduce uncertainty* include collecting additional information before a decision is made (as mentioned by many others in this paragraph), or postponing the decision until additional information is available (Hirst and Schweitzer, 1990). In case there is no information at hand, uncertainty can be reduced by extrapolating from information that is available. Several extrapolation methods are discussed. First, information on past and present events can be used to make predictions through statistical methods (Allaire and Firsirotu, 1989; Bernstein and Silbert, 1984). Another method is the application

of assumption-based reasoning. This approach aims at filling up knowledge gaps by making assumptions that are continuously adapted to fit whatever new knowledge becomes available. Uncertainty can also be reduced by shortening time-horizons, which improves the predictability of future events. This is done by for example favoring short-term over long-term goals. Furthermore, uncertainty is reduced by controlling the sources of variability through incorporating critical elements into the organization or by establishing long-term contractual agreements (Lipshitz and Strauss, 1997).

The second strategy is to *acknowledge uncertainty*, which can be used when reducing uncertainty is either impossible or too expensive. Acknowledging uncertainty can be done in two ways. The first way is taking uncertainty into account during the definition of a course of action. Secondly, decision makers can acknowledge uncertainty by preparing to avoid or confront potential risks. *Suppressing uncertainty* is the third proposed strategy, which involves the denial of information and tactics of rationalization. Undesirable information is sometimes deformed or ignored, which undermines the presence of uncertainty. Rationalization is done by symbolically managing uncertainty by simply 'going through the motions' of reducing or acknowledging uncertainty (Lipshitz and Strauss, 1997).

There are several others that focus their studies on the strategy of reducing uncertainty as well. Kato and Ahern (2008) focus on landscape planning and propose 'learning by doing' as a way to cut back uncertainty within this field. This approach is focused on perceiving uncertainty as an opportunity to learn from, rather than an obstacle. It involves feedback loops that assure that decision makers are provided with the monitoring results in time, which enables them to establish appropriate policies, or to alter plans or management practices in a proper way. According to Kato and Ahern (2008), learning by doing can fulfill the need for an understanding of the inherent uncertainties in landscape planning, so that strategies to address these uncertainties are well-informed. Furthermore, a transdisciplinary approach is suggested. Tress and Tress (2001) argue that a partnership of professionals, stakeholders, decision makers and researchers is needed to provide a framework for collaboration and information sharing, with explicit roles for each discipline within the process. This will help enhance the understanding of the situation, enlarge the availability of necessary information and in this way, it reduces uncertainty. Uncertainty can also be decreased by the use of control behaviors (Osman, 2010). Control behaviors are actions and decisions that are guided by goals. In order to generate particular future events, control behaviors involve the generation and application of actions that are goal directed (Lerch and Harter, 2001; Rossano, 2003). These behaviors can reduce uncertainty through the generation of feedback, which can be used to update and enhance the understanding of a task.

Another key action to reduce uncertainty is to improve the understanding of a system over time through monitoring. It provides more recent and complete data about the specific location(s) that are affected by the plan or management actions, on which succeeding decisions are made. Monitoring is used in several ways. First, it enables the assessment of the effectiveness of a project, plan, policy, or management practice. The results can be used to improve goals and objectives or management actions. Second, it can produce important basic information if no prior data are available. This information is then used to guide future decisions and actions. Most importantly, monitoring is used to assess the impact of management actions during its application and afterwards (Kato and Ahern, 2008). However, the variables on which the monitoring is based need to be clear and agreed upon by all stakeholders. Another requirement is that the goals and objectives are clearly stated. Furthermore, the method of monitoring needs to be complemented to the setting in which the planning occurs. If not, there is a risk of having too many variables which challenges the assessment of progress towards goals, but also the evaluation afterwards (Kato and Ahern, 2008).

Sigel *et al.* (2010), differ between uncertainty caused by a lack of knowledge and uncertainty caused by a lack of confidence about knowledge. Related to this, they suggest two ways of reducing uncertainty. A lack of knowledge can be improved by generating knowledge, an often proposed solution. Another way of reducing uncertainty is then to enhance confidence about given aspects of knowledge by for example ensuring that this knowledge flowed from reliable sources. Because according to Sigel *et al.* (2010), empirical work showed that uncertainty is not handled systematically, they introduce a method that combines the standard scientific

approach (i.e. probability theory) with what is feasible in practice. First, any potential source of uncertainty needs to be identified and, if possible, prioritized. Then, these sources need to be subdivided into one of two categories: fact-related uncertainty (arises when an individual lacks confidence about his knowledge on certain facts), or norm-related uncertainty (which arises when an individual lacks confidence about knowledge concerning norms and values). This step is followed by tracing the relevant causes of uncertainty and assessing the reducibility of this uncertainty. Lastly, some of these uncertainties can be quantified by using probabilities.

Abbott (2005) mentions Friend and Jessop's (1969) three dimensions of uncertainty and their corresponding action plans. According to them, uncertainty can affect the decision making process in three ways. There can be uncertainty in knowledge of the external environment (UE), about appropriate value judgments (UV) and about the future intentions of people and organizations (UR). Each type of uncertainty calls for a different course of action to address it. UE requires more research, which leads to more information and analyses and therefore a better understanding of the (physical, economic, social and natural) environment. UV needs more policy guidance and UR needs more coordination to broaden the field of decision, so that involvement is maintained.

Forecasting

Forecasting is an inevitable action when one tries to cope with the uncertainty about future events and the corresponding course of action. Menke (1979) claims that current prediction and forecasting practices are useful processes in subsequent planning and decision making. Predictions are then made through modeling, time series extrapolations, environmental analyses or pure judgment (Menke, 1979; Zinn, 2009). Moyer (1984) suggests that dealing with uncertainty is better done by relying on scenarios than forecasts. Forecasts imply that the future is measurable and controllable, scenarios are based on the belief that it is not. Scenarios provide some of the key factors that need to be taken into account and then show how these factors can affect the process. Forecasts try to quantify the future, while scenarios are tools to guide the process of decision making. Another downside to forecasting is that it is often secluded from decision making, which challenges an organization's ability to cope with uncertainty (Fildes *et al.,* 1978). Because the future plays a crucial part in every decision-making process, Craver (1973) suggests a number of tactics to reduce the uncertainty of the future. One of them is, similar to Moyer, the construction of scenarios. Other strategies include the application of one or more trend extrapolation techniques and relying on subjective opinions of experts.

Difficulties in coping with uncertainty

According to Sigel *et al.* (2010), uncertainty is always reducible. The approaches to cope with uncertainty are numerous and by reading them it all seems so simple. However, in practice, it might not be that easy. Despite all efforts to reduce uncertainty as much as possible, it can never be fully avoided (Abbott, 2005; Kato and Ahern, 2008). The biggest reason for this is that planners will never have all necessary information about the systems they work in (Kato and Ahern, 2008). Other reasons can be developments and factors that cannot be influenced or controlled, the close to impossible prediction of both the behavior of humans and dynamic systems, the emergence of unpredictable events and a restricted capacity of analyses due to limited financial resources (Sigel *et al.,* 2010). Abbott (2005) adds that time is also an important resource that restricts the full elimination of uncertainty. When focusing on forest and nature management, reducing uncertainty is challenged because the probability of damage (e.g. wind throw risk, risk of fires) changes continuously due to growth, interactions between tree stands and altered management actions (Heinonen *et al.,* 2009). Furthermore, it is not for certain that uncertainty can be reduced. Sometimes, for example, the production of new information can generate new questions and thus new uncertainty (Sigel *et al.,* 2010). Several methods of reducing uncertainty are proposed, but there does not seem to be one particular solution to the problem. According to Mintzberg (2000), thé way of dealing with uncertainty is to plan, which is also the focus of this study. The next paragraph will introduce the ten types of planning (Mintzberg and Lampel, 1999) that can be used to cope with uncertainty.

2.3 Uncertainty and Strategic Planning

2.3.1 Levels of Planning

There are several types of planning to be recognized in literature. Traditionally, forest and nature management was characterized by three different types of planning (or planning levels); normative planning, operational planning and strategic planning (Ozbekhan, 1969; Graham Smith, 1982). *Normative planning* concerns the organization as a whole. It is focused on the systematic reflection on the organization and deals with the position of the organization within the social environment. Examples of important factors are the norms and values, the credibility of the organization and external communication (Ozbekhan, 1969; Graham Smith, 1982). *Strategic planning* is one of the most mentioned types of planning in literature. Generally, a strategy defines the direction of the organization, how to fulfill its purpose and how to achieve its mission (Mintzberg, 2000). Strategic planning is long-term planning. It is designed in order to guarantee the survival of the organization and concerns the organization's mission, its direction and future goals. This type is mostly based on three factors; an analysis of the current conditions and situation, the desired targets in a particular timeframe and which path to follow in order to reach the desired goals (Ozbekhan, 1969; Graham Smith, 1982; Shrader *et al.*, 1989; Mintzberg, 2000). Strategic planning in forest and nature management deals with the same factors, but on the level of the area to be managed and often based on the five questions of Leibundgut (1973), or at least a number of them:

- What types of forest/nature are present
- How did these types come together
- In what direction do these types develop naturally
- What development is desired
- How to reach these developments

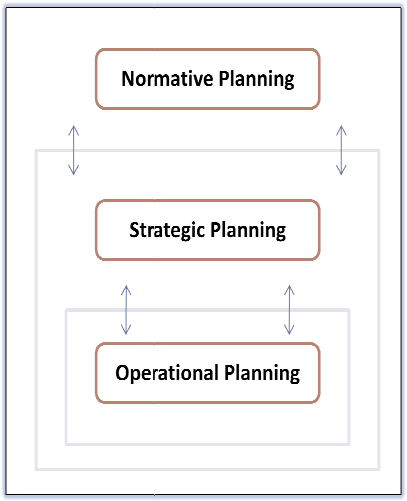

Figure 3: Relationship between planning levels

Operational planning is, similar to strategic planning, focused on future activities, however in relates to the short term. The goals and objectives for an organization and the strategy to reach these, formed in strategic planning, is concretized in the operational planning. It is concerned with explicit activities that need to be carried out in the coming year(s) to realize the organization's strategy. They might include sales forecasts, a written inventory and budgets for monthly or quarterly time periods (Ozbekhan, 1969). Operational planning often has a time span of one or two years. Strategic plans are more general and cover longer time periods (Graham Smith, 1982; Shrader *et al.*, 1989). Put differently, strategic planning is about 'doing the right things' and operational planning is about 'doing those things right'. The three planning levels are strongly connected. On the lowest level of operational planning, the organization determines the means to reach the goals on a higher level; both strategic and normative planning (figure 3).

The focus of this study will be on strategic planning, in which uncertainty plays an important part due to the fact that it involves planning for the long term (Shrader *et al*., 1989; Mintzberg, 2000). Strategic planning has different classifications. Brews and Purohit (2007) divided strategic planning into four dimensions. First, *symbolic planning* involves plans that include a long-term vision or mission for the enterprise. Plans that involve a complete formulation of specific goals, action plans and budget-based routines that were formally formed, are so-called *rational plans*. During *transactive planning*, plans are constructed repeatedly and on an ongoing basis. These plans are formed to continuously adapt and respond to (market)feedback. The fourth, dimension,

generative planning, encompasses plans that encourage innovation. Generative and transactive planning are strongly associated with environmental instability. Symbolic and rational planning are mainly used to provide structure and stability in the organization (Brews and Purohit, 2007).

Hudson *et al.* (1979) mention some of these types too. They defined five different dimensions. The dominant tradition within planning is that of *synoptic planning*, which has four classical elements: goal-setting, identification of policy alternatives, evaluation of means against ends and the implementation of policy. *Incremental plans* are plans that are established through the union of experience, intuition, rules of thumb, a variety of techniques and numerous consultations. They also mention *transactive planning* as an important type. Their definition is different to the one Brews and Purohit (2007) put forward. According to Hudson *et al.* (1979), transactive planning involves face-to-face contact with people that are affected by the decisions. It is characterized by a process of mutual learning. The emphasis is more on personal and organizational development instead of achieving specific functional objectives. In contrast to what is said by Brews and Purohit (2007), Hudson *et al.* (1979) do not mention the continuous evaluation and changes that are made. Their fourth type is *advocacy planning.* This planning is usually put into action to defend the interests of the weak against strong community groups or large organizations, to defend environmental causes, or to defend the poor and disenfranchised against the powers of business and government. Lastly, they mention *radical planning*, which consist of two versions. The first is focused on substantive ideas about collective actions which make it possible to achieve concrete results in the immediate future. The second stream is about critically and holistically looking at large-scale social issues. It focuses on the theory of the state, which characterizes the social and economic environment and determines the evolution and structure of social problems.

In forest and nature management, different modes of strategic planning can be recognized. The rational approach has always been the most important idea (Mohai, 1987; Bengston, 1994). Within this approach, planning is based on (scientific) knowledge, which decreases uncertainty (Zinn, 2008). For the last decades, the idea of adaptive management has gained importance (Holling, 1978; Boo and Wiersum, 2002; Kato and Ahern, 2008). Mintzberg and Lampel (1999) also recognize these two approaches, but include more ideas. Their classification forms the basis for this study. In short, they propose that strategic planning can be divided into ten different types or 'schools' of planning. These planning schools will be further explained in the next part. Nevertheless, this study's focus is not on the different dimensions of planning but on the way people plan and the resulting planning practices. As interesting as the different theories are, the most important part of this study is about getting an overview of strategic planning in the field.

2.3.2 Schools of Planning

The different advantages and disadvantages of planning have led to different approaches to planning; people handle planning as they find most suitable in the environment they work in. Some studies put forward that there are several planning theories that describe what and how certain situations need to be approached. Two critical theoretical studies (Lawrence, 2000; Richardson, 2005) have highlighted the major planning theories. Lawrence (2000) claims that there are five planning theories:

- Rationalism
- Pragmatism
- Socio-ecological Idealism
- Political-Economic Mobilization
- Communications and Collaboration

The first theory is simple, explicit and adaptable. *Rationalism* is defined by decision-making which is strongly centralized with clear and agreed upon objectives. Furthermore, the addressed problems are simple, and because of stable environmental conditions, there is a high degree of scientific knowledge. The planning that

follows from this theory is systematic, consistent and logical. *Pragmatism* is also applied to stable environments, but the complexity of the problems results in a limited availability of information and resources. The pace of change is slow, but the dispersion of decision-making makes planning challenging. Planning within this theory is based on the assumption that knowledge-based experience should guide planning action. The third, *Socio-ecological idealism* is used for complex, interdependent problems in which change is disordered. Within this type of planning, democratic institutions are participating. Decision-making is weakly centralized, and innovation and creativity is required. Also, there is consensus about the environmental and social values within the problem. *Political-economic mobilization* is applied to social and environmental equity and justice issues, when traditional planning and market forces are failing to address the needs of the community. This planning is challenging because the interests are often diverse and conflict arises because of that. The fifth approach is that of *Communication and collaboration.* This type is defined by an open and collective way of decision-making. The problems that are addressed are moderately complex, and an environmental and social acceptable middle ground is sought. The power of all relevant parties can be imbalanced, but all parties are willing and able to participate in the debate and discussions.

Next to the classifications by Brews and Purohit (2007), Hudon *et al.* (1979) and Lawrence (2000), Mintzberg and Lampel (1999) propose a categorization of planning as well. The different theories are closely linked with some overlap between them and based on the same basic principles. However, Mintzberg and Lampel's theory is more detailed. Also, their classification has a more concrete nature. Therefore, this study is based on the principles put forward by Mintzberg and Lampel (1999): the ten 'schools of planning'.

The ten 'Schools of Planning'

Canadian scientist Henry Mintzberg is an internationally renowned author on business strategy and management. It is therefore no surprise that his work is used as a basis for this study. Together with Lampel, he investigated the evolution of strategic planning and identified ten 'schools'. These perspectives represent both different parts of the same process and fundamentally different processes of strategic planning. In other words, aspects of the different schools can all be present in one and the same planning process. However, Mintzberg prefers to mention the different schools separately. For this study, it is also important that the schools reflect ten different methods to carry out planning practices. Table 1 presents an extensive overview of all types. It describes the main focus of the planning process per school, its objectives, a description of the school and the approaches that are often used. Furthermore, it represents how people within the planning school view the external environment (in a range from controllable to unpredictable) and their view on the internal processes (in a range from rational to natural). The aim is to ascribe the planning practices of a number of Dutch forest and nature management organizations to a certain planning school. For this purpose, the schools are divided into a number of criteria.

Table 1: The Schools of Planning and their characteristics

	Design school	Planning school	Positioning school	Entrepeneurial school	Cognitive school
Process	A process of conception	A formal process	An analytical process	A visionary process	A mental process
Intended message	Fit	Formalize	Analyze	Envision	Cope or create
Realized message	Think	Program	Calculate	Centralize	Worry
Description	Achieving the essential fit between internal strengths and weak-nesses and external threats and oppor-tunities; Clear, simple and unique strategies in a deliberate process of conscious thought	Process is not just cerebral but formal, decomposable into distinct steps, delineated by checklists, and supported by techniques	Planners are analysts: Strategy selected through formalized analyses of industry situations	Plans are visions or broad perspectives of a creative leader who has close control over the implementation of his/her vision	Strategies are developed in people's minds as frames, models, maps, concepts or schemas; cognition is used to construct strategies as creative interpretations
Approach	Dynamic capabilities	Soft techniques (scenario and stakeholder analysis)	Negotiated strategy; strategic maneuvering	Intrapeneurial (venturing); revolutionary change	Constructionism; institutional theory
External world	Comprehensible, controllable	Comprehensible, controllable	Comprehensible, controllable	Comprehensible, controllable	Unpredictable, confusing
Internal process	Close to rational	Rational	Rational	Natural	Natural

	Learning school	Power school	Cultural school	Environmental school	Configuration school
Process	An emergent process	A process of negotiation	A social process	A reactive process	A process of transformation
Intended message	Learn	Promote	Coalesce	React	Integrate, transform
Realized message	Play	Hoard (accumulate, stock away)	Perpetuate	Capitulate (surrender under agreed conditions)	Lump (tolerate, withstand)
Description	Strategies are emergent; strategists can be found throughout the organization; formulation and implementation intertwine	*Micro*: power can be divided, strategy developed within the organization through bargaining, persua-sion and confronta-tion; *Macro:* organi-zations use their power over others to negotiate 'collective' strategies	Strategy formation as a social process rooted in culture; focus is on common interest and integration	Illuminates the demands of environment; considers which responses are expected when facing particular environmental conditions; severe limits to strategic choice	Organization is a coherent cluster of characteristics and behaviors; transformation from relative stability to a dynamic configuration
Approach	Dynamic capabili-ties; Resource-based theory; Soft techniques; Chaos and evolutionary theory	Soft techniques; Institutional theory; Negotiated strategy; Strategic maneuvring	Resource-based theory; Constructionism	Chaos and evolutionary theory; Institutional theory; Intrapeneurial (venturing)	Revolutionary change
External world	Unpredictable, confusing	*Micro:* Unpredictable, confusing; *Macro:* Close to comprehensible	Close to unpredictable	Unpredictable, confusing	Close to comprehensible
Internal process	Natural	Close to natural	In between rational and natural	Rational	Close to rational

Mintzberg and Lampel (1999) do not mention uncertainty explicitly. However, it is reflected in their visualization of the ten schools (see figure 4). A number of planning types are characterized by a comprehensible, controllable external world. This indirectly means that while applying these types, no uncertainty is experienced. On the other hand, there are schools that are represented by an unpredictable, confusing external world, i.e. a world in which uncertainty plays an important part.

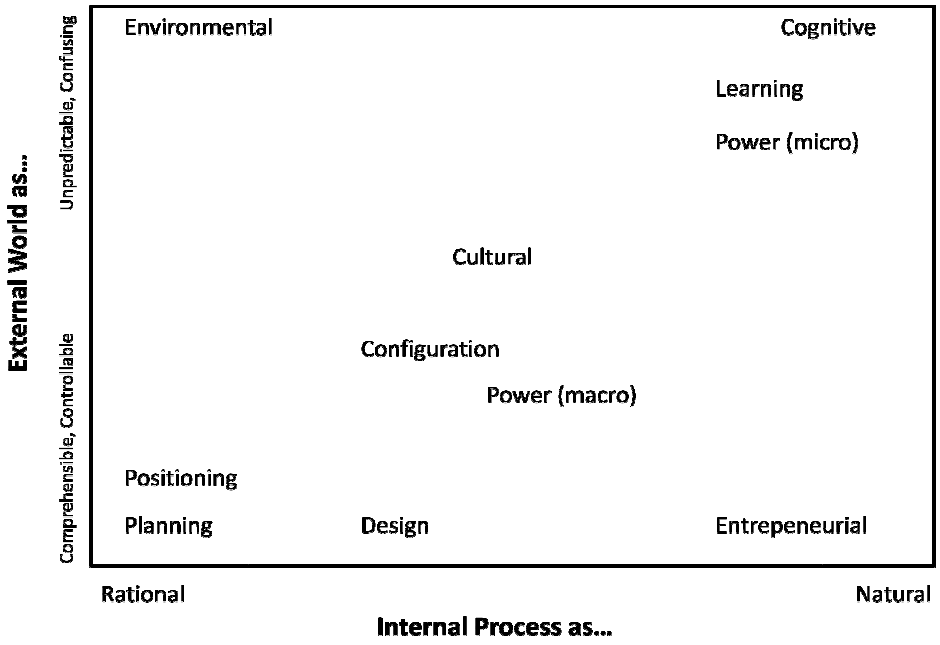

Figure 4: Strategy formation as many processes (Mintzberg and Lampel, 1999)

Furthermore, the types are divided according to a rational or natural approach to carry out internal processes. For example, the Environmental School has to cope with an unpredictable external world. This unpredictability however, can be solved rationally. Within the Learning School, the unpredictable environment cannot be dealt with systematically. For both axes (the external world and the internal process), there are a number of schools that are positioned somewhere along the gradient. The approach of the Design school for example, is not fully rational and not naturally manageable (Mintzberg and Lampel, 1999).

3 Methodology

Art and science have their meeting point in method

Edward Bulwer-Lytton(1803-1973)
English dramatist, novelist and politician

This chapter will elaborate on the methods that are applied in this research. First, the research approach is explained briefly. In the second part, the methods used for data collection is described. The analysis of these data will be described in the last paragraph.

3.1 Research approach

The study has an explorative character. An exploratory study is undertaken when not much is known about the topic of study (Yin, 1994) as is the case with the topic of management planning in forest and nature management organizations. So far, no overview exists of the planning practices used by forest and nature management organizations across the Netherlands. In other words, this research is focused on a first understanding of the phenomenon studied. In this study, data are gathered within a qualitative methodological framework. In contrast to a quantitative approach, which usually involves statistical analysis and relies on numerical evidence to draw conclusions on the phenomenon studied, a qualitative approach is characterized by the identification of themes and motifs through text-based analysis (Ticehurst and Veal, 1999; Jennings, 2001). Qualitative approaches are considered to be particularly appropriate when exploratory research is carried out (Patton, 2002).

3.2 Data collection

3.2.1 Method

Methods are the tools that are used to gather empirical data (Sarantakos, 1998; Jennings, 2001). This study makes use of semi-structured interviews for data collection. Interviews can be described as mere conversations from which information can be derived. Dexter (1970) elaborates a bit further on the nature of interviews as conversations. He sees interviews as conversations with a purpose. According to Oakley (1981), interviews are a bit more than that; they are pseudo-conversations, characterized by a set of rules to follow. For example, there has to be a relationship of mutual trust in order to get the desired results. Also, there should be a non-hierarchical atmosphere. Ticehurst and Veal (1999) mention another rule about the relationship between the interviewer and interviewee. According to them, the interviewer is not to engage in the conversation. He or she should only listen and encourage the respondent to talk. This method has the advantage of giving the respondent the freedom to openly discuss whatever comes to mind. This might reveal important issues. On the other hand, this approach might result in an interview that does not produce the desired answers. For this reason, the approach that is used in this research will not have this open character. The type of interview that is applied has a semi-structured nature.

Semi-structured interviews are characterized by a qualitative methodology, in-depth interviews and the use of a topic or theme list with generally open-ended questions (Jennings, 2001). In this way, the respondent will be forced to come up with his or her own answer, without being influenced by the (way of) questioning. The purpose is to bring forth the views of the interviewee. This will enable an objective division of the planning practice used by the organization for which the respondent is interviewed, into one of the ten 'schools of planning' as mentioned by Mintzberg and Lampel (1999).

Semi-structured interviews can also be labeled as conversations, but with a list of issues and themes that focus and guide the interaction. This type of interview has a fluid nature, but at the same time, has some structure through the use of the theme list (Jennings, 2001). According to Spradley and McCurdy (1972), semi-structured (and unstructured) interviews start with a number of so-called grand tour questions, to make respondents feel comfortable and to set the context for the interview. This study makes use of this type of questions as well.

There are a number of reasons why this approach is chosen:

- The respondent is not constrained to follow the interviewer's a priori reasoning
- Questions are not predetermined and presented, this enables the participant to ask for further clarification and detail
- The interview can be altered to follow the path the interviewee pursues, or to steer away from this path if it is heading in the wrong direction
- Follow-up questions can be framed to further extend responses

There are several other advantages to semi-structured interviewing (Jennings, 2001), the ones mentioned above are the most important and most relevant to this study.

In relation to an unstructured approach, the semi-structured approach has the advantage of being more structured which enables the interviewer to keep track of the conversation and keep an overview of what is said. Structured interviewing was an option as well. With structured interviews, there is a list of questions that is used. The interviewer runs through the list step by step and makes sure that each question is answered satisfactory. However, with this approach, there is no opportunity to follow through and ask about the motivation behind the given answer. This can result in missing important information. As opposed to structured interviewing, semi-structured interviews are open-ended and have the advantage that it is possible to explore and expand the given information. Here, a series of questions, statements or items are presented and the respondent is able to answer, respond to or comment on them in their own way (Cohen *et al.*, 2007).

However, there are a number of disadvantages to semi-structured interviews as well. For example, critics question the reliability and validity of the data collection because this style is closer to unstructured than structured interviewing (Jennings, 2001). To counter this drawback, the interviews will be recorded, after which transcripts are made. This enables a systematic analysis of the data. In this way, the reliability and validity of the data collection is being secured as good as possible.

Structure of the interview

The questionnaire was comprised of a number of categories (see Appendix B for the complete semi-structured questionnaire). The first part consisted of introductory questions (grand tour questions (Spradley and McCurdy, 1972)) about the interviewee's position within the organization and activities within this position. The second part was focused on the organization's approach to planning and included questions about the importance of planning, the development of the plans and who is responsible for it and the time period for which the organization plans.

Within the second and third part of the interview, a number of questions were focused on the planning practices of the organization and indirectly linked to the different planning schools. First, the interviewee was asked about the way in which the organization plans, to get an overview of their planning practices. Second, the interviewee was presented with ten different statements. These statements were based on the key concepts as proposed by Mintzberg and Lampel (1999) for the ten planning schools they have defined (see table 2).

Table 2: Statements about planning as presented to the interviewees

Planning School	English	Dutch – Planning is...
Design	*Process of conception*	een kwestie van het begrijpen van de situatie
Planning	*A formal process*	een formeel proces
Positioning	*An analytical process*	een kwestie van analyseren en systematisch te werk gaan
Entrepeneurial	*A visionary process*	vooruitzien; kansen grijpen en daarop inspelen
Cognitive	*A mental process*	een proces van nadenken; de planning komt voort uit de ideeën van één persoon
Learning	*An emergent process*	een leerproces dat zich naarmate de tijd vordert steeds verder ontwikkelt
Power	*A process of negotiation*	een kwestie van overleg
Cultural	*A social proces*	een kwestie van maatschappelijke belangen
Environmental	*A reactive process*	continu kijken wat er gebeurt en daarop reageren
Configuration	*A process of transformation*	het samenbrengen van ideeën en het aanbrengen van veranderingen

Also, the interviewee was asked to position the organization on two scales, which were based on figure 4. The first scale was about the internal processes in the organization and how planning can be characterized; as systematic and rational, or as a more natural process. The second scale was about the external world and where the organization fits on a scale from a 'comprehensible/controllable' environment to an 'unpredictable/confusing' one.

The last part of the interview was focused on the concept of uncertainty. Questions within this category included questions about deviating from the plans (and why) and if uncertainty is experienced during the development of the plans (and why). Furthermore, the interviewee was asked two final questions that were not explicitly linked to uncertainty but could give important insights into the planning practices of the organizations; whether the organization could do without planning and what the interviewee would like to change about the current planning practices.

3.2.2 Respondents

In order to get a clear overview of planning practices within forest and nature management in the Netherlands, ten different organizations were included in this study. These organizations were chosen in order to get a cross-section of all Dutch forest and nature management organizations. The purpose was to get an impression of the planning practices used in forest and nature management in the Netherlands. Therefore, this study is focused on a less in-depth research into different types of organizations (see table 3). Despite the differences between them, they all have to deal with their limitations as caused by uncertainty.

Table 3: Interviewed organizations

Organization	Type of organization	Description
Bosgroep Zuid	Private	Cooperative private association that supports its members[1] with the management of their forest and nature areas
Dienst Vastgoed Defensie (DVD)	National government	Department of the Dutch Ministry of Defense, concerned with management of the Ministry's real estate and terrains
Drents Landschap	Nature conservation organization	One of twelve provincial forest and nature management organizations in the Netherlands
Landgoed ter Coulster	Private	Small private estate located in the province of North-Holland
Landgoed Schovenhorst	Private	Private estate located near the city of Putten, in the middle of the Netherlands
Municipality of Ede	Local authority	Municipality centrally located in the Netherlands, managing own municipal forest area
Natuurmonumenten	Nature conservation organization	The largest national private organization that manages forest and nature areas across the Netherlands
Staatsbosbeheer	National government	National organization managing forest and nature areas upon instructions from the national government
Stichting Beheer Natuur en Landelijk Gebied (SBNL)	Other public organization	Advisory body and interests organization for private and agricultural nature management with a number of areas of their own
Stichting Hoge Veluwe	Private	Private organization managing the oldest and largest National Park in the Netherlands

In order to get valuable information, people were interviewed that are either responsible for nature management planning or knowledgeable about the planning practices within their organization. Because these people were not known beforehand, the organization as a whole was contacted in order to get to the right person. A number of interviewees were approached through contacts and a couple of interviewees were received through snowball sampling. A list of the names and functions of the interviewees is presented in Appendix A.

[1] Members include private owners, other nature management organizations and governments such as municipalities

3.3 Data analysis

3.3.1 Methods of Analysis

"Data analysis involves organizing what you have seen, heard and read so that you can make sense of what you have learned" (Glesne, 1999: 130). According to Jennings (2001), there are several ways to analyze qualitative data. For this study, using memos will be an important method that is put forward by Jennings (2001). Memos are made through the use of oral recorders (recordings are transcribed later) and through the (obvious) use of pen and paper to produce diary and field notes, which are used to supplement the transcriptions and observations. The purpose of using memos is to assist the researcher throughout the analysis phase (Strauss, 1987; Jennings, 2001).

The analysis in this study is based on the evaluation of the memos and the full transcripts of the interviews. The transcripts are analyzed and used to draw conclusions on the planning practices that are used by that particular organization. Here, another qualitative analysis as mentioned by Jennings (2001) comes into play: qualitative content analysis. This study makes use of this approach as described by Mayring (2000). According to him, the object of this type of analysis can be every kind of recorded communication (be it transcripts of interviews, protocols of observations, video tapes, documents, etc.). The analysis is done step by step, following certain rules of procedure. The aim is to ascribe the planning practices of a number of Dutch forest and nature management organizations to a certain planning school. For this purpose, the schools are divided into a number of criteria. This makes that the different schools of planning represent the different categories that accompany a qualitative content analysis.

3.3.2 Deductive Category Application

Mayring (2000) developed a number of procedures for qualitative content analysis, with two central approaches: inductive category development and deductive category application. A deductive category application was used during the analysis. The texts were analyzed with predetermined categories. This method works with prior formulated, theoretical derived aspects of analysis and linking them to the text. The qualitative step is a methodological controlled assignment of the category to a passage of text. Here, it means that the transcripts of the interviews (the texts) are assessed to see if the organizations linked to these texts can be ascribed to any of the ten planning schools by Mintzberg and Lampel (1999) (the categories). The steps used to carry out this approach as described by Mayring (2000), are shown in figure 5.

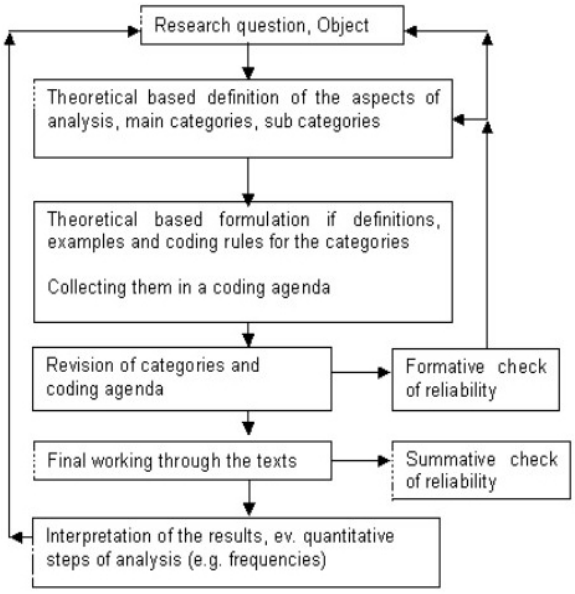

Figure 5: Step model of deductive category application (Mayring, 2000)

The essence here is to develop definitions, examples and coding rules for each deductive category (here: planning school). This makes it possible to determine exactly which category a text passage is coded with. The category definitions are summarized within a so-called coding agenda (Table 1 in paragraph 2.3.2). In this study, each text is assessed on four points that point out a certain category:

1. The organization's description of current planning practices
2. Which statement is most relevant for the planning practices within the organization
3. Where is the organization placed on a scale from rational planning to natural planning
4. Where is the organization placed on a scale from a comprehensible environment to an unpredictable environment

For this study, the coding rule is that a text can be ascribed to a certain category, if three or more of these four points clearly point out the same planning school. The analysis will then produce an overview of the planning practices used in the field throughout forest and nature management organizations and private owners in the Netherlands and how these practices deal with the uncertainty that arises during the planning process.

4 Results

For my part I know nothing with any certainty,
but the sight of the stars makes me dream

Vincent van Gogh (1853-1890)
Dutch painter, one of the greatest of the Post-Impressionists

This chapter presents the results of this study. The transcripts of the interviews are interpreted and the interpretation is elaborated in a number of subjects. First, the planning practices will be explained. Next to an overview of how the different organizations develop their plans, it is also shown what planning periods are applied, how the responsibility of planning is divided within the organization, why planning is important for the organizations, if organizations deviate from their plans and why. The second paragraph explores the concept of uncertainty in light of the interpretation of the transcripts. The last part investigates if the different organizations can be assigned to one particular planning school as proposed by Mintzberg and Lampel (1999).

4.1 Planning Practices

4.1.1 Developing Plans

Although the different organizations have different approaches to planning, overall, the planning in the different organizations has the same elements; first an inventory of the situation is carried out, then the objectives are established or reassessed and lastly, the way to reach these goals is defined. Some organizations, for example, apply a different sequence of the general elements, others have additional elements such as the participation of other parties. Landgoed Schovenhorst for example, has its own way of applying the basic elements. For this organization, planning consists of two parts. First, a vision is established about what the organization wants to achieve with their management. Over the years, this vision is checked for relevance. Second, a forest inventory is carried out to reveal what has been realized over the last period and if the developments within the area follow the planned course. For Bosgroep Zuid, it is important to achieve the objectives as set by the owners of the area. After the inventory, a plan is developed which also provides the owner with an overview of the costs and profits. After consulting the owner, it is modified if needed. The Dienst Vastgoed Defensie (DVD) distinguishes itself from other organizations in their objectives. As a side-branch of the Ministry of Defense, its main objective is to maintain the areas as practice fields for the military, which sometimes leads to unique management activities and therefore unique planning. Carrying out certain management activities is for example dependent on time periods in which the military does not use the area for practicing the use of artillery. This organization is currently busy renewing its forest and nature management plans to adjust them to Natura 2000. The Municipality of Ede has its own special way of planning as well. First, the organization developed a concept. Then, together with a consultancy company, they arranged for six meetings across the municipality of Ede in order to give the inhabitants a chance to share their ideas about the management of the municipal forest. In total, one hundred people attained these meetings and out of these hundred, forty people were included in the development of the plan. This all happened under the supervision of the consultancy company, so that the municipality would not be accused of trying to steer the process. From these forty people, eleven were selected to guard the process over the next twelve years.

It seems that the size of the organization is an important factor. The two largest organizations, Natuurmonumenten and Staatsbosbeheer, are somewhat different because they have clear standardized manuals for writing their plans. The smallest organization, Landgoed ter Coulster, differs because its plans do not cover more than a couple of lines; planning is mostly in the head of the owner of the estate. Furthermore, a number of organizations differ because of their practical approach. The practicality lies in the fact that some of these organizations regularly visit the areas they manage, but also because they divide their area up into a number of work blocks in which the management activities rotate over the years. The Hoge Veluwe, Bosgroep Zuid, Municipality of Ede and Landgoed Schovenhorst all use this approach. The time period in which all blocks are visited once differs per organization.

A number of organizations mentioned to develop plans for both the organization as a whole and the management of their areas. Staatsbosbeheer is one of them. Natuurmonumenten has a policy document ('Doelstellingen Nota') that includes the goals for the entire organization, regarding forest and nature management. This general document is developed into a number of sub-documents, for e.g. forest management, the management of grasslands etc. The overall note and the sub-notes together form the framework for the management plans per individual area. Drents Landschap also has a multiannual plan for the organization as a whole, which has a timeframe of five years. Other organizations have multiannual plans that are not focused on the organization itself, but on their management practices.

4.1.2 Planning Periods

Planning within forest and nature management ranges from very practical short-term plans (operational plans) to multiannual plans that span decades (see figure 6). A combination of both is used as well. A number of organizations are characterized by such a combination of an overall multiannual plan that described the objectives and goals for the management of their areas and operational plans that cover smaller periods, in order to plan the activities that need to be carried out to achieve the objectives. Staatsbosbeheer, the Hoge Veluwe, Bosgroep Zuid, Landgoed Schovenhorst and SBNL all indicated this situation to be present in their organization. Most organizations plan for a time period of about ten years. According to Natuurmonumenten, a lot of areas do not change that rapidly which is why this organization plans for twelve to eighteen years. Staatsbosbeheer shares this opinion by stating that a cycle of ten years for example, is not a long period when it comes to the development of forest and nature areas. The complete area managed by Staatsbosbeheer is divided into ten parts and the organization renews one of these parts every year. In other words, every year, ten percent of the total area is provided with new plans. Landgoed Schovenhorst also has plans that cover a decade. If this period would be shorter, little change will be noticed. If the period is longer, it is more difficult to interpret what happens. Bosgroep Zuid is characterized by planning for three levels. Next to an operational plan, they have plans that cover ten years as well as a far off vision that can span more than twenty years. This organization also considers ten years to be a short period because for this organization, ten years only covers two thinning cycles. The same goes for the Municipality of Ede; in twelve years, two thinning cycles of six years have passed. The DVD used to have plans that spanned about 24 years. However, in order to agree with the inventories carried out by ecologists (every six years) and Natura 2000 and the increasing number of organizations that apply a six year timeframe as well, the DVD will use a timeframe of six years. Some parts of their managed areas are approached differently, which is caused by the unique position this organization is in. Because of their military objectives, their grasslands for example have a timeframe of three years. Their grasslands are mainly situated close to airports, which means that the grass has to be kept short to keep bigger bird species from nesting there. The nesting of these birds increases the chance of birds flying into the engines of aircrafts. Furthermore, the cut grass has to be removed frequently because it might get into the rotors of helicopters or engines of other aircrafts.

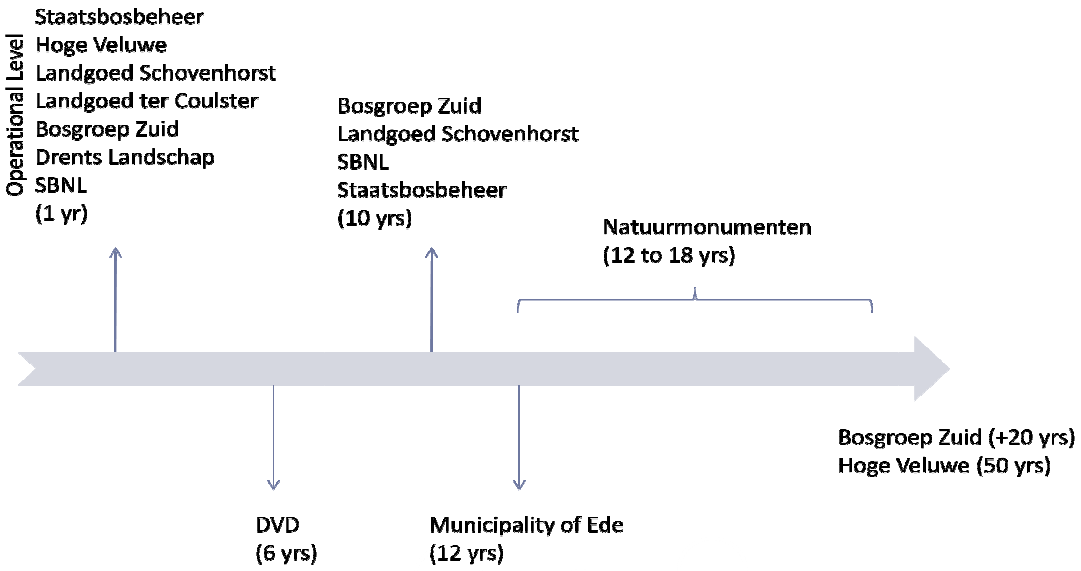

Figure 6: Timeline of planning periods

The focus of this study is on long term planning due to the fact that this type of planning is expected to involve the most uncertainty. Also, long term planning is inherent in forest and nature management planning (Duerr, 1960; Convery, 1973). The majority of organizations however, do not plan for the long range at all. They plan annually; mostly to better control their management activities. For the Hoge Veluwe, the main focus is on these annual operational plans. As stated by the person responsible for the planning in the organization, their plans "are always carried out", due to the short term for which is planned. Together with Bosgroep Zuid and Landgoed Schovenhorst, this annual planning is focused on the different work blocks that split up the area. The other organizations, Drents Landschap, Landgoed ter Coulster and Staatsbosbeheer do not work with this division in blocks. These three organizations all have their special characteristics. Remarkable about Drents Landschap is that they have annual plans, but some of these plans are more than fifteen years old. Management is mostly carried out based on experience. If there are any doubts about the objectives, the plans are checked to see what has been agreed upon. Landgoed ter Coulster is special because planning is something that mostly exists within the mind of the owner of the estate, which means that no formal plans exist. Staatsbosbeheer is different due to the fact that they provide ten percent of the area with new plans every year. Besides this activity, the management activities are also planned each year. Some organizations do not explicitly plan annually, but plan certain activities on an annual basis. SBNL for example, visits the field every year to keep track of any developments and the Municipality of Ede annually thinks about changes within perspectives on forest management and if the opinions of inhabitants of the municipality are still included.

Three organizations also have long range plans that include what the managed areas need to look like in the future. Besides annual plans, Landgoed ter Coulster also has such an overall plan. However, this vision has no set time period. The main future objective is to keep the estate within the family. Other organizations with far off visions are Bosgroep Zuid and the Hoge Veluwe. For Bosgroep Zuid, these plans are established by the owners of the area and include the vision of the owner for time periods that can cover twenty to sometimes even one hundred years. The Hoge Veluwe traditionally has a plan that includes a vision for the next fifty years. Every ten years this plan is reviewed to see if the objectives are still relevant.

The time period after which an evaluation of planning practices is carried out also differs. Most organizations evaluate their planning practices when a new plan is developed. A number of organizations, Natuurmonumenten, Municipality of Ede, Drents Landschap and SBNL, are required to evaluate their planning practices every six years in order to receive subsidies.

4.1.3 Planning Responsibility

Every organization has its own way of assigning the responsibility of developing new plans. Natuurmonumenten for example, is split up in a number of regions throughout the Netherlands and every region is responsible for its own planning. Within each region, the managers of the areas together with the ecologist of that region develop the plans. Staatsbosbeheer is also subdivided into a number of regions. Their plans are developed by a project team that includes people who work in the district the plans are made for. This team consists of the head of the district, the overseer and his ranger, people from the public relations department, a staff member of management planning (safeguarding the process itself), someone from the recreation department and one or two ecologists. Writing the plan is mostly done by the ecologist and staff members of the recreation and landscape department. The DVD also gives responsibility to the managers of their areas, together with a coordinator.

There are more organizations that form teams to develop new plans. Drents Landschap even has its own department. The Department of Research and Planning ('Onderzoek en Planning' in Dutch) writes the plans together with other staff members within the organization. This plan has to be approved by a scientific advisory committee ('Wetenschappelijke Advies Commissie'), after which the board has to approve it. The Hoge Veluwe also has a team that works on planning. Staff members go through the area and together with a number of advisors (i.e. ecologists), the annual plan is developed. Some organizations have a special approach and therefore a different way of dividing the responsibility of developing plans. For Bosgroep Zuid, it varies per owner. Some owners want the Bosgroep to develop a plan, others want the Bosgroep to ask a number of agencies to develop a plan that fits the owner's and the Bosgroep's needs. The Municipality of Ede involved the inhabitants of the municipality which gives them, together with the consultancy company that was hired, the responsibility of establishing a management plan.

In other organizations, the responsibility is given to one or two people within the company. Landgoed ter Coulster is owned, managed and planned by one person; the owner of the estate. For Landgoed Schovenhorst, the responsibility also lies with one person. The interviewee, land agent of the area, establishes the plans. SBNL is split up into two regions (North and South) with their own coordinator. The coordinators are responsible for writing the plans.

4.1.4 The Importance of Planning

The results of this study indicate that planning is important for forest and nature management. According to Natuurmonumenten, it is "obvious that planning is essential". The reasons why planning is so important varies per company. Table 4 gives an overview of the reasons why planning is important, as mentioned by the interviewees.

A number of important features were mentioned by different organizations. The most important one is that planning is used to communicate the objectives for an area and the activities that are or will be used to achieve these goals. If an organization happens to deviate from their plans, they need to be able to explain their actions and plans are the way to do so. Communication is then focused on members of the organization, the volunteers that work for the organization or society as a whole. Often, it is used to clarify what the organization

does with the financial means that are provided by these parties. For Bosgroep Zuid and SBNL, planning is an important tool for justifying their actions to the people they work for; the owners of the area. Another important aspect of using planning for communication is that planning is a necessity for receiving subsidies. Natuurmonumenten, Drents Landschap and SBNL mentioned this feature separately.

Table 4: Important features of planning

	Communication	Guidance (overview goals and agreements)	Continuity management	Other
Bosgroep Zuid	X			
Drents Landschap	X		X	
DVD	X	X	X	X
Hoge Veluwe		X		
Landgoed Schovenhorst	X	X		X
Landgoed ter Coulster	X		X	X
Municipality of Ede	X			X
Natuurmonumenten	X	X		
SBNL	X	X		
Staatsbosbeheer		X	X	X

According to Landgoed Schovenhorst, “planning provides a framework in which an organization can carry out its activities.” Planning is important because it defines what the organization wants to achieve. This importance is also reflected by other organizations. It is a useful method of keeping track of the agreements that are made between the general management and the people in the field and to give an overview of the goals that are developed for a particular area. Plans give guidance. Furthermore, the development of plans contributes to the continuity of forest and nature management within the organization. Over the years, the staff changes but the management needs to continue unaltered.

Other features were mentioned as well, some of them unique for that particular organization. For Landgoed ter Coulster for example, planning is mostly important for keeping track of the finances. The organization has a certain budget and planning is needed to make sure that they do not exceed it. It is also used as a way of communicating with other family members that are joint owners of the estate. Staatsbosbeheer stresses that plans enable the organization to customize management activities to the uniqueness and conditions of a certain area. The DVD thinks of planning as an important way of safeguarding knowledge about the management of areas and the vision and objectives of the organization. This contributes to the continuity in the organization, but also to the management practices that are carried out. Not every manager has the same amount of knowledge and skills concerning forest and nature management. Managers can consult the plans if things are unclear. For the DVD, planning is also important for the evaluation of the management practices. The importance of planning for the Municipality of Ede is reflected by the fact that this organization spent the last three years developing a plan in cooperation with the citizens of the municipality, which was an intensive process. Furthermore, the Municipality of Ede and Landgoed Schovenhorst mentioned that planning is important because they are FSC certified and such a certification comes with the condition of developing plans. Drents Landschap has its own view as well. Even though planning has many important aspects, Drents Landschap values the long term plans in which the choices and objectives for certain areas are described, a lot more. According to Drents Landschap, it is important not to focus on planning too much, because otherwise “you cannot or will not see spontaneous developments due to the fact that you are focused on one particular goal”. Drents Landschap is not the only organization that puts the importance of planning in perspective; the Hoge Veluwe also appears to assign less value to this practice. Though planning gives guidance, “it is never definite”. Furthermore, the DVD and Staatsbosbeheer mentioned that planning is merely a resource, “it should never be a goal on its own”.

4.1.5 Deviating from Planning

Different circumstances surrounding an organization can cause them to deviate from what is stated in their plans. Some organizations mentioned that they did not deviate so much. The Hoge Veluwe for example, stated that they do not deviate; they prepare and they carry out. “Our plans are always executed”, which is the advantage of short term planning. According to Drents Landschap, deviating from plans does not happen but what does happen is adjusting small things in the activities that are carried out to achieve the objectives as stated in the plans. This happens due to new insights or new ideas about the management of the areas. Planning within this organization is flexible, which means they do not deviate much. Staatsbosbeheer mentioned not to deviate much either, due to the short timeframe for planning the activities.

Most organizations however, find themselves having to depart from their plans. For Natuurmonumenten, this mostly occurs when suddenly opportunities arise for purchasing new land. Bosgroep Zuid claims that deviating from plans depends on the quality of those plans. The organization has deviated from plans because the objectives were not well thought-out while developing the plans. Sometimes certain goals are aimed for, but circumstances and developments within the area (e.g. ecological influences) might point out that another goal would be better. Landgoed Schovenhorst also mentioned that the plan itself influences deviation from it. It depends on how detailed the plans are; the more concrete a plan, the bigger the chance of deviating from it. For Landgoed Schovenhorst, the management activities are not written down in detail, which makes it more flexible. Still, this organization parts from its plans if circumstances in the field are different from what is desired. New insights within forest and nature management also influence the planning practices. This last reason was also put forward by the Municipality of Ede. Lastly, SBNL differs because of the many volunteers that need to carry out the activities that might not be available all the time and the fact that this organization has to deal with a large number of agrarians. For some of the areas, the SBNL has to pass land of agrarians which means they have to invest in maintaining their relationship.

Both the DVD and Landgoed ter Coulster stated that they deviate quite often. For the DVD, the biggest reason is the special management activities this organization has to carry out. Because of the military focus, some activities cannot be carried out in a regular way. Management of heath land for example, is done by controlled fires. Turfing is not possible due to the unexploded ammunition that might still be present in the area. These fires can be executed only in winter and under certain circumstances that for example concern the humidity of the ground, the wind direction and the dryness of the vegetation. These circumstances do not come by very often, which means that planning the management activities is difficult. Additionally, the organization depends on shooting free periods. This means that the activities have to be carried out in a short period and at exactly the right time. Furthermore, the DVD deviates from planning because of the capacity of staff members, new insights, external influences of rules and legislation and expenditure cuts that halt or delay activities. For Landgoed ter Coulster, deviating is mainly caused by the fact that the estate includes several buildings with monumental value. Restoring this buildings costs a lot of time due to permits, and a lot of money, which then cannot be spent on management practices. Also, the owner has to carry out his practices in his spare time, which restricts the available time for forest maintenance.

4.1.6 Desired Changes in Planning Approach

Planning practices are not always at its best. Some organizations mentioned several changes they would like to see happen in the way planning is carried out today. None of the mentioned changes are related to better coping with uncertainty. Most factors concerned technical aspects or other things that would streamline the planning and management practices. A number of organizations, for example, would like to improve the monitoring and recording of management activities. Natuurmonumenten, Staatsbosbeheer, DVD and SBNL all

pointed out that this would lead to a clear overview of the activities in the field. This would enable them to better steer or adjust these activities. Also, earlier activities can be evaluated better and this evaluation can be included in the development of future plans. Another interesting fact is that a couple of organizations also stressed the capacity of the staff members. Four out of ten organizations (Natuurmonumenten, Staatsbosbeheer, DVD and Drents Landschap) stated that the knowledge and skills of the people within the organization, on all levels, could be improved. One way of improving knowledge and involvement, as proposed by the DVD, would be for the plans to be clearer and better accessible for the staff members and managers of the areas.

For some organizations, other improvements were required as well. Natuurmonumenten would like to improve its quality assessment. For the Hoge Veluwe, the use of inventories for deciding on the activities to carry out could be improved. SBNL would like the inventories itself to be improved. In order to streamline the process, the Bosgroep would like to have access to a system that combines GIS maps with information about the areas on the maps. This gives insight in earlier activities in an area. Drents Landschap pointed out that the six-year evaluation decreases the flexibility of the organization. They have to stick to the objectives they have described in their plans. If they deviate, they have to explain their argumentation in detail, which has given them a sense of being somewhat restricted in their actions. Furthermore, two organizations, the Municipality of Ede and Landgoed Schovenhorst, mentioned no desired changes at all. The Municipality's plan has been developed half a year ago and so far, everything is going well. For Landgoed Schovenhorst, the interviewee has a big influence on what happens which means that any changes that would be needed would be implemented directly. Lastly, Landgoed ter Coulster is implementing the desired change; this organization is currently busy setting up a volunteer network for doing some activities in the estate.

4.2 Uncertainty

4.2.1 Experiencing Uncertainty

Essentially, planning is coping with uncertainty. The way in which uncertainty is experienced by the people responsible for planning during the planning practices of the organization, varies. Some organizations state that they experience uncertainty quite often and extensively. Bosgroep Zuid, for example, mentions to experience it and lots of it too. This organization even adjusted the time frame of their work plans. Before, they had work plans for five to six years. However, Bosgroep Zuid chose to alter these time frames to annual plans because they often found themselves deviating from their planning and planning periods. Unexpected circumstances prolonged both the activities and the time periods. According to the Municipality of Ede, "it is obvious" that they experience uncertainty, as things always change. Drents Landschap also considers the circumstances surrounding the organization to make planning difficult. As the head of management puts it; "the goal is static, but everything surrounding it is not". According to this organization, in every project something can happen that halts its development. Landgoed Schovenhorst also experiences uncertainty, but not as a bad thing. Fact is, you need a future goal in order to carry out your activities. Landgoed ter Coulster even keeps its planning open and flexible on purpose and SBNL also considers uncertainty to influence the planning process. The DVD states that uncertainty is mostly experienced by the managers in the field. According to the interviewee, there are different situations in which these managers experience uncertainty: when they carry out their management activities (if they are doing the right thing) but also when explaining their activities to outsiders. This is mainly caused by knowledge gaps.

A number of organizations mentioned to experience no or little uncertainty. Staatsbosbeheer and Natuurmonumenten do not consider uncertainty to be very influential. According to Natuurmonumenten, the only uncertainty within forest and nature management is whether the goals will be reached. Staatsbosbeheer 'sometimes' experiences uncertainty; it depends on how controllable certain influences are. The Hoge Veluwe even pointed out not to experience any uncertainty at all, mostly because of their short-term plans. According to the Hoge Veluwe, little can happen in a year that causes them to deviate or experience uncertainty. They are consistent in their practices, which means they will realize their goals.

4.2.2 Uncertainties

Different organizations often share the same factors that cause them to experience uncertainty. The main reason for experiencing uncertainty concerns expenditure cuts or other forms of financial uncertainty. Eight out of ten organizations explicitly mentioned this part of their business to be causing uncertainty: Natuurmonumenten, Hoge Veluwe, Drents Landschap, Landgoed Schovenhorst, SBNL, DVD, Bosgroep Zuid and Landgoed ter Coulster. For the Hoge Veluwe, this is a very important aspect. This organization does not receive any subsidy which means they are solely reliant on the timber market and the number of (paying) visitors. Landgoed Schovenhorst explained the influence of the financial uncertainty as follows; uncertainty about the timber market causes uncertainty about finances, which means uncertainty about the available means and uncertainty about reaching the desired objectives. However, as stated by this organization, "this is inherent in forestry". Managing natural resources means dealing with environmental processes that are mostly highly unpredictable. However, only three organizations mentioned this to be influencial (Natuurmonumenten, Drents Landschap and Landgoed Schovenhorst).

Other uncertainties within planning practices were mentioned as well. For Natuurmonumenten, unexpected opportunities for purchasing new land increase the unpredictability of plans. Staatsbosbeheer mentioned that it is uncertain if what is planned will also be carried out by people in the field. For the Municipality of Ede, new ideas and insights within forestry as a whole cause uncertainty and for SBNL the uncertainty lies in the fact that it is increasingly difficult to find volunteers to help. According to Drents Landschap, the biggest uncertainty at this moment is the political climate in our country. Forest and nature management is about dealing with people and dealing with nature, but also with the political view on these factors. Furthermore, Drents Landschap mentioned the many negotiations with other parties to cause uncertainty. Obviously, some of the uncertainties as mentioned by one organization could very well also be present in another. However, this part was meant to give an overview of the uncertainties as mentioned by the interviewees.

When looking back on the planning periods, there appears to be no relationship between the duration of the plans and experiencing uncertainty. Bosgroep Zuid mentioned to experience a lot of uncertainty, but mostly plans annually. The Municipality of Ede has quite a long planning period and also stated to experience lots of uncertainty. However, Natuurmonumenten has a somewhat similar planning period and points out to experience little uncertainty. Considering the deviation from plans, the results show that there might be a link between experiencing uncertainty and deviating from plans. The Hoge Veluwe, Drents Landschap and Staatsbosbeheer do not deviate much. The Hoge Veluwe does not experience uncertainty, Drents Landschap on the other hand does, but Staatsbosbeheer does not consider uncertainty to be very influential. The DVD and Landgoed ter Coulster are the two organizations that stated to deviate often. These organizations also mentioned to experience quite some uncertainty.

The categorization as mentioned by Price (1989) is difficult to recognize amongst the researched organizations. Uncertainties related to the natural environment were only mentioned by Drents Landschap, Landgoed Schovenhorst and Natuurmonumenten. The second category, technological advances, was not mentioned at all. The other three categories were mentioned only once. Human behavior was important for SBNL due to the

fact they are reliant on volunteers, Landgoed Schovenhorst pointed out that markets were influential and only Drents Landschap considered the political climate to possibly cause problems.

4.3 Planning Schools

For each organization, a number of characteristics were studied to see if the organization fits one of the ten planning school by Mintzberg and Lampel (1999). First, the description of their planning practices can be used to assign them a certain planning school. Then, two scales concerning the internal processes and the external world indicate a certain school as well. The position of the organization on these scales can be linked to the planning schools. Furthermore, the statement that was chosen is linked to a particular planning school as well. Lastly, the general information about the organization's planning practices and uncertainties are also used to see if the organization can be labeled with one of the ten schools.

4.3.1 Organizations' View on Planning Practices

Organizations were placed on a scale from having rational internal processes and natural ones. Following Mintzberg and Lampel (1999), planning can be based on rational processes that are based on a systematic approach on the one hand, or natural processes that are based on the perceptions and ideas of the people involved (see figure 7).

Figure 7: Internal process of the organizations

The different organizations can roughly be divided into three groups; (1) (close to) rational, (2) in between rational and natural and (3) (close to) natural. Three organizations undoubtedly placed themselves on the left side of the scale (i.e. having a rational approach). Staatsbosbeheer, the Municipality of Ede and Landgoed Schovenhorst all stated to either be close to rational (Staatsbosbeheer and Landgoed Schovenhorst) or fully rational (Municipality of Ede). The majority of the organizations claimed to be somewhere in between. According to Natuurmonumenten, knowledge on nature management increased enormously over the last decades, which makes planning a lot more systematic and rational. However, natural processes always play a part too. It depends on the area. SBNL claims something similar and states that it all depends on the area. Some areas need a more rational approach than others, which is why this organization is somewhere in between. Based on the answers of both Natuurmonumenten and SBNL and where they placed their organization on the scale, these organizations appeared to be closer to rational than a natural approach. Bosgroep Zuid places itself in the middle. There are certain activities that are carried out in a rational manner (thinning for example). Other activities are sometimes carried out based on natural processes; every manager

handles their area as they thinks is best. Furthermore, Drents Landschap is somewhere in between. According to this organization, rational processes are sometimes guided by natural processes. Lastly, a number of organizations mentioned to apply a (close to) natural approach to planning. The Hoge Veluwe has a fairly systematic description of the goals, but applies a more natural planning process. The DVD also defines itself as an organization with planning practices that are based on processes that are close to natural. Finally, Landgoed ter Coulster applies a natural approach due to the fact that the owner has no forestry background. Knowledge about forestry and management activities was passed on from generation to generation.

4.3.2 Organization's View on the (Uncertain) Future

The organization's view on the future is linked to their view on uncertainty in their environment. Following Mintzberg and Lampel (1999), organizations can be placed on a scale from a comprehensible and controllable external world to an uncertain and unpredictable one (see figure 8).

Figure 8: Future perspectives of the organizations

Most organizations claim that the future is (close to) predictable and controllable. According to Natuurmonumenten, the external world is close to controllable due to the improved insights in forest and nature management over the years. However, there will always be small uncertainties. For Staatsbosbeheer, it depends on the area and the task at hand. The bigger an area, the more controllable certain aspects are such as hydrology and recreation pressure. Staatsbosbeheer tries to gain as much insight as possible to control the situation, which is why they place themselves closer to the 'controllable' side of the scale. DVD also states that it depends on the area. Generally, the future is seen as controllable because according to the DVD, the influence of environmental aspects on their often large and robust areas has decreased over the years. For Drents Landschap, the future is also mostly predictable, although there are some unpredictable factors present. According to Landgoed Schovenhorst, the future objectives need to be clear to have a direction within the organization. Because the objectives of this organization are clear, Landgoed Schovenhorst sees the future as predictable. Still, it is never clear if this future will be established.

Some organizations would say that the future is neither comprehensible nor unpredictable. Plans for the Hoge Veluwe are checked every ten years to see if the goals are still up to date. Because they have been relevant for the last five decades, this organization states that the future is pretty predictable. However, the Hoge Veluwe tries to respond to the situation in the field which places them somewhere in between. According to Bosgroep Zuid, there will always be uncertainties. However, the predictability of the future depends on the area that is considered and what the owner wants with it. SBNL also stated that it depends on the area. Some areas can be

planned and managed without experiencing uncertainties about the future, others can be more difficult to manage due to the unpredictability of future events.

Some organizations see the future as (close to) unpredictable. According to the Municipality of Ede, the future is per definition unpredictable. As the operations manager stated: "I know things will change in the next twelve years, I just don't know how. It cannot be any other way". Landgoed ter Coulster also sees the future as confusing and unpredictable. Landgoed ter Coulster mentioned the future to be uncertain, mostly because of uncertainty about the financial means and how to keep the estate within the family.

Figure 8 indicates that the organizations can be divided into three categories; the organizations that think of the future as unpredictable, organizations that place themselves somewhere in between and organizations that see the future as predictable and controllable. In other words, it seems that the organizations cannot be placed on one side of the scale; the variety between the organizations is too large.

4.3.3 Assigning Planning Schools

This study focused on how forest and nature managers cope with the uncertainty that is caused by the long time horizons for which they have to plan, by investigating which type of planning is used. The ten planning types as proposed by Mintzberg and Lampel (1999) were the basis. In order to assign a certain planning school, a number of factors were investigated: (1) The general information about the planning practices, (2) the organization's view on the internal processes (based on the organization's position on the scale), (3) the organization's view on the external world (also based on the position on the scale) and (4) the statement that was chosen, which was linked to a particular planning school. Table 5 gives an overview of the different characteristics of the organizations and the related planning schools. Also, it indicates which planning school can be assigned to that organization.

Table 5: Characteristics of the organizations linked to the planning schools

	Planning practices	Scale internal processes	Scale external world	Statement	Planning School
Bosgroep Zuid	Design	Power	Configuration Cultural	Positioning	Various
Drents Landschap	Cognitive Environmental	Power	Configuration Power	Power	Power School
DVD	Configuration Environmental	Entrepeneurial Learning Power	Configuration	Configuration	Configuration School
Hoge Veluwe	Environmental	Entrepeneurial Learning Power	Configuration Cultural	Environmental	Various
Landgoed Schovenhorst	Entrepeneurial	Configuration Design	Design Entrepeneurial Planning Positioning	Positioning	Various
Landgoed ter Coulster	Entrepeneurial Environmental	Entrepeneurial Learning Power	Cognitive Environmental Learning	Environmental	Environmental School
Municipality of Ede	Cultural Design	Environmental Planning Positioning	Cognitive Environmental	Configuration	Various
Natuurmonumenten	Design Environmental	Configuration Design	Configuration Power	Design	Design School
SBNL	Design Environmental	Configuration Design	Configuration Cultural	Positioning	Various
Staatsbosbeheer	Design	Configuration Design	Configuration Cultural	Positioning	Various

For Bosgroep Zuid, if any, the planning school that fits the description of the planning practices best would be the Design School, because Bosgroep Zuid needs to represent the ideas and wishes of the owners of the areas. This means having to find a perfect combination of the internal strengths of the Bosgroep (i.e. the expertise and knowledge of the staff members) and external threats and opportunities (i.e. the ideas of the owners), which is a characteristic of the Design School (Mintzberg and Lampel, 1999). The other three characteristics are fairly straightforward. The place on the two scales is linked to the graph by Mintzberg and Lampel (1999) (see figure 4) and reflects one or two planning schools as well. The planning approach that is used lies somewhere in between rational and natural, but closer to natural, which fits the Power School. Whether the external world is seen as predictable or unpredictable, depends on the area. Overall, Bosgroep Zuid sees the future as somewhere in between. The last element is the statement that was chosen out of ten statements that were presented, which is directly linked to one of the ten planning schools. For this organization, the statement that fitted the Positioning School was the most relevant one. This means that Bosgroep Zuid does not clearly apply one of the ten planning schools; the variety in characteristics is large, not one planning school is apparent more than once.

Drents Landschap appears to apply a combination of two planning schools; the Cognitive School, which uses cognition to construct strategies and involves strategies that are developed in people's minds, and the Environmental School that forms a reactive process which illuminates the demands of the environment and considers which responses are expected when particular environmental conditions are faced (Mintzberg and Lampel, 1999). The Cognitive School is a little less obvious. The strategy is not developed in people's minds, but it is very much present inside their minds because management is mostly carried out based on experience. The Environmental School is also applicable to the Drents Landschap due to their reactive management and focus on environmental conditions. Based on the organization's place on the two scales, the Drents Landschap represents aspects of the Power and Configuration School. Together with the chosen statement (that fitted the Power School), the Drents Landschap seems to apply a planning practice that is close to the Power School.

The planning practices of the Dienst Vastgoed Defensie (DVD) appear to be most similar to the Configuration and Environmental School. The Configuration School is based on integration of different interests (Mintzberg and Lampel, 1999). The DVD is focused on integrating the military purposes of the areas with other objectives such as nature and recreation. The Environmental School is relevant because this organization constantly responds to particular (environmental) circumstances that are faced. Management of the areas is highly dependent on the situation on the spot, which is influenced by the military operations that take place. Furthermore, strategic choice is limited due to this dependence which is a characteristic of the Environmental School as well. The internal processes were considered to be close to rational, fitting the Entrepeneurial, Learning and Power School. In general, the future was seen as controllable. The position of the DVD fits the Configuration School best. This school was also represented by the statement that was chosen. In summary, this organization seems to apply an approach that is similar to the Configuration School.

The description of the Hoge Veluwe's planning practices comes very close to that of the Environmental School. This organization focuses on what happens in the area and fully bases its planning practices on the circumstances and developments in the field. Strategic choice is limited, but the Hoge Veluwe would probably not have it any other way. With their very practical approach to forest and nature management, they fit the Environmental School best. However, the rest of the traits do not reflect this school as much. The statement that was chosen by the interviewee also pointed out the Environmental school, but the two scales indicated a variety of other schools. Therefore, the Hoge Veluwe does not clearly apply one of Mintzberg and Lampel's (1999) planning schools.

The planning practices of Landgoed Schovenhorst best fits the Entrepeneurial School, which is a visionary process with plans that are visions or broad perspectives of a creative leader who has close control over the implementation of his/her vision (Mintzberg and Lampel, 1999). This school is applicable to Landgoed Schovenhorst because the plans for this organization are established by one leader, the manager of the area, who has close control over the implementation of his ideas. The manager indicated to develop the plans

himself and if alterations have to be made, he takes care of that too. Internal processes are close to rational, the future is seen as predictable. Table 5 shows that Landgoed Schovenhorst cannot be clearly subdivided into one particular planning school; the organization reflects three different planning schools most.

Landgoed ter Coulster is very different from all the other organizations. Due to the small scale of the area and the fact that the owner has full responsibility over all practices within the area, this organization would best fit the Entrepeneurial School. There is only one leader that has close control on the implementation of his ideas. Furthermore, the Environmental School seems to be used as well. The area is visited regularly, which means that the planning reflects the demands of the environment. The internal processes are seen as very close to natural, which is linked to the Entrepeneurial, Learning and Power School. The future is seen as very close to unpredictable, which fits the Cognitive, Learning and Environmental School. Together with the chosen statement, this means that Landgoed ter Coulster can be assigned to the Environmental School. However, this conclusion is made with caution, because two other planning schools appear to be very much present as well.

For the Municipality of Ede the description of their planning practices would fit the Design School. Their way of planning is focused on involving the inhabitants of the municipality. Involving the inhabitants means involving external threats (opposing inhabitants) and external opportunities (ideas). However, the Cultural School appears to be applicable as well, probably even more than the Design School. This school is based on a social process and strategy formation is focused on common interest and integration of different ideas (Mintzberg and Lampel, 1999). Involving the inhabitants indicates that common interest and integration are important. Furthermore, strategy formation is a social process, which is reflected by the Cultural School (Mintzberg and Lampel, 1999). As for the scale concerning internal processes, the Municipality indicated to apply a rational approach, which is also reflected by the Environmental, Planning and Positioning School. The future was seen as unpredictable, which indicates a characteristic of the Environmental and Cognitive School. Finally, the Municipality thought the statement about the Configuration School fitted the organization best. Overall, the Municipality of Ede would fit the Environmental School best. However, this conclusion is weak due to the variability in the other characteristics.

Considering the description of their planning practices, Natuurmonumenten can be said to apply (a combination of) two planning schools: the Design school and the Environmental school. The Design school is about fitting the internal situation to external opportunities, which applies to the way in which Natuurmonumenten develops its plans. Natuurmonumenten focuses mainly on unexpected opportunities and possibilities regarding their areas and perceives uncertainty as being a result of these factors. Because Natuurmonumenten also expresses the demands of the environment and constantly considers the proper response to present environmental conditions, it reflects characteristics of the Environmental School as well (Mintzberg and Lampel, 1999). Natuurmonumenten stated to be almost fully rational, which reflects both the Design and the Configuration School. Because this organization mentioned that the future is somewhere in between comprehensible and unpredictable, but closer to comprehensible, this trait is linked to the Power School and the Configuration School. For Natuurmonumenten, the statement that was chosen fitted the Design School. In summary, three out of four characteristics point out that Natuurmonumenten uses the approach of the Design School.

SBNL appears to apply a combination of planning schools. Characteristics of both the Design and Environmental School are present. Because this organization is also involved in agricultural nature management, they have to include a number of other parties when considering how to plan the areas. Besides the agrarians, inhabitants of their surroundings are involved as well in order to combine the internal capabilities of the organization with external threats and opportunities. Furthermore, the Environmental School seems to be applicable as well. The organization visits the areas annually to see if any changes or developments have occurred. Also, the development of the plans is based on the inventories of the areas. The organization stated the internal processes to be somewhere in between rational and natural, but closer to rational. The external world was seen as in between comprehensible and unpredictable. Together with the statement (that was linked to the

Positioning School), there seems to be no particular planning school for this organization; the variability is too large.

Based on the description of their planning practices, Staatsbosbeheer cannot be clearly placed within one planning school. Their approach involves multiple actors, ranging from staff members that focus on recreation to the head of the district. This means that the internal strengths are combined in order to minimize the internal weaknesses. Also, involving different experts means a better chance of decreasing external threats and utilizing opportunities. Therefore, this trait would fit the Design School best. For the view on the internal processes, Staatbosbeheer fits the Design and Configuration School, because this organization claimed to have a close to rational approach to planning. The future is seen as in between comprehensible and unpredictable. The statement that was chosen fitted the Positioning School. In summary, it is close to impossible to assign Staatsbosbeheer to a certain planning school. The results show that this organization applies an approach that is close to the Design School, but nothing conclusive can be said.

Table 5 indicates that the organizations' planning characteristics are linked to a variety of planning schools which makes it difficult to place them under one particular planning school. The four organizations that can be labeled with a planning school, all have different planning schools linked to them which also indicates the enormous variety in planning between the organizations. Figure 9, which is derived from table 5, shows this variety even better. It gives an overview of the number of times each planning school was represented by the characteristics of the different organizations.

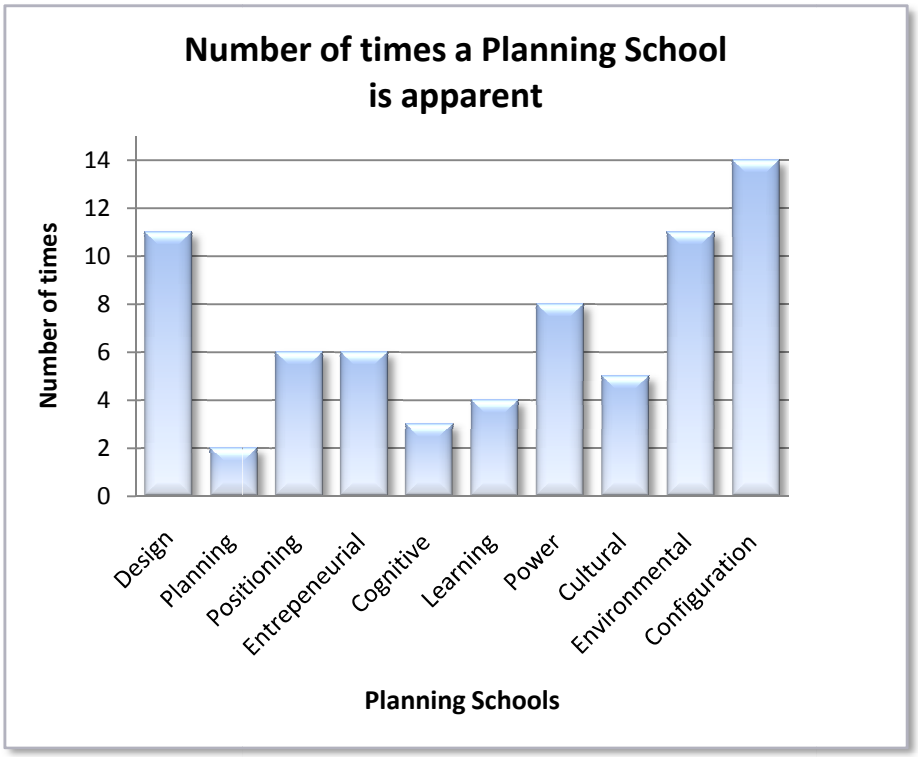

Figure 9: Overview of the number of times each planning school was represented

These results indicate that three planning schools (Design, Environmental and Configuration) are most apparent amongst the different forest and nature management organizations. The next chapter will discuss these findings, together with the rest of this chapter, and explain them in the light of current theories.

5 Discussion

Certainty is the mother of quiet and repose
and uncertainty the cause of variance and contentions

Sir Edward Coke (1552-1634)
English jurist who defended common law and wrote The Petition of Right (1628)

This chapter is comprised of three parts. The first part reflects on the findings of the study while relating them to current literature. Then, the theoretical framework that is used is discussed. Lastly, the methodology of this research will be reviewed.

5.1 Reflection on results

5.1.1 The practice of planning

This study was focused on getting an overview of the different planning practices amongst a number of Dutch forest and nature management organizations and specifically on the way they deal with the inherently uncertain future. The aim was not to see if the organizations plan well, but to find out how organizations plan. The results showed that organizations vary greatly in their planning practices. Planning periods range from short term plans to plans that span multiple decades and different uncertainties play a part during the planning process. Mintzberg (1994) also mentioned this diversity to be present within the realm of strategic planning; some plan more ahead than others, some plan more precise than others. The difference between organizations was also stressed by Duerr (1960). According to Duerr (1960), some apply a planning horizon that is not too far away, which makes it easier to see what is ahead. For others, plans have to be made far ahead which makes planners susceptible to the inevitable: uncertainty. Results of this study show that the majority of the organizations are indeed susceptible to different uncertainties. Which uncertainties exactly, is another one of the aspects in which the organizations differ greatly. However, in literature nothing is mentioned about this large variability within forest and nature management. This study has empirically shown that this sector is characterized by a great deal of variety.

5.1.2 Importance of Planning

Literature showed that planning is an important part of any enterprise (Mintzberg, 1994). As the results have shown, planning practices differ in forest and nature management. But not only the practices differ, the reasons for planning vary as well. The different reasons for planning that were mentioned by the organizations are also represented in literature. According to Bryson (1988), planning enables organizations to clarify the future direction and to make today's decisions in light of their future consequences. Langley (1988) and Mintzberg (1994b) state the same. Plans guide future decisions and activities toward some consistent purpose, which makes planning an important control device. In this way, plans specify what behaviors are expected of particular departments and individuals in order to realize strategy. Also, they provide feedback by comparing these expectations with actual performance. Landgoed Schovenhorst mentioned that guiding the organization

is the core of planning. “Management activities that are carried out now, influence what happens in the future. If you do not have a future goal, you cannot act at all.” Another advantage of planning that was mentioned by the organizations and in literature as well, is that planning is a way of effectively dealing with rapidly changing circumstances (Bryson, 1988). This advantage was mostly stressed by the Hoge Veluwe. This organization applies a very practical approach of continuously going through the area and responding to any changes by planning annually. Lastly, Kangas *et al.* (2001) point out that planning is important for several things, including public participation in forestry-related decision making. This was especially reflected by the planning practices of the Municipality of Ede. This organization made the effort to include the inhabitants of the municipality in order to make sure the wishes and ideas of the people were taken into account in the best way possible.

The most important advantage that was mentioned by eight out of ten organizations is the communication aspect of planning. This value is also indicated by other studies (Oesten, 1984; Hoogstra, 2008). As Mintzberg (1994b) explains it, plans are used for coordination of the organization by pulling everyone in the same direction, for promoting the efforts of insiders and to seek support by informing important outsiders.

5.1.3 Planning Schools and Rationality

It comes as no surprise that the planning schools that seem applicable to the organizations, show a great variety as well. The planning of not one organization could directly be appointed to one planning school, due to the many other planning schools that were apparent as well. The Configuration School was the most apparent planning school amongst the different characteristics. This is probably caused by the fact that this planning school is focused on the integration of multiple ideas, with a close to comprehensible external world and internal processes that are based on a strategy that is somewhere in between rational and non-rational (i.e. natural) (Mintzberg and Lampel, 1999). The fact that the Design School became apparent several times as well can probably be explained by the fact that this planning school forms the basis of all planning practices. According to Mintzberg and Lampel (1999), this school reflects the original perspective on planning; in combination with other ideas, it gave rise to the other planning schools. Due to the nature of the organizations, one might have expected that the Environmental School would be present most. Although this planning school was very much apparent as well, it is not the most important school overall. This is probably caused by the fact that the Environmental School is based on a rational approach. Traditionally, forest and nature management is said to apply a very rational approach, despite the many inherent uncertainties (Mohai, 1987; Bengston, 1994). Strategies for managing uncertainty based on rationality are seen as more effective than non-rational approaches (Zinn, 2008). However, even apparently non-rational (or even irrational) responses to uncertainty can be useful in the everyday management of uncertainty. Also, in practice, there is rarely enough time and knowledge available to apply a fully rational approach (Zinn, 2008). This might explain why the Planning School (characterized by a rational approach and a controllable external environment) has not been apparent at all, even though this school is considered as the traditional approach to forest and nature management.

Almost all of the organizations apply planning processes that are either in between rational and natural or fully natural. A number of organizations indicated to apply some sort of combination of both. According to Natuurmonumenten, knowledge on nature management increased enormously over the last decades, which makes planning a lot more systematic and rational. However, natural (uncertain) processes always play a part too. It depends on the area. SBNL for example, claims that some areas need a more rational approach than others, which is why this organization applies a strategy that can be placed in between rational and natural. Bosgroep Zuid mentioned that certain activities are carried out in a rational manner (thinning for example) while other activities are carried out based on natural processes; every manager handles their area as they think is best. Drents Landschap indicated rational processes are sometimes guided by natural processes, which is why this organization can be said to apply a combination of a rational and natural approach.

Acting both rational and non-rational is also put forward by Keynes (1936). In his 'General Theory of Employment, Interest and Money', he stated:

> "*We are merely reminding ourselves that human decisions affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculation does not exist; and that it is our innate urge to activity [animal spirits] which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for out motive on whim or sentiment or chance"* (Keynes, 1936: 161-163)

The majority of the organizations seem to use an approach similar to the one as described by Keynes (1936) and the one as proposed by Zinn (2008): a strategy that is neither fully rational nor non-rational. These strategies might show some characteristics of rationality, e.g. relying on the use of (scientific) knowledge. Features of non-rational strategies are apparent as well, which means that they are influenced by personal context, feelings or beliefs. These in between strategies are seen as complementing and useful in overcoming some of the limitations of calculative approaches to uncertainty management. The combination of rational and non-rational strategies therefore facilitates more effective control over the future (Zinn, 2008), which is possibly why this approach is also reflected by the majority of the organizations.

A number of organizations claim to apply an approach that is close to natural. Because a natural approach is to a great extent influenced by personal context, feelings or beliefs and includes using trust, intuition or emotion, it is highly dependent on the individual that is responsible for decision-making (Zinn, 2008). The influence of the personality of the manager or planner is often discussed (e.g. Christensen, 1985; Richardson, 2005; Zinn, 2008). The way in which a person deals with uncertainty, for example, is highly dependent on the individual (Hoogstra and Schanz, 2008). However, there's a difference between the individual himself and the individual that represents his cooperative. Still, the difference remains as every firm has its own environment with its own interpretation of uncertainty, which is reflected in the communication, rituals and behavior of the firm (Hoogstra, 2008). Several scientists state that the personal perceptions of uncertainty of the external environment by the top-level managers, is tightly linked with and defining for strategic planning (Lindsay and Rue, 1980; Boulton *et al*., 1982; Javidan, 1984). Strategic planners are said to be the gatekeepers of information that emerges from the environment. Because this external information hardly ever consists of simple verifiable facts, the strategic planner 'absorbs uncertainty' when the information is passed on to the organization (Boulton *et al*., 1982). The differences between the way people (and therefore organizations) plan, can be ascribed to the attitudes and vision of the person that is responsible for the planning. The social circumstances are also causes for the differences (Duerr, 1960). Additionally, corporate performance is influenced by the way in which senior executives perceive and act upon their firms' environment (Bourgeois, 1985). Lorenzi *et al*. (1979) assume that uncertainty will even hurt a manager's performance which can potentially influence the organization as a whole. Hatten and Schendel (1975) also emphasize the importance of the managers on strategic planning. They found that the value of a strategy is dependent on the management's ability to identify and correctly assess discontinuities in the environment. Menke (1979) even states that planners are sometimes overconfident and have the natural tendency to ignore or to try to eliminate uncertainty. Surprisingly, Boulton *et al*. (1982) state that uncertainty does not consistently influence strategic planning activities. The findings of this study indicate that non-rational strategies (such as intuition) are also apparent in some of the organizations (see figure 7). Furthermore, this research showed that the influence of individuals can be substantial. Landgoed Schovenhorst and Landgoed ter Coulster, for example, rely on one individual for the establishment of the organization's strategies.

5.1.4 Coping with Uncertainty

The results concerning uncertainty showed some contradictions. Some organizations claim to experience no or little uncertainty at first, but their answers to other questions concerning uncertainty indicated that uncertainty did play a part in their practices. Landgoed Schovenhorst, for example, indicated to experience uncertainty quite often because it is part of forest and nature management. However, the external world is seen as predictable. There does not seem to be a relationship between how uncertainty is experienced and the planning practices of an organization. Organizations that mention to experience uncertainty (e.g. Municipality of Ede and Landgoed Schovenhorst) do not apply comparing planning practices. The same goes for organizations that state to experience little uncertainty (such as the Hoge Veluwe and Natuurmonumenten).

The study does not show high levels of uncertainty within forest and nature management organizations, although the future is by definition unknowable (and therefore uncertain) (Weber, 2000; Hoogstra, 2008). This seems to concur with the results of Hoogstra and Schanz (2008a), which show that foresters seem to perceive the future as manageable. Hoogstra and Schanz (2008b) indicated that foresters often have to depart from planning due to the many uncertainties they face. However, Hoogstra and Schanz (2008b) focused on the level of execution while this study concentrates on the planning level. This means that there could be a difference between the planners, who experience little uncertainty, and the people in the field, who experience a lot of uncertainty (as was put forward by the DVD). The results about the low levels of uncertainty are in line with the findings of Hoogstra (2008), who showed that the forestry sector does not experience more uncertainty than other sectors (such as the agricultural sector). This might be the result of the fact that they use different strategies in order to cope with uncertainty (sometimes without them even being aware of it).

Nevertheless, the organizations do appear to apply several strategies that are related to coping with uncertainty. First, rational, non-rational and so-called 'in between' strategies can be used. The appliance of these strategies by the researched organizations is discussed above. Another method is that of adaptive management (Holling, 1978). This approach seems to be especially present in the planning practices as carried out by the Hoge Veluwe. Although this organization does not experience uncertainty, it does manage the area adaptively through frequently assessing the area and using these assessments for the development of (new) plans. The organizations also seem to apply one (or more) of the strategies to cope with uncertainty, as proposed by Lipshitz and Strauss (1997). Their study distinguishes three basic approaches to cope with uncertainty. One can *reduce* uncertainty, *acknowledge* uncertainty, or *suppress* it.

Reducing uncertainty is the most discussed approach in literature and the most apparent strategy amongst the researched organizations as well. Tactics to reduce uncertainty include collecting additional information before a decision is made (e.g. Allaire and Firsirotu, 1989; Tress and Tress, 2001; Kato and Ahern, 2008; Sigel *et al.,* 2010), or postponing the decision until additional information is available (Hirst and Schweitzer, 1990). Other strategies of reducing uncertainty include extrapolating from information that is available about past and present events, assumption-based reasoning and improving knowledge through monitoring. Uncertainty can also be reduced by shortening time-horizons, which improves the predictability of future events. This is done by for example favoring short-term over long-term goals. This strategy appears to be carried out by all of the organizations that make use of annual (operational) plans (see figure 6). Two organizations stand out; Bosgroep Zuid and the Hoge Veluwe. Bosgroep Zuid mentioned to first apply longer time periods for their plans. However, this organization has chosen to shorten the time-horizon due to the many uncertain developments that influenced the management practices in a negative manner. The Hoge Veluwe stands out due to their strong preference for short-term plans. According to the head of management of this organization, the advantage of planning for the short term is that these plans are always carried out, which is why they would not do it any other way. Bosgroep Zuid, together with SBNL, applies another strategy for reducing uncertainty as well. Uncertainty is reduced by establishing long-term contractual agreements (Lipshitz and Strauss, 1997).

Both Bosgroep Zuid and SBNL are organizations that act upon instructions of owners of areas. For this purpose, they have long-term contractual agreements with the owners they work for.

Another strategy for reducing uncertainty that was proposed by Kato and Ahern (2008), focuses on 'learning by doing' as a way of cutting back uncertainty. This approach is focused on perceiving uncertainty as an opportunity to learn from, rather than an obstacle. This method appears to be applicable to Landgoed Schovenhorst because according to the operations manager of this organization, "uncertainty is experienced, but not as harmful". According to Kato and Ahern (2008), learning by doing can enhance the understanding of the inherent uncertainties in planning, which results in well-informed strategies to address these uncertainties. Furthermore, the transdisciplinary approach as suggested by Tress and Tress (2001) can be linked to one of the organizations. This approach makes use of a partnership of professionals, stakeholders, decision makers and researchers, which provides a framework for collaboration and information sharing. Uncertainty is reduced by enhancing the understanding of the situation and enlarging the availability of necessary information. Based on their planning practices, the Municipality of Ede can be linked to this particular strategy of coping with uncertainty. The collaboration of the inhabitants of the municipality with an advisory body shows features of the approach as proposed by Tress and Tress (2001). Improving the understanding of a system over time through monitoring is another key action to reduce uncertainty (Kato and Ahern, 2008). This strategy applies to almost every researched organization. Monitoring provides more recent and complete data about the specific location(s) that are affected by the plan or management actions, on which succeeding decisions are made (Kato and Ahern, 2008). It enables the assessment of the effectiveness of the different activities of the organization and it can produce important basic information if no prior data are available. The information that is gained from monitoring is used to guide future decisions and actions.

The organizations did not show any signs of ignoring uncertainty completely, which is a tactic that fits the strategy of *suppressing uncertainty* as proposed by Lipshitz and Strauss (1997). This does not mean that none of the organizations indeed apply the tactic of *acknowledging uncertainty* which means taking uncertainty into account with every step in the planning process. Ignorance of uncertainty can certainly be present, as proposed by Dawes (1988), Lipshitz and Strauss (1997) and Price (1989), who even calls ignoring uncertainty in forest and nature management irresponsible. Nevertheless, even if some of the organizations do not acknowledge uncertainty, one should not forget that long-range planning has more functions, as shown above. As Oesten (1984) points out, the interactive, social planning process that is inherent in forestry might be more important for the results than the planned goals themselves.

The results of this exploratory study are solely based on interviews with people who are either responsible for planning or knowledgeable about the planning practices within the organization. The results should therefore be interpreted with care. Still, a number of conclusions can be drawn, which will be presented in the next chapter.

5.2 Reflection on the theoretical framework

The planning schools by Mintzberg and Lampel (1999) proved to be an interesting framework. It is the most extensive overview that clearly shows which different planning practices can be present. However, it was very difficult to assign the planning practices of forest and nature management organizations to a planning school. These organizations show too much variation for them to be undoubtedly linked to one of the planning schools. This difficulty is also something Mintzberg and Lampel (1999) have indicated themselves.

As Mintzberg and Lampel (1999) mention in their study, the planning schools can be interpreted in two ways. The authors themselves claim to have difficulty in clearly choosing one of them. First, the planning schools can be seen as separate ways of planning, which is also the way the authors see their schools. Second, the planning

schools can be interpreted as ten different stages within the planning process as a whole. Even though Mintzberg and Lampel (1999) themselves turned to viewing the schools as separate processes, this study appears to show that the planning schools should be seen as different parts of one and the same planning process. For the studied organizations, the planning schools seem to form a continuum with strong overlap in their elements. In summary, Mintzberg and Lampel's (1999) study showed some limitations. However, the advantage of using this approach is that it is detailed and elaborate, which provided this study with a proper foundation.

This study has attempted to establish a categorization of planning practices in Dutch forest and nature management based on the outcomes and the characteristics of the organizations and possible trends that appeared. However, the characteristics between and within the organizations vary so much that such a classification, based on the (qualitative) data, was not possible.

5.3 Reflection on methodology

The methodology was subject of a number of limitations. First, the number of interviewees can be questioned. This research did not include all forest and nature management organizations within the Netherlands. Furthermore, the number of interviews is not substantial. Due to the limitation of time, ten interviews were carried out. However, this study had an exploratory character and was meant to provide an overview by making a cross section of the different Dutch organizations. In order to have a broad focus, both large organizations were interviewed as well as a number of private and governmental organizations. Nevertheless, future research could possibly take a closer look at smaller, private organizations, because these parties are (statistically) underrepresented in this study.

The analysis showed some limitations as well. In order to assign a planning school to an organization, this study has attempted to make the planning schools as concrete as possible, but this was very difficult. The interviewees were for example asked to choose one out of ten statements. However, most organizations could not choose just one statement and made a top three or sometimes even a top four or five. Only the most important statement for that organization was included, to simplify the analysis. Applying some sort of quantitative method for these results might be better. Furthermore, the scales that were used to assess whether the organizations view the future as uncertain and whether they view the internal processes as rational, showed to be more difficult to analyze than expected in advance. One particular position on the scale often corresponds with more than one planning school, which hinders a proper analysis. Further research could therefore focus even more on concretizing the planning schools by further investigating the different characteristics and making even more clear when a certain planning practice can be assigned to a planning school. Approaching this research in a more qualitative manner would be interesting, for example by conducting more interviews and using a factor or cluster analysis in order to investigate which schools can be differentiated.

Despite of the different limitations, this exploratory study did derive some valuable points for further research. It provides more information about the different planning practices as used amongst Dutch forest and nature management organizations. It was not known how these organizations planned in practice; this study has finally given an insight.

6 Conclusions

There is no such uncertainty as a sure thing

Robert Burns (1759-1796)
Scottish poet and lyricist; widely regarded as the national poet of Scotland

Studies concerning the way in which (Dutch) forest and nature management organizations cope with uncertainty have not been carried out so far. This exploratory study has attempted to give an overview of the different planning practices of Dutch organizations. The following conclusions were derived from this study:

A great number of studies doubt the use of planning, due to the many uncertainties that influence the organization as a whole, especially concerning the development of plans (e.g. Crane *et al.*, 1936; Seeley, 1962; Christensen, 1985; Godschalk *et al.*, 2009). However, this study has given an indication that planning is important and useful, regardless of the many uncertainties that play a part in every organization.

Planning and management practices as carried out by Dutch forest and nature management organizations are very diverse. It ranges from short-term to long-term plans, from planning as being an explicit focus to something that 'is done on the side', from one person being responsible to a gathering of different expertises. Furthermore, although forest and nature management is traditionally characterized by a rational approach, most organizations apply an approach that is characterized by features of both rational and natural processes.

The organizations all cope with uncertainty differently. Landgoed ter Coulster and the Municipality of Ede most likely apply planning practices that are focused on coping with uncertainty. The majority of organizations also consider uncertainty to play a part in their planning practices, but it is not their main focus. Other aspects of planning, such as utilizing it as a communication medium or guiding the activities are equally important. For Landgoed Schovenhorst, planning is the least focused on trying to cope with uncertainty.

The reason behind their planning practices has not become clear for every organization, but a number of organizations did indicate why they have chosen the approach they now apply. For Staatsbosbeheer, planning is an important tradition which shaped the organization over the years. The Municipality of Ede has chosen this approach to make sure the inhabitants of the municipality were included and concerned in the planning process. Because this organization is dependent on the city council for approval and because the city council could sell the area if they want to, it was important to involve the inhabitants. For the DVD, it was important to comply with Natura 2000 and Bosgroep Zuid plans in order to inform the area owners they work for.

To answer the central question of this research, this clearly shows that Dutch forest and nature management organizations do not explicitly plan in order to cope with uncertainty because in general, the organizations mentioned that they did not experience uncertainty that much. Still, their planning strategies represent a lot of approaches that, in literature, are used to cope with uncertainty. This means that the planning practices are not initially defined by how the organizations want to cope with uncertainty, but by other important features such as communication and guidance. This does not mean that uncertainty is not present at all, but that it is often not experienced (consciously).

Based on the way the organizations plan, how they look at uncertainty and how their planning process is formalized (and the great diversity within these factors), forest and nature management in the Netherlands cannot clearly be divided into a number of planning schools. Different elements of the planning schools are apparent and no trends seem to be present. Every organization has characteristics of more than one planning school. This research therefore shows that the planning schools are an interesting categorization, but not an unambiguous one. In closing, the forest and nature management planning of Dutch organizations cannot be said to have one particular approach.

References

Abbott, J., 2005. Understanding and Managing the Unknown: the Nature of Uncertainty in Planning. *Journal of Planning Education and Research,* 24: 237-251.

Alaszewski, A. and K. Coxon, 2009. Uncertainty in Everyday Life: Risk, Worry and Trust. *Health, Risk & Society,* 11(3): 201-207.

Alig, R.J., Adams, D.M., McCarl, B.A., 1998. Impacts of Incorporating Land Exchanges between Forestry and Agriculture in Sector Models. *Journal of Agricultural and Applied Economics,* 30(2): 389-401.

Allaire, Y. and M.E. Firsirotu, 1989. Coping with strategic uncertainty. *Sloan Management Journal*, 3: 7-16.

Anderson, B.F., Deane, D.H., Hammond, K.R., McClelland, G.H., Shanteah, J.C., 1981. Concepts in Judgment and Decision Research: Definitions, Sources, Interrelations, Comments. New York: Praeger. pp. 320.

Argote, L., 1982. Input Uncertainty and Organizational Coordination in Hospital Emergency Units. *Administrative Science Quarterly*, 27(3): 420-434.

Ascough II, J.C., Maier, H.R., Ravalico, J.K., Strudley, M.W., 2008. Future Research Challenges for Incorporation of Uncertainty in Environmental and Ecological Decision-Making. *Ecological Modelling,* 219: 383-399.

Bedford, T. and R.M. Cooke, 2001. Probabilistic Risk Analysis: Foundations and Methods. Cambridge: Cambridge University Press, 414 pp.

Bengston, D.N., 1994. Changing Forest Values and Ecosystem Management. *Society and Natural Resources,* 7: 515-533.

Bernstein, P.L. and T.H. Silbert, 1984. Keeping informed. *Harvard Business Review,* 62(5): 32-40.

Boulton, W.R., Lindsay, W.M., Franklin, S.G., Rue, L.W., 1982. Strategic Planning Determining the Impact of Environmental Characteristics and Uncertainty. *Academy of Management Journal,* 25(3): 500-509.

Bourgeois, L.J., III, 1985. Strategic Goals, Perceived Uncertainty and Econimic Performance in Volatile Environments. *Academy of Management Journal,* 28(3): 548-573.

Brews, P. and D. Purohit, 2007. Strategic Planning in Unstable Environments. *Long Range Planning,* 40: 64-83.

Bryson, J.M. and A.L. Delbecq, 1979. A contingent approach to strategy and tactics in project planning. *Journal of the American Planning Association,* 45: 167-179.

Bryson, J.A., 1988. A Strategic Planning Process for Public and Non-Profit Organizations. *Long Range Planning,* 21(1): 73-81.

Christensen, K.S., 1985. Coping with Uncertainty in Planning. *Journal of the American Planning Association,* 51(1): 63-73.

Cohen, L., Manion, L., Morrison, K., 2007. Research Methods in Education. New York: Routledge.

Convery, F.J., 1973. Forestry and Long Range Planning. *Long Range Planning,* 6(2): 27-28.

Corbin, R.M., 1980. Decisions that might not get made. In: T.Wallsten *mance*, **22,** 45–68. (Ed.), *Cognitive processes in choice and decision behavior*. Hillsdale, NJ: Erlbaum

Crane Jr., J.L., Comey, A.C., Tilton, L.D., 1936. Planning Organization and the Planners. *Journal of the American Planning Association,* 2(3): 61-69.

Craver, J.K., 1973. The effect of the future on today's decisions. *Long Range Planning,* 6(2): 29-34.

Cushman Coyly, D., 1936. Land Ownership and Planning. *Journal of the American Planning Association,* 2(2): 35-37.

Cyert, R. and J. March, 1963. A behavioral theory of the firm. Englewood Cliffs, NJ: Prentice-Hall.

Daniels, T.L., 2009. A Trail Across Time: American Environmental Planning from City Beautiful to Sustainability. *Journal of the American Planning Association,* 75(2): 178-192.

Dawes, R.M., 1988. Rational choice in an uncertain world. San Diego, CA: Harcourt Brace Jovanovich.

De Boo, H.L. and K.F. Wiersum, 2002. Adaptive Management of Forest Resources: Principles and Process. Nature Forest in Society Series. Forest and Nature Conservation Policy Group, Wageningen University.

Dewey, J., 1929. The quest for certainty: a study of the relation of knowledge and action. Gifford Lectures 1929. New York: Minton Balch & Company.

Dexter, L.A., 1970. Elite and Specialized Interviewing. Evanston: Northwestern University Press.

Di Castri, F. and M. Hadley, 1986. Enhancing the credibility of ecology: Is interdisciplinary research for land use planning useful? *GeoJournal,* 13(4): 299-325.

DiFonzo, M. and P. Bordia, 1997. Rumor and prediction: Making sense (but losing dollars) in the stock market. *Organizational Behavior and Human Decision Processes,* 71: 329-353.

Duerr, W.A., 1960. Fundamentals of Forestry Economics. The American Forestry Series. New York, Toronto, London. McGraw-Hill Book Company, Inc.

Duerr, W.A., 1969. Undergraduate Forestry Education: Where do we stand? *Journal of Forestry,* 67(6): 379-381.

Eriksson, L.O., 2006. Planning under Uncertainty at the Forest Level: A Systems Approach. *Scandinavian Journal of Forest Research,* 21(1): 111-117.

Feldman, M.S. and J.G. March, 1981. Information in organizations as signal and symbol. *Administrative Science Quarterly,* 26: 171-186.

Fildes, R., Jalland, M., Wood, D., 1978. Forecasting in conditions of uncertainty. *Long Range Planning,* 11(4): 29-38.

Fitzsimmons, M., 2006. The Problem of Uncertainty in Strategic Planning. *Survival,* 48(4): 131-146.

Food and Agriculture Organization of the United Nations, 1993. FAO Development Series 1: Guidelines for Land Use Planning. Prepared by the Soil Resources, Management and Conservation Service. Rome. Available at: http://www.fao.org/docrep/T0715E/t0715e00.htm Date of access: April 29, 2010.

Freeman, S. and N. Zeitouni, 2003. Optimal Environmental Development under Different Stochastic Regmies. In: Wesseler, J., Weikard, H.-P., Weaver, R.D. (eds). Risk and Uncertainty in Environmental and Natural Resource Economics. Cheltenham, UK: Edward Elgar Publishing Limited. pp. 330.

Friend, J. and N. Jessop, 1969. Local government and strategic choice: An operational research approach to the processes of public planning. London: Tavistock.

Funtowicz, S.O. and J.R. Ravetz, 1990. Uncertainty and Quality in Science for Policy. Dordrecht: Kluwer Academic Publishers.

George, C., 1972. The History of Management Thought. Englewood Cliffs, NJ: Prentice-Hall.

Glesne, C., 1999. Becoming Qualitative Researchers: An Introduction. Second Edition. New York: Longman.

Godschalk, D.R., Rose, A., Mittler, E., Porter, K., West, C.T., 2009. Estimating the Value of Foresight: Aggregate Analysis of Natural Hazard Mitigation Benefits and Costs. *Environmental Planning and Management,* 52(6): 739-756.

Graham Smith, L., 1982. Mechanisms for public participation at a normative planning level in Canada. *Canadian Public Policy,* VIII (4): 561-572.

Granberg, M., Lidskog, R., Larsson, S., 2008. Dealing With Uncertainty: A Case Study of Controlling Insect Populations in Natural Ecosystems. *Local Environment,* 13(7): 641-652

Grandori, A., 1984. A prescriptive contingency view of organizational decision-making. *Administrative Quarterly,* 29: 192-209.

Grant, R.M., 2003. Strategic Planning in a Turbulent Environment: Evidence from the Oil Majors. *Strategic Management Journal,* 24: 491-517.

Hamel, G., 1996. Strategy as revolution. *Harvard Business Review,* 74(4): 69-76.

Hatten, K.J. and D.E. Schendel, 1975. Strategy's Role in Policy Research. *Journal of Economics and Business,* 8: 195-202.

Heinonen, T., Pukkala, T., Ikonen, V.-P., Peltola, H., Venäläinen, A., Dupont, S., 2009. Integrating the risk of wind damage into forest planning. *Forest Ecology and Management,* 258: 1567-1577.

Hirst, E. and M. Schweitzer, 1990. Electric-utility resource planning and decision-making: The importance of uncertainty. *Risk Analysis,* 10: 137-146.

Hogarth, R.M. and H. Kunreuther, 1995. Decision-making under ignorance: Arguing with yourself. *Journal of Risk and Uncertainty,* 10: 15-36.

Holling, C.S., 1978. Adaptive environmental assessment and management. New York: John Wiley and Sons.

Holmberg, J. and K.-H. Robèrt, 2000. Backcasting from non-overlapping sustainability principles – a framework for strategic planning. *International Journal of Sustainable Development and World Ecology*, 7: 291-308.

Hoogstra, M.A., 2008. Coping with the Long Term. An Empyrical Analysis of Time Perspectives, Time Orientations, and Temporal Uncertainty in Forestry. PhD Thesis Forest and Nature Conservation Policy Group, Wageningen University, Wageningen, the Netherlands.

Hoogstra, M.A. and H. Schanz, 2008. How (Un)Certain is the Future in Forestry? A Comparative Assessment of Uncertainty in the Forest and Agricultural Sector. *Forest Science,* 54(3): 316-327.

Hoogstra, M.A. and H. Schanz, 2008a. The Future-Orientation of Foresters: An Exploratory Research Among Dutch Foresters into the Pre-requisite for Strategic Planning in Forest Management. *Forest Policy and Economics,* 10(4): 220-229.

Hoogstra, M.A. and H. Schanz, 2008b. Future Orientation and Planning in Forestry: a Comparison of Forest Managers' Planning Horizons in Germany and the Netherlands. *European Journal of Forest Research,* 128(1): 1-11. Published online and available at: http://dx.doi.org/10.1007/s10342-008-0234-6. Date of access: August 13, 2010.

Hudson, B.M., Galloway, T.D., Kaufman, J.L., 1979. Comparison of Current Planning Theories: Counterparts and Contradictions. *Journal of the American Planning Association,* 45(4): 387-398.

Huijbregts, M.A.J., Norris, G., Bretz, R., Ciroth, A., Maurice, B., von Bahr, B., Weidema, B., de Beaufort, A.S.H., 2001. Framework for modeling data uncertainty in life cycle inventories. *International Journal of Life Cycle Assessment,* 6(3): 127-132.

IPCC (Intergovernmental Panel on Climate Change), 1996. Climate Change 1995: Economic and Social Dimensions of Climate Change. Cambridge: Cambridge University Press.

Javidan, M., 1984. The Impact of Environmental Uncertainty on Long-Range Planning of the U.S. Saving and Loan Industry. *Strategic Management Journal*, 5(4): 381-392.

Jennings, G., 2001. Tourism Research. Milton, Qld: John Wiley & Sons Australia, Ltd.

Jepson, E.J., Jr., 2001. Sustainability and Planning: Diverse Concepts and Close Associations. *Journal of Planning Literature,* 15(4): 499-510.

Jokinen, H., Konkarikoski, K., Pulkkinen, P., Ritala, R., 2009. 'Operations' decision making under uncertainty: case studies on papermaking', Mathematical and Computer Modelling of Dynamical Systems, 15: 5, 435 — 452.

Kangas, J., Kangas, A., Leskinen, P., Pykäläinen, J., 2001. MCDM Methods in Strategic Planning of Forestry on State-Owned Lands in Finland: Applications and Experiences. *Journal of Multi-Criteria Decision Analysis*, 10: 257-271.

Kangas, J. and A. Kangas, 2005. Multiple Criteria Decision Support in Forest Management – the Approach, Methods Applied, and Experiences Gained. *Forest Ecology and Management,* 201(1-2): 133-143.

Kato, S., and J. Ahern, 2008. Learning by doing: Adaptive Planning as a Strategy to Address Uncertainty in Planning. *Journal of Environmental Planning and Management,* 51(4): 543-559.

Kessler, W.B., Salwasser, H., Cartwright, C.W. Jr., Caplan, J.A., 1992. New Perspectives for Sustainable Natural Resources Management. *Ecological Applications,* 2(3): 221-225.

Keynes, J.M., 1936. The General Theory of Employment, Interest and Money. London: Macmillan.

Knight, F.H., 1921. Risk, Uncertainty and Profit. Boston: Hart, Schaffner and Marx; Houghton Mifflin Company.

Koontz, H., 1958. A Preliminary Statement of Principles of Planning and Control. *Journal of the Academy of Management,* 1: 45-61.

Langley, A., 1988. The Roles of Formal Strategic Planning. *Long Range Planning,* 21: 40-50.

Lawrence, D.P., 2000. Planning Theories and Environmental Impact Assessment. *Environmental Impact Assessment Review,* 20: 607–625.

Leibundgut, H., 1973. Grundbegriffe und Technik der waldbaulichen Planung. *Schweizerischen Zeitschrift für Forstwesen,* 124: 124-144.

Lerch, F.J. and D.E. Harter, 2001. Cognitive support for real-time dynamic decision-making. *Information Systems Research,* 12: 63-82.

Leskinen, P. and J. Kangas, 1998. Modelling and simulation of timber prices for forest planning calculations. *Scandinavian Journal of Forest Research,* 13(1): 469-476.

Lindsay, W.M., and L.W. Rue, 1980. Impact of the Organization Environment on the Long-Range Planning Process: A Contingency View. *Academy of Management Journal*, 23(3): 385-404.

Lipshitz, R. and O. Strauss, 1997. Coping with Uncertainty: A Naturalistic Decision-Making Analysis. *Organizational Behavior and Human Decision Processes,* 69(2): 149-163.

Lipshitz, R., Friedman, V.J., Popper, M., 2007. Demystifying Organizational Learning. Thousand Oaks, CA: Sage Publications. pp 285.

Lorenzi, P., Sims, H.P. Jr., Slocum, J.W. Jr., 1979. Perceived Environmental Uncertainty: An Individual or Environmental Attribute? Working paper: 79-101, Edwin L. Cox School of Business, Southern Methodist University, Dallas, Texas.

Lundgren, A.L., 1984. Strategies for Coping with Uncertainty. *New Forests for a Changing World: Society of American Foresters Meeting:* 574-578. Society of American Foresters, Bethesda, Maryland.

Mack, R., 1971. Planning on uncertainty: Decision making in business and government administration. New York: Wiley Interscience. pp. 233.

Maier, H.R., Ascough II, J.C., Wattenbach, M., Renschler, C.S., Labiosa, W.B., Ravalico, J.K., 2008. Uncertainty in Environmental Decision Making: Issues, Challenges and Future Directions. *Developments in Integrated Environmental Assessment,* 3: 69-85.

Mayring, P., 2000. Qualitative Content Analysis. Forum: Qualitative Social Research, on-line journal, (1): 2. Available at: http://www.qualitative-research.net/index.php/fqs/article/view/1089/2385. Date of access: June 1, 2010.

McCook, L.J., Almany, G.R., Berumen, M.L., Day, J.C., Green, A.L., Jones, G.P., Leis, J.M., Planes, S., Russ, G.R., Sale, P.F., Thorrold, S.R., 2009. Management under Uncertainty: Guide-lines for Incorporating Connectivity into the Protection of Coral Reefs. *Coral Reefs,* 28: 353-366.

Menke, M.M., 1979. Strategic Planning in an Age of Uncertainty. *Long Range Planning,* 12(4): 27-34.

Mintzberg, H., 1994. The rise and fall of strategic planning. *Harvard Business Review,* 72(1): 107-114.

Mintzberg, H., 1994a. Rethinking Strategic Planning Part I: Pitfalls and fallacies. *Long Range Planning,* 27: 12-21.

Mintzberg, H., 1994b. Rethinking Strategic Planning Part II: New Roles for Planners. *Long Range Planning,* 27(3): 22-30.

Mintzberg, H. and J. Lampel, 1999. Reflecting on the Strategy Process. *Sloan Management Review,* 40(3): 21-30.

Mintzberg, H., 2000. The rise and fall of strategic planning. New York: Prentice Hall.

Mohai, P., 1987. Rational Decision Making in the Planning Process: Some Empirical Evidence from RARE II. *Environmenal Law,* 17(3): 507-556.

Moyer, R., 1984. The Futility of Forecasting. *Long Range Planning,* 17(1): 65-72.

Murray, A.T. and R.L. Church, 1995. Heuristic solution approaches to operational forest planning problems. *OR Spectrum,* 17: 193-203.

Neumayer, E., 1998. Preserving natural capital in a world of uncertainty and scarce financial resources. *International Journal of Sustainable Development and World Ecology,* 5(1): 27-42.

Nuttle, T., Bredeweg, B., Salles, P., Neumann, M., 2009. Representing and managing uncertainty in qualitative ecological models. *Ecological Informatics,* 4: 358-366.

Oakley, A., 1981. Interviewing Women: A Contradiction in Terms. In: Roberts, H. (ed.), 1981. Doing Feminist Research. London: Routhledge.

Oesten, G., 1984. Zur Operationalität der Ziele im Forstbetrieb. *Der Forst- und Holzwirt,* 39(14/15): 361-364.

Orasanu, J., and T. Connolly, 1993. The Reinvention of decision-making. In: G.A. Klein, J. Orasanu, R. Calderwood, C. Zsambok (eds.). Decision-making in action: Models and methods (pp. 3-20). Norwood, NJ: Ablex Publishing.

Osman, M., 2010. Controlling Uncertainty: A Review of Human Behavior in Complex Dynamic Environments. *Psychological Bulletin,* 136(1): 65-86.

Ozbekhan, H., 1969. Toward a General Theory of Planning. In: E. Jantsch (ed.). Perspectives of Planning. Paris: OECD, 47-155.

Patton, M.Q., 2002. Qualitative Research & Evaluation Methods. Third Edition. Thousand Oaks: Sage Publications, Inc.

Price, C., 1989. Theory and application of forest economics. Oxford: Blackwell. 402 p.

Quétier, F., Lavorel, S., Daigney, S., deChazal, J., 2009. Assessing ecological and social uncertainty in the evaluation of land-use impacts on ecosystem services. *Journal of Land Use Science,* 4(3): 173-199.

Ramírez-Sanz, L., Alcaide, T., Cuevas, J.A., Guillén, D.F., Sastre, P., 2000. A Methodology for Environmental Planning in Protected Natural Areas. *Journal of Environmental Planning and Management,* 43(6): 785-798.

Rees, W.E., 1995. Achieving sustainability: Reform or transformation? *Journal of Planning Literature*, 9(4): 343-361.

Regan, H.M., Colyvan, M., Burgman, M.A., 2002. A taxonomy and treatment of uncertainty for ecology and conservation biology. *Ecological Applications,* 12(2): 618-628.

Rice, G.H., Jr., 1983. Strategic Decision-Making in Small Business. *Journal of General Management,* 9(1): 58-65.

Richardson, T., 2005. Environmental Assessment and Planning Theory: Four Short Stories about Power, Multiple Rationality, and Ethics. *Environmental Impact Assessment Review,* 25: 341-365.

Rossano, M.J., 2003. Expertise and the evolution of consciousness. *Cognition,* 89: 207-236.

Sarantakos, S., 1998. Social Research. Second Edition. South Melbourne: Macmillan.

Seeley, J.R., 1962. What is Planning? Defenition and Strategy. *Journal of the American Planning Association,* 28(2): 91-97.

Shanteau, J. and T.R. Stewart, 1992. Why study expert decision making? *Organizational Behavior and Human Decision Processes,* 53: 95-106.

Shrader, C.B., Mulford, C.L., Blackburn, V.L., 1989. Strategic and operational planning, uncertainty and performance in small firms. *Journal of Small Business Management,* 27: 45-60.

Sigel, K., Klauer, B., Pahl-Wostl, C., 2010. Conceptualising Uncertainty in Environmental Decision-Making: The Example of the EU Water Framework Directive. *Ecological Economics,* 69: 502-510.

Simpson, D.G., 1998. Why Most Strategic Planning is a Waste of Time and What You Can Do About It. *Long Range Planning,* 31(3): 476-480.

Smithson, M., 1989. Ignorance and uncertainty: Emerging paradigms. New York: Springer Verlag.

Spradley, J.P. and D.W. McCurdy, 1972. The Cultural Experience: Ethnography in Complex Society. Chicago: Science Research Association.

Sterman, J.D. and L.B. Sweeney, 2005. Managing Complex Dynamic Systems: Challenge and Opportunity for Naturalistic Decision-Making Theory. In: Montgomery, H., Lipshitz, R., Brehmer, B., 2005. How Professionals make Decisions. Lawrence Erlbaum Associates, Inc., New Jersey. pp 435.

Strauss, A.L., 1987. Qualitative analysis for social scientists. New York: Cambridge University Press.

Ticehurst, G.W. and A.J. Veal, 1999. Business Research Methods: A Managerial Approach. Australia: Longman.

Tress, B. and G. Tress, 2001. Capitalising on multiplicity: a transdisciplinary systems approach to landscape research. *Landscape and urban planning,* 57(3-4): 143-157.

Van Nest Black, R., 1936. Planning as a Professional Career. *Journal of the American Planning Association,* 2(6): 144-147.

Walker, W.E., Harremoës, P., Rotmans, J., van der Sluijs, J.P., van Asselt, M.B.A., Janssen, P., Krayer von Krauss, M.P., 2003. Defining uncertainty: A conceptual basis for uncertainty management in model-based decision support. *Integrated Assessment,* 4(1): 5-17.

Weber, C.E., 1984. Strategic Thinking – Dealing with Uncertainty. *Long Range Planning,* 17(5): 60-70.

Weber, J.A., 1997. Certainty and Uncertainty in Decision-Making: A Conceptualization. In: Golembiewski, R.T., and J. Rabin (eds). Public Budgeting and Finance. Fourth edition. New York: Marcel Dekker Inc: 449-474.

Weber, J.A., 2000. Uncertainty and Strategic Management. In: Rabin, J., Miller, G.J., Hildreth, W.B. (eds). Handbook of Strategic Management. Second edition. New York: Marcel Dekker, Inc.: 203-226.

Weikard, H.-P., 2003. On the quasi-option value of biodiversity and conservation. In: Wesseler, J., Weikard, H.-P., Weaver, R.D., Risk and Uncertainty in Environmental and Natural Resource Economics. Edward Elgar, 2003, 330 pp. Edward Elgar Publishing Limited, Cheltenham, UK.

Wesseler, J., Weikard, H.-P., Ravalico, J.K., Strudley, M.W., 2008. Future research challenges for incorporation of uncertainty in environmental and ecological decision-making. *Ecological Modelling,* 219: 383-399.

Williams, M.R.W., 1981. Decision-making in forest management. Forestry research studies series, no. 1. R.S.P., Chichester

Wilson, J.S., and P.J. Baker, 2001. Flexibility in forest management: Managing uncertainty in Douglas-fir forests of the Pacific Northwest. *Forest Ecology and Management,* 145: 219-227.

Yin, R., 1994. Case Study Research, Design and Methods. Second Edition. Applied Social Research Methods Series, volume 5. Thousand Oaks: Sage Publications, Inc.

Zinn, J.O., 2008. Heading into the Unknown: Everyday Strategies for Managing Risk and Uncertainty. *Health, Risk and Society,* 10(5): 439-450.

Zinn, J.O., 2009. The Sociology of Risk and Uncertainty: A Response to Judith Green's 'Is it Time for the Sociology of Health to Abandon "Risk"?'. *Health, Risk & Society,* 11(6): 509-526.

Appendices

Appendix A List of interviewees

Organization	Name interviewee	Function
Bosgroep Zuid	Mr Rots	Regional manager
Drents Landschap	Mr Bezuijen	Head of management
Dienst Vastgoed Defensie	Mr van der Meulen	Coordinator forest and nature management
Hoge Veluwe	Mr Leidekker	Head of management
Landgoed Schovenhorst	Mr de Klein	Steward/Manager
Landgoed ter Coulster	Mr van der Feen	Co-owner and manager of the area
Municipality of Ede	Mr Boortman	Team leader 'nature'
Natuurmonumenten	Mr van Tooren	Head of department evaluation management
Stichting Beheer Natuur en Landelijk Gebied	Mr van der Vegt and Mr Smits	Regional managers
Staatsbosbeheer	Mr Wondergem	Senior staff member of area management; specialty ecology

Appendix B Semi-Structured Questionnaire[2]

Introduction

What is your function within the organization?

What are your activities exactly?

How long have you been working in this organization? And in this function?

Planning Practices

How important is management planning for this organization?

Who are involved in the development of a management plan?
Why these people?

Is there a department within the organization that specifically focuses on management planning?
If yes, how many people work in this department?
If no, why not and who is responsible for management planning?

Could tell a bit more about how the management plans are developed?
Is there a particular format/cycle/process?

Which statement is most applicable to the planning process that is carried out in this organization?[3]

What are the time periods for the plans?
Why this time period?
Would you like to change something about this time period (is it too long or too short)?

Type of planning

On a scale from 'rational/systematic' to 'natural', how would you characterize the planning within your organization?

On a scale from 'comprehensible/controllable' to 'unpredictable/confusing', how would your organization see the external world?

Uncertainty

In practice, does your organization deviate from the planning often?
If yes, could you indicate what causes this?

Do you experience a lot of uncertainty during the development of the plans?
If yes, what are the most uncertain factors?
Do you take this into account in the plans?

According to you, could this organization do without management planning?
Why? What would go wrong if it wasn't for planning?

If you could change anything about the planning as it is carried out now, would you?
What would you change and why?

[2] This questionnaire is translated from Dutch
[3] See table 2 for the choice of statements