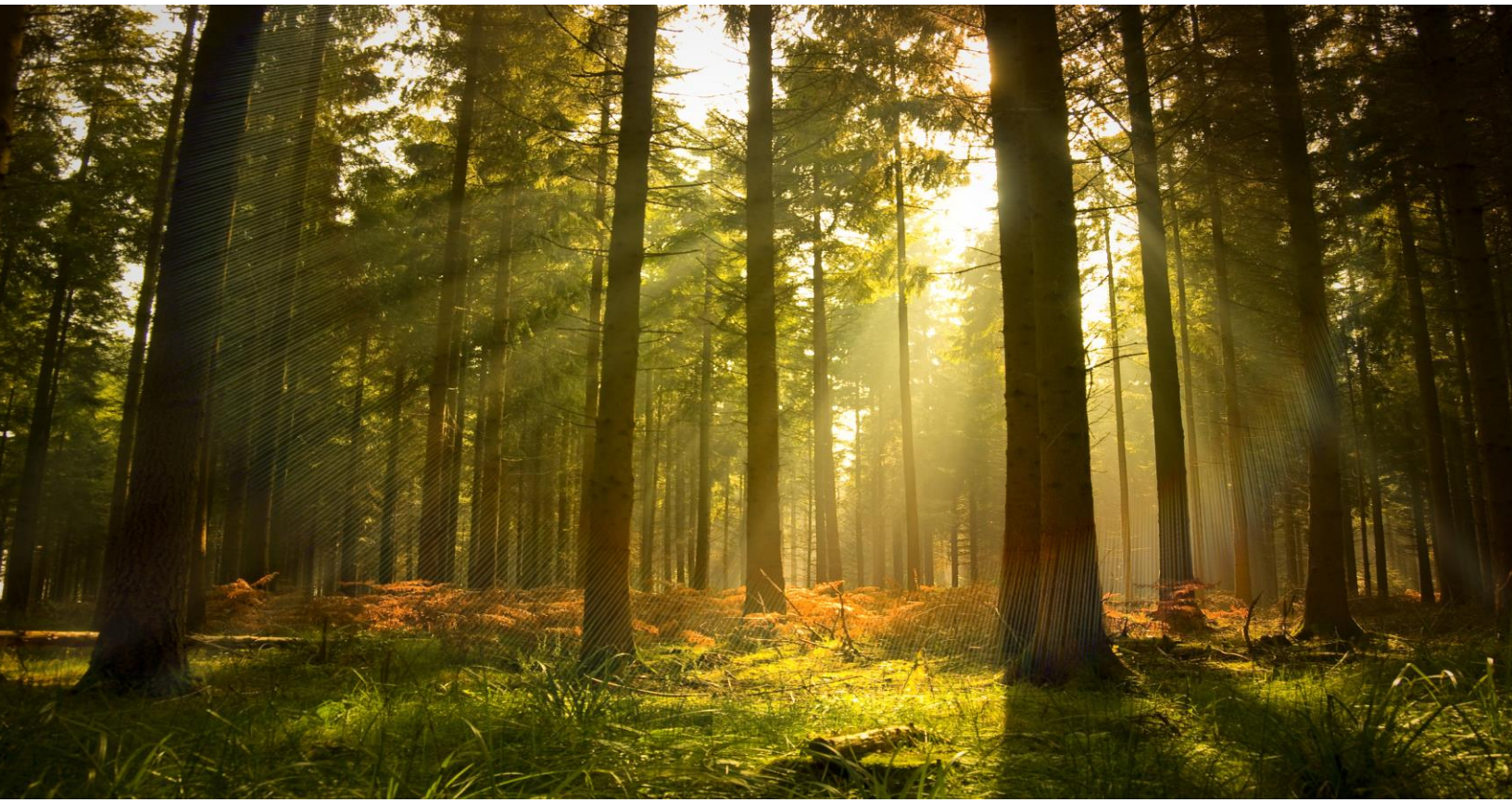
The Potential Usefulness of Scenario Planning in (Dutch) Forest and Nature Management



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Hidde Wagenvoort
MSc Thesis
March 2017

The Potential Usefulness of Scenario Planning in (Dutch) Forest and Nature Management

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Preface

Before you lies the end product of the time I spent researching and exploring the possible added value of scenario planning in (Dutch) forest and nature management. This research have been challenging since the topic of scenario planning itself is very abstract. Despite the outcome of this research to a large extent is an expected one I am convinced it is a very useful one. The outcome of this research confirms expectations but also provides new insights in potential opportunities, and threats of scenario planning in forest and nature management.

This thesis would not have been possible without the help of others. First of all I want to thank my supervisor Marjanke Hoogstra-Klein for her guidance along the way, her feedback and new ideas which helped me to complete this thesis. Also I want to thank Jilske de Bruin for sharing her experiences and knowledge about the topics of scenario planning and forest and nature management.

Many thanks and appreciation also to my interviewees and survey respondents. I have been positively surprised of the willingness and enthusiasm to participate in this research and share their stories with me. I really enjoyed interviewing these people and studying the outcomes of the interviews and surveys.

Lastly I would like to thank all people who I have involved, both voluntary and involuntary, on my route to finish this thesis. I want to thank them all for the support, creative ideas, feedback and lastly for being my wailing wall when I needed one.

I hope you enjoy reading!

Hidde Wagenvoort

Wageningen, March 2017

Summary

How will the world look in fifty years, in a year or even in five minutes? We can never tell for certain how the world is going to be because of the complexity and uncertainty of natural systems and changes in the social-economic and technical environment. Dealing with the uncertainty of the future is experienced as difficult, confusing and demoralizing. Forest and nature management organizations have been dealing with uncertainty and complexity in their working environments for decades and have developed different methods and tools to cope with this.

A tool barely used in forest and nature management is scenario planning. Scenario planning in a most basic form can be described as follows: *"a tool for improving decision making against a background of possible future environments"* (Mietzner and Reger, 2005, p. 224). When the theoretical concepts and methods of scenario planning are studied they seem to fit well as a tool for forest and nature managers to deal with the uncertainty and complexity. However as scenario planning is currently barely used. Therefore the main research question for this research is: *how could scenario planning be potentially useful to (Dutch) forest and nature management organizations?*

The results showed that scenario planning is considered successful when set goals are achieved or management practices contribute to achieving these goals. Different factors are called essential for the successfulness of forest and nature management: stability and flexibility; knowledge and expertise; and communication and cooperation. This research provides evidence to assume that a tool or method is useful to forest and nature managers if it contributes to the successfulness of it. The results showed relations and similarities between what are considered to be essential factors for the successfulness of forest and nature management and the functions ascribed to scenario planning in literature. This suggests scenario planning is potentially useful in forest and nature management, this presumption is strengthened by the opportunities the interviewees foresee for scenario planning in forest and nature management. The results also showed that scenario planning is currently barely used because forest and nature managers think scenario planning is considered to be complicated. Forest and nature managers tend to think and work pragmatically whereby the possible utility of scenario planning remains unseen. Besides potential threats are foreseen for both the development and applicability of scenario planning in forest and nature management.

With the derived outcomes of this study the main research question could be answered. This study showed that scenario planning could be potentially useful to (Dutch) forest and nature management organizations in different ways. Scenario planning can primarily be useful as a supportive tool in forest and nature management. Scenario planning can support forest and nature management by improving and facilitating among others: learning, communication, cooperation and evaluation. With this supportive function scenario planning contributes to a forest and nature managers expertise, making him or her eventually a more successful manager.

Contents

1. Introduction

In the introduction the basic principles of this study will be explained. First (1.1) the background where upon this study is based is discussed where after (1.2) the problem this research will focus on is stated. The chapter ends with the formulation of (1.3) the research objective, the main research question and sub-questions.

1.1 Background

How will the world look in fifty years, in a year or even in five minutes? We can never tell for certain how the world is going to be because of the complexity and uncertainty of natural systems and changes in the social-economic and technical environment (Funtowicz and Ravetz, 1994). Dealing with the future and its uncertainty is experienced as difficult, confusing and demoralizing but can also be an opportunity (Peterson et al., 2003). Uncertainty can inspire, encourage tolerance and humbleness to the environment which all may lead to better a better understanding and deeper thinking about the world around us.

Uncertainty increases when planning further away into the future. Complexity will increase as well because more variables may interact (Hoogstra and Schanz, 2008; Amer and Jetter, 2013). Dealing with uncertainty is a major part in planning, or a crucial task as Christensen (1985) calls it: "*A crucial planning task is to discover, assess, and address uncertainty*" (Christensen, 1985, p. 63). Uncertainty may lead to misunderstanding of the environmental system, resulting in ineffective management and planning for the future. By assessing uncertainties and matching these to the planning process, uncertainty can be significantly reduced according to Christensen (1985). Hoogstra and Schanz (2008) argue that ignoring uncertainty in planning will endanger an organizations survival because, without uncertainty taken into account, the predicted future is unrealistic. According to Craver (1973) planning for the future creates the ability to choose how we want our future to look like. Being able to cope with the uncertainty and complexity of the future helps to better plan and manage this future in a way it results in a more desired future situation. Dealing with complexity and uncertainty in future planning is thus essential for organizations and may benefit in a way they are better able to reach their goals.

Forest and nature management organizations are no exception here, and their ability to cope with uncertainty is possibly even more important. Forest and nature management organizations have to deal with the future in everyday planning, a future with long time horizons much longer than other sectors have to deal with (Zivnuska 1949). Because long term planning goes hand in hand with uncertainty it is said that uncertainty is inherent to forest management (Convery, 1973; Duerr, 1969). Managing forest and nature is perceived complex because of all the environmental, economic and social factors that needs to be taken into account (Diaz-Balteiro and Romero, 2008; Ananda and Herath, 2009). Dealing with this complexity and uncertainty is important in order to come up with a successful management strategy for the future. A successful management strategy benefits an organization because it will create a set of policies and management practices leading to a desired future situation. This is however easier said than done, because as "*the complexity of decisions increases, it becomes more difficult for decision-makers to identify a management alternative that maximizes all decision criteria*" (Ananda and Herath, 2009, p. 2535). The future planning approach needs to be able to examine trade-offs, deal with environmental,

economic and social factors while reducing conflicts and optimizing the outcome (Ananda and Herath, 2009). The difficulties experienced in decision making for such uncertain and complex issues gave rise to two specific needs according to Bradfield et al. (2005, p. 798): "*the need for a methodology to capture the reliable consensus of opinion of a large and diverse group of experts; and the need to develop simulation models of future environments which would permit various policy alternatives and their consequences to be investigated*". Traditional planning approaches, such as forecasting, expect that efficient and effective management can be created when goals are well-defined and expertise knowledge is used (Peterson et al. 2003). However these traditional planning approaches often fail to include, or successfully integrate, factor varieties and uncertainties. Christensen (1985, p. 63) adds to this that traditionally, "*planning has assumed that both means and ends are known*". These assumptions and the failure to successfully integrate uncertainty, may lead to wrongly constructed plans which are not effective and produce wrong results. This could be a real danger for organizations because it will create false assumptions on security and uncertainty (Hoogstra and Schanz, 2008). Lundgren (1984) emphasizes this by mentioning that we are dealing with a false impression of reality if the uncertainty and complexity of the future is not acknowledged. This importance of taking uncertainty and complexity into consideration is widely acknowledged but there are different approaches on how to deal with this, and to create a successful decision making strategy.

1.2 Problem statement

A planning tool that focusses on planning in a complex and uncertain future is scenario planning. Mietzner and Reger (2005, p. 224) describes scenario planning in a most basic form as; "*a tool for improving decision making against a background of possible future environments*". Scenario planning aims to create different possible futures by taking into account the uncertainty, unpredictability and instability rather than producing one single prediction of the future (Peterson et al., 2003). Scenario planning became a popular tool over the last decades, and is used in many different sectors (Bradfield et al., 2005; Varum and Melo, 2010). Amer et al. (2013) explain the increasing popularity of scenario planning by indicating a correlation between adaptation of scenario planning and the business environment having to deal with uncertainty, unpredictability and instability more.

Using scenarios has also found to be useful when dealing with the environment (Hetemäki, 2014). For example it is used in generating climate scenarios by the Intergovernmental Panel on Climate Change (IPCC) and to create forest outlook studies that provide policy scenarios to make trade-offs (Hurmekoski and Hetemäki, 2013). However scenario planning is relatively new to the forest and nature management sector it already gained a strong foothold over the last decade as a strategic decision making tool (Hoogstra et al., 2016). Despite the popularity of scenario planning and use in different sectors, there is both conceptual and methodological confusion and chaos (Bradfield et al., 2005; Mulvihill and Kramkowski, 2010). When scenario planning is discussed in the literature, it is often assumed that the reader already knows what scenario is all about, however it is impossible to find a well-defined and shared concept and method for scenario planning in literature (Ringland and Schwarz, 1998). Scenario planning has been applied over the last 50 years in different sectors and disciplines which has led to the development and use of scenarios in a variety of ways (Van Notten et al., 2003). In order to structure the chaos different typologies have been created that give an overview of different approaches, their

characteristics and their goals (van Notten et al., 2003; Börjeson et al., 2006; Kosow and Gaßner., 2008). The creation of typologies has been very useful like Varum and Melo (2010) emphasize "*systematizing and organizing the existing literature is a necessary step in developing the field and bringing the value of scenarios to a wider public*" (Varum and Melo, 2010, p. 356). Börjeson et al. (2006) adds to this that these typologies have been important tools to communicate, understand, compare and develop scenarios.

Despite this, and its popularity and promising added value of scenario planning, there is also criticism. Both positive and negative stories exist with both strong arguments. This contradictory and disunity is typical to the nowadays situation concerning scenario planning. This stimulates, but also frustrates, many authors and scientists who recognize the opportunities of scenario planning. Like Millet (2003) states: "*in the ensuing years I have observed with some frustrations that corporate and institutional managers still do not get the full return on investments in scenarios that they should, nor do they employ scenarios on the full range of corporate issues suited to this methodology*" (Millet, 2003, p. 16). Rickards (2014) addresses the high expectations people have from scenario planning. People expect that scenario planning will inform and provide evidence for decision making but afterwards realize the impact has been limited. Wright et al. (2013) are even questioning if there exists such a thing as a connection between scenario planning and improved decision making. However Rickards (2014) mention that the seemingly missing connection is maybe not to blame on scenario planning but it emphasize another issue. "*The failure of scenario planning to penetrate organizational decision making may actually serve the important purpose of illuminating epistemological and political barriers to adaptation that arise out of outdated expectations about the form, content, and purpose of appropriate evidence for decision making*" (Rickards, 2014, p. 654-655). Chermack (2004) argues that scenario planning have the potential to overcome of what is stated as the causes of decision making failure, namely: bounded rationality, consideration of exogenous and endogenous factors, information stickiness and knowledge friction and mental models and decision premises. What causes the misconnection is therefore difficult to point out, but Chermak (2004) and Rickards (2014) argue that adaptation is essential; adaptation of scenarios to the user's expectations and the desired outcome, or in other words, scenarios that fit. This adaptation is recognized and mentioned by many other authors as the key issue of scenario planning (Barber, 2009; Amer et al., 2013; Rickards, 2014). Scenario typologies are of great value, but development of 'suitable' scenarios that match the expectations and provide desired outcomes still appears to be a challenge. Harries (2003, p.798) states: "*understanding the value of scenario-based decision making requires an understanding of the interaction between the actions, goals and knowledge of the individual organization and the environment in which they are operating*".

Scenario planning seemingly is an interesting tool in forest and nature management because it focusses on planning in a complex and uncertain future is scenario planning. The future forest and nature management organizations are planning for is considered both complex and uncertain. The question arises if and how scenario planning can be useful in forest and nature management, and if and why it is barely used nowadays despite the seemingly potential of it.

1.3 Research objective and research question

The objective of this research is to explore the possible added value of scenario planning in forest and nature management. Previous studies have focused on provisioning an overview of the diversity and

opportunities of scenario planning. Several authors like Börjeson et al. (2006) and Varum and Melo (2010) emphasize this overview is very important but is not always sufficient to understand the possible added value. Therefore the aim of this study is to explore how scenario planning could be of added value specifically for (Dutch) forest and nature management organizations. The main research question for this study is::

How could scenario planning be potentially useful to forest and nature management organizations?

Sub questions that are asked are:

- What determines if forest and nature management is successful?
- What is essential when doing forest and nature management?
- What challenges do forest and nature management organizations face?
- How do theoretical aspects of scenario planning connect to practical aspects of forest and nature management?

2. Theoretical background

This chapter will provide the research's theoretical background. The theoretical background will give an overview of what is considered to be relevant about the concept of scenario planning. First (2.1) the origins and (2.2) definitions of scenario planning are discussed. In (2.3) the definition of scenario planning is conceptualized. Next (2.4) different classifications and typologies are explored. The last two paragraphs discuss the functions ascribed to scenario planning in literature (2.5) and possible identified pitfalls (2.6).

2.1 Origins of scenario planning

The concept of scenario planning has been around over 60 years and is widely used in different sectors (van Notten et al., 2003). Since the beginning of time people have been interested in the future and have used the concept of scenarios as a tool to explore this future (Bradfield et al., 2005). The military started using scenarios following World War II. This was the first time it was actually used as a strategic planning tool (Bradfield et al., 2005). With the traumatic experience of the oil crisis in the early 1970's people started to realize what the extreme consequences of unexpected changes in the business environment are (Mietzner and Reger, 2005). With the presentation of the report "*Limits to growth*" by the 'club of Rome' in 1972, awareness grew on the importance of future studies, and the development of computer simulations helped to create scenarios (Kosow and Gaßner, 2008). Since then scenarios, or future visions, had a big influence on human-thinking and decision making (Grunwald, 2011). Amer et al. (2013) indicates a correlation between adaptation of scenario planning and the business environment having to deal with uncertainty, unpredictability and instability. This correlation may explain the increasing popularity and application of scenario planning. The revival and increasing popularity of scenario planning in different sectors has, however, also created a chaos in the literature which led to doubts about scenario planning and a decrease in popularity. The absence of one accepted definition and a clear methodology led to a "*conceptual and definitional confusion*" (Mulvihill and Kramkowski, 2010, p. 2454).

2.2 Definitions of Scenario planning

Over time many different definitions for scenario planning have been created. This has led to scenario planning being a fuzzy concept that may include many things. The concept of scenario planning is widely used but also misused or even abused because it is misunderstood (Mietzner and Reger, 2005). Herman Kahn, considered to be one of the founders of the concept scenario planning, gave the following definition in his book: ''*a set of hypothetical events set in the future constructed to clarify a possible chain of causal events as well as their decision points*'' (Kahn and Wiener, 1967). Van Notten et al. describes scenarios as follows: "*scenarios are descriptions of possible futures that reflect different perspectives on the past, the present and the future*" (Van Notten et al., 2003, p.424). Bishop et al. (2007) sees a scenario as a product of future studies, stating that future studies focus on thinking deeply and creatively about the future so that one will not be surprised or unprepared for what will come. At the same time, we should prepare for multiple futures because of these uncertainties (Bishop et al., 2007). The definition of Peterson et al. (2003) match to the one of Bishop et al. (2007) but emphasizes on what makes scenario planning unique: "*The central idea of scenario planning is to consider a variety of possible futures that include many of the important uncertainties in the system rather than to focus on the accurate prediction of a single outcome*"

(Peterson et al., 2003, p. 359). Börjeson et al. (2006, p. 723) describe scenario's as an approach of future studies that can denote both "*descriptions of possible future states and descriptions of developments*". Varum and Melo (2010) argue that scenario planning is a strategy approach, which differ from traditional approaches, and focusses on the process searching for an optimal strategy. Reviewing the literature proves that there is a wide variety of definitions. As there is no agreement upon one definition for scenario planning, this research uses a self-defined definition by the researcher that covers most of the above mentioned aspects, to prevent exclusion:

Scenario planning is a planning technique that is used to provide insight on different possible future situations based on the analysis and understanding of what are considered the drivers of change in a system that is characterized by uncertainty.

2.3 Conceptualization of scenario planning

To explain this definition of scenario planning it is separated into different parts and analysed using existing literature. First of all scenario planning is a planning technique, but what is considered to be planning? The definition of planning should be clear enough to give guidance, but vague enough to allow for flexibility as it could be interpreted in the context it is used (Seeley,1962). Mintzberg (2000) asked the seemingly simple question 'what is planning' and concluded that planning could be seen best as: "*it must be seen, not as decision making, not as strategy making and certainly not as management, or as the preferred way of doing any of these things but simply as the effort to formalize parts of them – through decomposition, articulation, and rationalization"* (Mintzberg, 2000, p. 15). All definitions of scenario planning agree with scenario planning using future situations for planning. However, there is a variety of how the future is used, this depends on the scenario planning approach. A distinction can be made here in two groups that differ from each other in the order of events. Scenario planning can be either descriptions of future situations that help us move from the actual to the future situation, or scenario planning is descriptions of possible future situations as a result of trends and policies. Both ways imply that descriptions of possible future situations are used for planning, either to provide guidance for planning or create awareness of the consequences of planning.

The description of different possible future situations is based on the analysis and understanding of what are considered the drivers of change in a system. Drivers, or drivers of change, are described as "*the exogenous variables for which we set values in a scenario*" (Kuhlman et al., 2006, p. 10). Selecting and including the right drivers of change is key for scenario planning. The selection of drivers is the basis for scenario planning, excluding a key driver with major impact on the future situation result in a scenario that is not a good reflection of how the future will be. The drivers of change determine how a system will look in the future and prepare you for this future. By adding a driver of change like a particular policy it can be determined how this will influence your system in the future. Van Notten et al. (2003) is using variables instead of drivers of change. Variables can be actors, factors and sectors. Both variables and drivers of change will interconnect and determine the dynamics of a scenario.

Uncertainty plays a major role in scenario planning since the future in unpredictable and is therefore characterized by uncertainty. Peterson et al. (2003) speaks about facing uncontrollable and irreducible uncertainties when dealing with the future. Scenario planning will explore the joint impact of uncertainties

(Schoemaker, 1995). Scenario planning techniques are considered to be extremely useful in times of high uncertainty and complexity since by creating multiple possible futures it will help to overcome thinking limitations and stimulates strategic thinking (Amer et al., 2013).

2.4 Classification and typology of scenario planning approaches

When scenario planning seem to be an useful and credible tool to support organizations in their decision making different approaches to scenario planning are available. Different authors (e.g. van Notten et al., 2003; Mietzner and Reger, 2005; Börjeson et al., 2006) have created classifications for scenario planning to provide an overview in what is called the methodological chaos in scenario planning (Bradfield et al., 2005; Amer et al., 2013). Martelli (2001) summarizes the methodological chaos by stating that; "*scenarios lack a set of theories, principles and practical rules commonly accepted by at least the vast majority of the theoreticians and of the practitioners*" (Martelli, 2001). Bradfield et al. (2005) adds that the methodological chaos is a consequence of an abundance of "*different and at times contradictory definitions, characteristics, principles and methodological ideas about scenarios*" (Bradfield et al., 2005, p. 796). Kosow and Gaßner (2008) and van Vliet (2011) conclude there exists not such a thing as 'the' scenario method or type. The term scenario methodology covers the wide variety of approaches, techniques and research designs available. Van Notten (2003) emphasizes the importance of a shared understanding of typical features and relevant terminologies of scenarios. In typologies or classifications of scenario approaches created in literature, fundamental distinctions are made in variables that provide insight in the variety and opportunities scenario planning offers (van Notten et al., 2003). Kosow and Gaßner (2008) emphasizes the importance of a good understanding of the concept of scenario planning and all aspects since only a good understanding of those will result in optimal use of scenario planning. Two classifications are discussed below. First, a classification is presented based on the techniques used for the development of scenarios. Second, a classification is discussed based on the question posed for the development of a scenario. Both between and within the classifications there is overlap in reasoning and foundation which is symbolic for the methodological chaos in literature.

2.4.1 Intuitive logics, la prospective and the probabilistic modified trends methodology

There is a wide variety of classifications based on scenario techniques, the most common distinction made in methodologies is between the intuitive logics school, the la prospective school and the probabilistic modified trends school. The latter is subdivided between two matrix based methodologies; trend-impact analysis and cross-impact analysis. These three scenario methodologies are called the three main schools of techniques and all have a different origin and development route over time (Bradfield et al., 2005).

The intuitive logics school

The intuitive logics school receives most attention in literature (Amer et al., 2013). This technique is also referred to as the Shell approach because this approach gained first attention when used at Royal Dutch Shell (Bradfield et al., 2005). The intuitive logics methodology assumes that the complex set of relationships among economic, political, technological, social, resource, and environmental factors are the basis for decision making (Huss and Honton, 1987; Amer et al., 2013). Relationships between different aspects are analyzed with this approach, namely; "*the critical uncertainties (as they resolve themselves), important predetermined trends (such as demographics), and the behavior of actors who have a stake in the particular future (who tend to act to preserve and enhance their own interests)*" (Wright et al., 2013, p.

634). For developing scenarios the intuitive logics method heavily relies on the understanding and knowledge of experts and participants of the scenario. The basis of the intuitive approach is mostly formed by an interactive group with a variety of people who develop stories or storylines, therefore the intuitive mostly rely on qualitative data (van Notten et al., 2003). Mietzner and Reger (2005) argue that is the best method to use all information available about the future, which can be used to develop scenario that are flexible and internally consistent. Within the intuitive logics school there are several approaches (Bradfield et al., 2005). There is a variety in the number of steps the process take varying from only 5 steps up to 15 and more, which depends on the features of a scenario that are taken into account, or ignored.

The probabilistic modified trends school

The probabilistic modified trends school incorporates cross-impact analysis and trend-impact analysis techniques (Bradfield et al., 2005). Both involve the probabilistic modification of extrapolated trends (Amer et al., 2013). Both analysis techniques are quantitative techniques which are opposite to the intuitive logistics school which relies mostly on qualitative data (Bishop et al., 2007). Trend-impact analysis focuses on one key dependent variable that is impacted over time by different events (Huss and Honton, 1987). This method is evolved from traditional forecasting methods that left out the possible effects of unprecedented future effects in their extrapolation of historic data (Bradfield et al., 2005). Advantage of trend-impact analysis is that there is choice in the selection of factors influencing the development of the key variable which leaves it open to think creatively. A disadvantage is that it can only be used if detailed and reliable data over a long time period is available that can be processed by the experts (Mietzner and Reger, 2005). Cross-impact analysis developed because of the need to interrelate intuitive forecasts (Huss and Honton, 1987). Cross-impact analysis attempts, like trend-impact analysis, to analyze the impact on a key variable by examining the effect from probable of future events (Bradfield et al., 2005). The difference with trend-impact analysis is that it also includes the interrelationship between the key influencing factors. Trend-impact analysis sees these influencing factors as freestanding factors that only influence the key variable itself and don't influence other influencing factors.

The la prospective school

The la prospective school results from the 'French Centre'. The French were in Europe the first to use scenario techniques to study the scientific and political structures of the future (Bradfield et al., 2005). The prospective methodology relies on the following principal; "*the future is not part of a predetermined temporal continuity, and it can be deliberately created and modelled*" (Amer et al., 2013, p. 27). Godet (1987) states that the development of this method by the French philosopher Gaston Berger came as a reaction of 'traditional' forecasting methods revealingly failing. The method relies on four basic concepts: the base, the external context, the progression and the images. These four concepts refer to the present situation, the environment of the system, the past and a representation of future situations (Amer et al., 2013). Bradfield et al. (2005) also argues that the la prospective school is often seen as a blend of intuitive logics and probabilistic modified trend methodologies. Bradfield et al. (2005, p. 802) states that the objective of la prospective is "*to formulate an acceptable scenario-based methodology for developing positive images or 'normative scenarios' of the future and to lead these images into the political arena where they could serve as a guiding vision to policy makers and the nation, providing a basis for action*".

2.4.1.1 Themes for classifying scenarios

However a distinction is made between the three schools of scenario techniques there is also overlap. The foundation of each school is found in different places and moments and time which have resulted in each school having different characteristics. Characteristics of scenario approaches are identified by several authors. Van Notten et al. (2003) created a list of fourteen characteristics divided over three themes; project goal, process design and scenario content. Weidenhaupt et al. (1998) and Amer et al. (2013) came up with similar lists of characteristics which can be used to distinguish and compare different scenario approaches. Three overarching themes selected by van Notten et al. (2003) cover most characteristics mentioned in other literature as well. These three themes are used to compare the three schools of technique. The table below provides an overview of these characteristics.

Overarching themes	Characteristics
1. Project goal	Inclusion of norms: descriptive vs normative
	Vantage point: forecasting vs back casting
	Subject: issue-based, area-based, institution-based
	Time scale: long term vs short term
	Spatial scale: global/supranational vs national/local
2. Process design	Data: qualitative vs quantitative
	Method of data collection: participatory vs desk research
	Resources: extensive vs limited
	Institutional conditions: open vs constrained
3. Scenario content	Temporal nature: claim vs snapshot
	Variables: heterogeneous vs homogenous
	Dynamics: peripheral vs trend
	Level of deviation: alternative vs conventional
	Level of integration: high vs low

Theme 1: the project goal

The first overarching theme is the project goal and includes the objectives of scenario planning as well as criteria for the scenario development process. The first characteristic, the inclusion of norms, distinguishes normative and descriptive scenarios. The inclusion or exclusion of norms and values plays a significant role in scenario development. The inclusion or exclusion of norms and values is the variable that distinct normative from descriptive scenarios. Van Notten et al. (2003) however argues that all scenarios are normative to a certain level since they will always be influenced by the interpretations, values and interests of the people that develop the scenarios. Scenarios with a descriptive character explore possible futures where normative scenarios describe probable or preferable futures (van Notten et al., 2003). All three schools of scenario development techniques mostly are used for exploring the future. The intuitive logistics school however is also used to get better understanding of the consequences of actions and, or policies on the future situation. The year 2000 study and Horizon planning initiative by Shell are examples of how scenarios developed according to the intuitive logistics school were used as a framework to improve thinking about the future (Bradfield et al., 2005). Therefore the intuitive logistics school can also be characterized as normative since it is used to improve decision making and reach a preferable or desired future outcome. The second characteristic, the vantage point, describes the moment in time from which the scenario is developed. The moment in time chosen decides whether it is a

forecasting or back casting scenario. Forecasting scenarios take the present as a starting point and are mostly explorative scenarios where back casting scenarios take a certain future point and explore the steps needed to arrive successfully at this desired future point (van Notten et al., 2003). The vantage point depends on whether scenarios are descriptive or normative. Descriptive scenarios explore the future and argue from the present time where normative scenarios serve as an exploration of strategies to reach a desired situation in the future (van Notten et al., 2003). The third characteristic, the subject of the scenario study, distinguishes issue-based, area-based and institution-based scenarios (van Notten et al, 2003). The subject of a scenario provides focus. Issue-based scenarios take particular societal issues as a focus, area-based scenarios focus on a particular geographical area. Institution-based scenarios are divided into contextual and transactional scenarios; this depends on whether the institution can influence the issue that is studied directly or not (van Notten et al., 2003). Scenarios developed using one of the schools of technique can be each issue-based, area-based or institution-based or even a combination of these three. The focus of scenarios depends on the scope of the scenario. The intuitive logistics scenarios can have either a broad or narrow scope, focussing on the entire world or a small region, one industry or a specific issue (Bradfield et al., 2005; Amer et al., 2013). Scenarios developed with the la prospective method generally have a narrow scope but consider many factors within this scope (Bradfield et al., 2005). The scope in the probabilistic modified trends is narrowly focused the probability and impact of specific events (Amer et al., 2013) and will therefore generally be issue-based. The last two scenario characteristics as identified by van Notten et al. (2003) in the project goal theme are the time scales and spatial scales. The spatial scale used for probabilistic modified trends and la prospective methods will be small relatively to the spatial scale that can be used with the intuitive logics method. The time scale or time frame that can be used for all three technique schools are the same according to Bradfield et al. (2005) and Amer et al. (2013), three to twenty years.

Theme 2: the process design

The second overarching theme, the process design, includes scenario characteristics that are mostly related to the data and resources used for the design or development of scenarios. Van Notten et al. (2003) distinguish here an intuitive from a formal approach based on the four characteristics for this theme. The first characteristic, the nature of data, distinguishes qualitative and quantitative data. The nature of data used for the three planning schools can be best analysed based on the tools commonly used. The tools used for data collection is also the second characteristic as identified by van Notten et al. (2003). The third and last characteristics within the process design theme are the nature of the resources and nature of institutional conditions. The nature of resources includes all things needed for the process and content of a scenario analysis but can differ in availability. Resources can be for example financial and research resources, time and skill full people available for the project. These resources can be available in different numbers and proportions. This extensive or limited availability of resources have impact on the outcome and results. The nature of resources is related to the nature of institutional conditions, with institutional conditions the room for manoeuvre a scenario project is given is addressed. Van Notten et al. (2003) argue that the institutional conditions can be called a resource and therefore fits within the characteristic of nature of the resources. The reason van Notten et al. (2003) discuss both characteristics separately is because; "*resources tend to be transparent whereas the institutional conditions are often more illusive*" (van Notten et al., 2003, p. 432). The four characteristics as identified for the process design

all relates to each other very strongly, therefore the characteristics will not be discussed separately for each school of technique. Each school of techniques general process design will be discussed based on the four characteristics. The intuitive logistics method is a process oriented approach and the la prospective and probabilistic methods are outcome oriented approaches (Amer et al., 2013). The intuitive logistics heavily rely on the capabilities of the scenario developers and according to Bradfield et al. (2005) the tools generally used are; brainstorming, STEEP analysis, clustering, matrices, system dynamics and stakeholder analysis. With the application of the intuitive logics approach the following are enabled: "*identification of the driving forces of the future that are present in the broad business environment and will impact an "issue of concern" — often the viability of a focal organization and its offering into the market place; consideration of the range of possible and plausible outcomes of each of these forces; and understanding of how the forces interact with each other in terms of cause and effect, and chronological order*" (Wright et al., 2013, p. 634). The intuitive approach, strongly relying on qualitative knowledge and insights is on one end of the process design dimension, at the other end is the formal approach (van Notten et al., 2003). The la prospective and probabilistic trend methods are on the other end of the dimension with a formal approach (Godet, 1996). The formal approach, contradictory to the intuitive approach develops scenarios more rational and analytical, working more with quantitative data from for example computer models (van Notten et al., 2003). The probabilistic trend method uses primarily trend impact and cross impact analysis where la prospective uses other different analytical and evaluation tools (Bradfield et al., 2005). The resources and institutional conditions cannot be linked directly to one of the schools of techniques and are dependent on the specific situation.

Theme 3: the scenario content

The last overarching theme, the scenario content, is about the composition of developed scenarios (van Notten et al., 2003). Where the second theme focusses on the 'how' question for scenario development is the scenario content theme focussing on the 'what' question for scenario development. The scenario content describes the interconnection between nature of variables and dynamics in scenarios. Because the characteristics for the scenario content theme as indicated by van Notten et al. (2003) show a high level of connection to each other they will be shortly discussed individually where after each school of technique is discussed based on the scenario content characteristics. The first characteristic, the temporal nature, indicates how a scenario describes the path to an end-state or the other way around. Scenarios can either describe a path of development to a particular end-state, or describe an end-state of a particular path of development (van Notten et al., 2003). The second characteristic, the nature of the variables, addresses the types and numbers of variables in a scenario. The nature of variables can be heterogeneous or homogeneous. The nature of the dynamics is related to the nature of the variables and distinguishes peripheral and trend scenarios (van Notten et al., 2003). A trend scenario is developed when the future is considered surprise free so trends can be extrapolated to the future, when unlikely and extreme events are considered to be possible a peripheral scenario is created (Ducot and Lubben, 1980). The fourth characteristic, the level of deviation, refers to the range of possible futures that is considered (van Notten et al., 2003). Alternative and conventional scenarios are distinguished, where development of alternative scenarios creates futures that significantly differ from each other and conventional scenarios stay with the 'business as usual'. A high level of deviation is a perquisite for good use of scenarios, implying that conventional scenarios are of no use (Porter, 1985). Conventional and alternative scenarios

have different purposes (van Notten et al., 2003). The purpose of conventional could be to improve or support current strategy where the purpose of alternative scenarios could be to create new strategies. The last characteristic for the scenario content theme is the level of integration. The degree of interaction between variables and dynamics depends on the level of integration; "*scenario study with a high level of integration unifies in an interdisciplinary and transparent manner the relevant variables and dynamics across time and spatial scales, and across relevant social, economic, environmental, and institutional domains*" (van Notten et al., 2003, p. 434). A good start to analyse the three schools of techniques on the characteristics for the scenario content is the purpose of the scenario work for each school. The main purpose of the scenario work from each school of technique may tell a lot more about the content of a scenario, however this is still highly dependent on the specific case the scenario is developed for. The la prospective and probabilistic modified trend method is generally once-off activities. The la prospective method focusses on improving, or developing more effective, strategies and action plans. The probabilistic modified trend method enhances policy evaluation and extrapolative prediction. The purpose of the intuitive logics method can be multiple, improving and developing strategy but also organizational learning (Amer et al., 2013). The purpose together producing generally descriptive scenarios will make all three schools of planning techniques most likely to produce scenarios that describe a path to a particular end-state. This path could describe the most likely way the future will develop which can be used for improving sense making or strategies, but this path could also be used to evaluate and oversee the consequences of policies. The nature of the variables, indicating the number and type of variables used for a scenario, is determined by the identification and selection of key driving forces. The way key driving forces are identified and selected, differ per school of planning technique since they use different tools for this. The nature of the variables, or driving forces, however depends on the issue or subject studied. The subject of scenario study, a scenario characteristic of the project goal theme, can be as discussed either issue-based, area-based, institution-based or a combination of these. The subject; either issue, area, institution or a combination, will not determine the nature of variables but the scale of the subject. This scale is generally well presented by the scope of a scenario. The scope used in the intuitive logic school can be either broad or narrow making the nature of the variables dependent on the subject. The la prospective school generally has a small scope but a wide variety of variables examined within this scope. The probabilistic modified trend schools scope has a narrow scope, focusing on specific subjects (Bradfield et al., 2005). The nature of dynamics, which is related to the nature of variables, considers the probabilities attached to the scenarios. According to Bradfield et al. (2005) scenario developed using the intuitive logics school method should be equally probable where the la prospective and the probabilistic modified trend school methods do attach probabilities to their scenarios based on probable assumptions derived from the identified key variables and indicators of the future. The level of deviation is according to Van Notten et al. (2003) related to the purpose of a scenario; conventional scenarios could improve or support a current strategy where alternative scenarios could help to create new strategies. All three planning technique schools will generally produce alternative scenarios since they all intend to create alternatives to improve strategies. However scenarios with a purpose to make extrapolative predictions and policy evaluation, like the probabilistic modified trend school can be seen as conventional scenarios since they use one variable and see what happens along with 'business as usual'. At last, the level of integration, highly depends on the subject of the scenario study, the nature of the variables and dynamics,

and level of deviation. Therefore it is difficult to tell what the level of integration is, but generally it may be assumed that each planning technique school will strive to a high level of integration.

2.4.2 Explorative, predictive and normative scenarios

Another classification in scenarios that is used by several authors distinguishes three categories; explorative, predictive and normative scenarios (van Notten et al.,2003; Mietzner and Reger, 2005; Börjeson et al., 2006). The decision on whether to use explorative, predictive or normative scenarios depends firstly on the project goal, and secondly on peoples need to know the probable, possible or preferable future (van Notten et al., 2003). The classification is based on three questions, questions that are posed on the future by the user of scenarios (Börjeson, et al., 2006): What can happen? What will happen? And how can a specific target be reached? This typology of scenarios differs from the classification based on the three different planning technique schools. This typology starts working from a project goal, a question posed about the future, and explains what scenario approach fits best to answer this question. The planning technique schools, in contrast, offer a pre-determined set of techniques to develop scenarios. The purpose of explorative, predictive and normative scenarios is straight forward: answer the question that is posed on the future. The expected answers to these questions and the ability of scenarios to fulfil to these expectations are used to analyse this scenario classification.

Explorative scenarios

The first category of scenarios will help answering the question; what can happen? Scenarios developed to answer this question are called explorative scenarios. The individual goal of and explorative scenarios is to explore the future, from a variety of perspectives, that are regarded as possible to happen (Börjeson et al., 2006). Kosow and Gaßner (2008) distinguishes scenarios that are normative or explorative in nature depending on whether they are oriented on desirability. The exploratory nature is explained by Mietzner and Reger (2005, p. 225) as; "*exploratory means starting from past and present trends and leading to a realisable future*", regardless their desirability. Exploratory scenario planning will raise awareness, stimulate creative thinking and give better insight on how different processes; social, economic and environmental, will influence each other (van Notten et al., 2003). Kosow and Gaßner (2008) add that explorative scenario exercises may encourage networking between actors and create awareness on external actors and critical issues. Explorative scenarios are most useful when there are strategic issues (Börjeson et al., 2006). According to van Notten et al. (2003) the process of scenario development is often as important as the eventual product. The exploration of different developments, from a variety of perspectives and constructed with a long-time horizon will show: unpredictability's, development possibilities and identify key factors (Kosow and Gaßner, 2008). Svenvelt et al (2010) adds to this that the framework explorative scenarios provide different policies and strategies can be assessed and developed. Explorative scenarios are most efficient when users have insight on how the system works in the present, and have knowledge on how the system has worked in the past (Börjeson et al., 2006). The main question posed for explorative scenarios is; what can happen? As Börjeson et al. (2006) stated this kind of scenarios are most useful when dealing with strategic issues. Dealing with strategic issues can pose two questions itself according to Börjeson et al. (2006, p. 727): "*external scenarios respond to the user's question: What can happen to the development of external factors? Strategic scenarios respond to the question: What can happen if we act in a certain way?*". External scenarios may seem not strategic oriented in the first place but insight on the development of external factors is essential in strategy making. This insight, in the

development of external factors or development of the system if acting in a particular way, is named the explorative or knowledge function, and is one of the main functions ascribed to scenarios in general.

Predictive scenarios

Predictive scenario relates to the question: what will happen? The aim of predictive scenarios is to give insight on what is most likely to happen in the future (Börjeson et al., 2006). The definition given by Peterson et al. (2003, p. 359) of what a prediction is relates to this aim: "*a prediction is understood to be the best possible estimate of future conditions*". Two types of predictive scenarios are distinguished based on the conditions placed on what will happen (Börjeson, et al., 2006, p. 726):

- *"Forecasts respond to the question: What will happen, on the condition that the likely development unfolds?"*
- *"What-if scenarios respond to the question: What will happen, on the condition of some specified events?*"

Where Börjeson et al. (2006) put forecasts as a form of predictions, Peterson et al. (2003) put forecasts as a contrast of predictions because a prediction is the best possible estimate of future conditions where a forecast is the best estimate from a defined model, method or individual in particular. With predictive scenarios the user can plan and adapt to the likelihood a specific scenario will take place. This will make them better prepared to the future which makes them aware of possible dangers or opportunities.

Normative scenarios

Normative scenario planning is also called anticipatory scenario planning, van Notten et al (2003, p. 429) describes normative scenarios as scenarios that "*describe probable or preferable futures*". Amer et al (2013) explains the aim of normative scenarios which is similar to Bradfield et al (2005): by developing scenarios of the future and define the desired future, normative scenarios can be a guide for policy makers. Kosow and Gaßner (2008) complements that normative scenarios main function is to be target building and strategy developing. This lead us back to the question Börjeson et al (2006) connected to normative scenarios: how can a specific target be reached? Börjeson et al (2006) distinguishes preserving and transforming scenarios. Preserving scenarios are used to find out how a specific target can be reached most efficiently. Transforming scenarios starts from a certain, desired future point. But in order to reach this point only marginal changes in current developments are not sufficient (Börjeson et al., 2006).

2.5 Functions ascribed to scenario planning

Scenario planning is a strategic planning tool. Strategic planning tools are expected to produce the best strategies as well as clear instructions on how to carry them out (Mintzberg, 1994). Deciding what strategic planning tool to use depend on the purpose or goal set for planning (Kosow and Gaßner, 2008). The purposes of scenario planning as a strategic planning tool are: "*making sense of a particular puzzling situation; developing strategy; anticipation; and adaptive organisational learning*" (van Notten et al., 2003, p. 806). However a shared definition of scenario planning, where everybody agrees upon is missing, the main purposes assigned to scenario planning are corresponding in literature. Kosow and Gaßner (2008) distinguished four functions or purposes of scenario planning. The four functions defined by Kosow and Gaßner (2008) match the purposes of scenario planning identified by inter alia; Ratcliffe , (2002); van

Notten et al., (2003); Bradfield et al., (2005) and Amer et al., (2013). Kosow and Gaßner (2008) identified the following functions:

1. The explorative and/or knowledge function
2. The communication function
3. The goal-setting function
4. The decision making and strategy formation function

The functions of scenario planning thus focus on the purpose or what can be achieved with scenario planning. The classifications, typologies, themes and characteristics of scenario planning focus on what different approaches of scenario planning are there. It is thus possible that different scenario approaches are used all with the same purpose or function.

The explorative and knowledge function

The first function of scenario planning is all about providing a better understanding on the future. By exploration better insight is created on what might happen, and most importantly for planning is to show potentials and dangers (Amer et al., 2013). Schoemaker (1995) adds that exploring and gaining knowledge about the future is useful when uncertainty is high making it difficult for managers to predict or adjust. Peterson et al. (2003) states that a better understanding will stimulate to evaluate and reassess people belief about the system they are dealing with. Van Notten et al. (2003) includes awareness raising, stimulation of creative thinking and gaining insight into the way societal processes influences one another into the explorative project goal of scenario planning. Kosow and Gaßner (2008) divided the function into different levels. Additionally, there is the explorative function that serve to systemize and get a better understanding of developments, conditions and influences. Scenarios forces to make basic assumptions about future developments since they are built on factors that are considered to be relevant. At last, scenarios will also help focussing, by assessing the range of possible eventualities, on paths of development, characteristics and interaction of key factors. All descriptions of the explorative and knowledge function put emphasis on the understanding and insights scenario planning provides on the future. This understanding and insight in the future, its uncertainty and different possible futures will create, or improve, the ability of managers to oversee the future. Bradfield et al. (2005) recall this as making sense of a particular puzzling situation, by sense making the puzzling skills will improve.

The communication function

The second function assigned to scenario planning is the communication function. Kosow and Gaßner (2008) distinguish two different communication functions. On the one hand scenarios can promote and create a shared understanding which lead to better cooperation and communication between the people who are involved. On the other hand scenarios can be used to generate communication on new topics and priorities by expanding and enriching the understanding of the topic. Ratcliffe (2002) adds to this that scenarios form a common vocabulary which is important for effective communicating complex problems. Neilson and Wagner (2000, p. 11) describes the aim of scenarios can be to "*facilitate the art of strategic conversation*". Also Chermack (2004) assigns strategic conversation to scenario planning, scenarios acts as building blocks for these conversations. A strategic conversation is "*dialogue within the organization that leads to continuous organizational learning about key decisions and priorities*" (Chermack, 2004, p. 302).

The communication function can be interpreted in a broad way and many different aspects of scenario planning add to this communication function. Scenarios are useful for highlighting the implications of a decision or policy, identify the nature and timing of these implications (Amer et al., 2013). This use of scenario planning will help to discuss the best strategies by communicating the consequences of action or the consequences of non-actions. By communicating consequences also awareness will be raised, one of the goals of scenario planning as identified by van Notten et al. (2003). Identification of new issues and problems, one of the purposes according to Varum and Melo (2010), connects to the second communication function identified by Kosow and Gaßner (2008). By sharing and communicating thoughts and ideas about scenario planning the understanding and quality of scenarios will likely to be enhanced. Awareness raising can also be related to the second communication function; generate communication on new topics and priorities by expanding and enriching the understanding of the topic, since being aware of the highly uncertain world we are living in forces us to better understand this and think about it in a structured way (Schoemaker, 1991).

The goal-setting function

The third function, the goal-setting function can be a function in two ways, scenarios can be a basis to identify a goal about where you want to be in a particular future moment as well as being used to identify steps needed to reach a set goal (Kosow and Gaßner, 2008). This two goal-setting functions will be the result of different scenario types. Scenarios that are used to identify steps needed to reach a desirable future are called mostly normative scenarios. Normative scenarios respond to policy planning concerns, it starts at a future point in time and looks back to the present. The result will be a description of the process on how to attain a desired state at this future point, this can support goal-setting and strategy development (Kosow and Gaßner, 2008). Using scenarios for identifying goals can be done in different ways. The description of different possible future situations and the course of events will help one to move forward from the present to the future (Amer, et al, 2013). This is done by improving decision making regarding the uncertain future overcoming decision making failure (Chermack, 2004). The goal-setting function assigned to scenario planning should be understood as the ability to either set goals or reach goals using scenarios.

The decision making and strategy formation function

The last function, the decision making and strategy formation function, focus on how scenarios can be used throughout the planning process. Scenarios can be used to evaluate a decision made in the past or help making decisions regarding the future. With the help of scenarios decisions and strategies to be made can be 'tested' on their effectiveness, reliability and robustness (Kosow and Gaßner, 2008). Using scenarios would improve the decision making process (Amer et al., 2013). Decision making differs from decision-support but for both scenarios can be used. Scenarios can help to make better decision regarding the future but also support decisions by showing the consequences of a decision. Decisions will together form a strategy. This last function is actually the main and overlapping function; goal or purpose of scenario planning from the origins of scenario planning. Using scenarios is a result of people being interested in the future, scenarios were one way to explore the future (Bradfield et al., 2005). The explorative, knowledge, communication and goal-setting functions, all contribute to a better understanding and insight in the future which will either directly or indirectly influence the decision we made regarding the future.

2.6 Pitfalls of scenario planning

Despite scenario planning is considered to be a very useful tool for strategic planning, it should always be a deliberately decision to actually use scenario planning as a planning technique. Scenario planning has, like other strategic planning tools, also disadvantages, limitations and pitfalls. Not knowing the ins and outs of the concept may lead to misuse or even abuse of scenario planning. Godet (2000) argues that a wrong understanding of what a scenario is could lead to people believing a scenario is a future reality instead of a way of foreseeing the future. Kosow and Gaßner (2008) emphasize that only a good understanding of scenarios will result in optimal use. Scenarios should not be viewed as hard and fast predictions but help with answering 'what could happen if?' questions. Schoemaker (1995) warns for biases in scenario planning. Scenarios development will always be influenced by humans and assume wrong correlations, look for confirming evidence and disconfirming evidence which will lead to biased scenarios. Kosow and Gaßner (2008) adds to this that scenario development is limited by human ability to think about the unknown and uncertainty scenarios are dealing with. Mietzner and Reger (2005) emphasize the difficulty of developing good quality scenarios. The development of scenarios is very time-consuming, requires suitable participants and experts, and a necessity of a deep understanding and knowledge about the research field. So before deciding to use scenarios for strategic decision making, organizations should check whether it is appropriate to use scenarios in their situation, and if they meet the requirements for being able to develop useful and credible scenarios.

These negative aspects of scenario planning, or so-called limitations and disadvantages, are part of the concept scenario planning. Since they are part of the concept, it is important to be aware of them when using scenario planning. Awareness will make it possible to avoid, or help to reduce, that limitations and disadvantages will result in scenario planning being a bad planning technique (O'Brien, 2004). Not being aware of these limitations and disadvantages will make them into pitfalls in scenario planning. Schoemaker (1998) created a checklist of possible pitfalls in scenario planning who are divided into process and content pitfalls. Process pitfalls are problems with the execution of scenario creating activities, content pitfalls are referred to as problems with the quality of input. In the table below an overview is provided of the twenty pitfalls formulated by Schoemaker (1998).

Process pitfalls	Content pitfalls
Failure to ensure top management support	Failure to take the long view
Not enough contribution from outside	Failure to take the wide view
Lack of balance between line people and staff	Too much attention to trends
Unrealistic expectations	Too homogeneous a range of views
Poorly defined roles	Lack of internal logic
Failure to keep on track	Failure to look at deeper-level causes
Too many scenario's	Failure to challenge mind-sets
Not enough time allowed	Failure to make the scenarios dynamic
Failure to link to existing process	Irrelevance
Failure to link to our everyday world	Failure to create a real breakthrough

3. Methodology

In this chapter the methodology that is applied in this research is elaborated. First (3.1) the research approach is explained (3.1) where after the methods used for data collection are described (3.2). The methods for data analysis of is described in the last paragraph of this chapter (3.3).

3.1 Research approach

The study has an exploratory character. An exploratory research is undertaken when research is performed on a topic not much is known about yet (Shields and Rangarajan, 2013). The potential usefulness of scenario planning in (Dutch) forest and nature conservation is not specifically discussed in literature yet. The objective of this research is to explore the possible added value of scenario planning in forest and nature management. So far scenario planning literature focussed on providing insight in the concept and methods of scenario planning. This research focusses on what the potential usefulness of scenario planning is in forest and nature management. The main data for this study is gathered using qualitative methods. Quantitative data gathered in a survey and is used to reflect the qualitative data where possible. A qualitative research approach is considered to be especially appropriate when an exploratory research is carried out (Patton, 2002).

3.2 Data collection

3.2.1 Data collection methods

The methods used for data collection in this research are semi-structured interviews and an online survey. The aim of the interviews is to collect information on a specific topic by asking people questions about this. These questions can be about the knowledge an interviewee possess, but this can also be questions about opinions, understanding of concepts or preferences. The role of the interviewer in the interviews is asking questions and directing the interview. The interviewee answer the question to their capacity and guide the interviewer. Collecting data with interviews has strengths but also weaknesses. Strengths of using interviews as a data collection method are; provision of rich in-depth qualitative data, allowance for both verbal and non-verbal data, possibility for interactivity and flexibility. Weaknesses of interviews as a data collection method are; threat to internal validity and reliability, limited external validity and interviews being time consuming. It is important to be aware of the weaknesses and the role of the researcher in this research. The interviewer should be aware of these strengths and weaknesses and understand what they mean for the outcome of the interviews.

After having conducted ten interviews a moment of reflection is held. At the end of each interview the interviewee is asked whether they have suggestions for other people to be interviewed. This is called snowball sampling. "*Snowball sampling method yields a study sample trough referrals made among people who share or know of others who possess some characteristics that are of research interest*" (Biernacki and Waldorf, 1981, p. 141). As more interviews were conducted the suggestions from the interviewees started to result more in the same names that were on the list to be interviewed or who were already interviewed. This suggested that relevant people within the sector who possess characteristics of interest for the interviews were selected. At this point it was decided to do an online survey among other people within the sector to check whether the results of the interviews among a wider group of respondents. The

survey was sent to among others; consultants, regional forest and nature organizations, research institutes and professors from the Wageningen University. Criteria used for selecting the survey respondents were similar to the selection criteria used for the interviewees. An anonymous survey was send to 73 respondents. With a response rate of 33%, the study sample finally existed of 24 respondents.

3.2.2 Interview structure

First an interview blueprint was constructed. In the interview blueprint the abstract interview questions are formulated, the objectives of the interview questions and the topics and aspects. The abstract interview questions are related to the research questions. The interview objectives are more concrete steps that are needed to answer the research question. The objectives were translated into topics which defined more explicitly what was discussed with the interviewees. Each topic had different aspects, these aspects are important to get more detail in the answers of the interviewee. Based on the interview blueprint an interview guide was created, which formed a leading document during the interviews. An interview guide helps to make the interviews more standardized and increases the reliability and the possibility to compare interviews. Both the final interview blueprint and interview guide were discussed with the supervisor of this research, before the interviews were conducted. The interview guide (see appendix B) consists out of three parts; an introduction to the interview, the interviews questions, and a concluding part of the interview. In the introduction part of the interview the interviewer is introduced and the research topic and goal are explained. The considered relevance of this research and interview is discussed and how the derived data from the interviews will be used. An indication for the time the interview will take is given and the interviewee is asked for permission to record the interview. After the introduction the interviewees were asked to introduce his- or herself and give a description of the organization they are working for. After this it is announced that from here the main interview questions start, and the structure of the interview is shortly explained. The interview questions are divided into two parts; general questions about forest and nature management and questions specific about scenario planning. The interview questions are open questions which may come with follow-up questions based on the answers given to get more in-depth information. After the last interview question is answered to the satisfaction of both the interviewer and interviewee, a short summary of the interview is provided by the interviewer and there is asked if the interviewee have any additions to the interview. If not the interviewee is thanked for the provided information and asked if he or she can be contacted again by the interviewer if necessary. At last there is asked if the interviewee want to receive the thesis when it is finished.

3.2.3 Main interview questions

The semi-structured interviews had two groups of questions. The first group of questions were about forest and nature management in practice. The second group of questions was focussed on scenario planning. The objective of the interview questions about forest and nature management in practice was to get insight in what is considered successful forest and nature management. To understand what makes forest and nature management successful the interviewees were asked if there are any essential factors that determines this successfulness. The interviewees were also asked, if there are essential factors, if these are sufficiently present or not. Also three possible challenges were presented to the interviewees which relates to the considered complexity and uncertainty in forest and nature management, and how organizations deal with this.

The objective of the interview questions about scenario planning specific was to get insight in how forest and nature managers think of scenario planning and if they foresee potential opportunities or threats. This insight could help understand how scenario planning could be useful in forest and nature management. First of all the interviewees were asked if currently scenario planning is used in forest and nature management. Second, the interviewees were asked if they foresee any potential opportunities or threats for forest and nature management organizations using scenario planning. It will be interesting to hear about these opportunities and threats because they can be indicators for the potential usefulness of scenario planning in forest and nature management.

3.2.4 Online survey

The survey was composed after conducting the interviews, the complete survey can be found in appendix D. The website www.thesistools.com was used to create and send the survey. The statements posed in the survey are developed to result in answers which can be compared to the interview answers. The first two questions of the survey were about the type of organization the respondent was working for and what position is of the respondent in the organization. This information, just like the entire survey are anonymous but is essential for the analysis of data. The respondents were told the survey will be anonymous. The statements posed could be answered with: strongly disagree, disagree, neutral, agree and strongly agree. There was a possibility to give an explanation with each answers. The statements posed in the survey were about the successfulness of forest and nature management, essential factors for the successfulness, challenges in forest and nature management, familiarity with scenario planning and what ways scenario planning could possibly contribute to forest and nature management.

3.2.5 Respondents

Relevant interviewees are selected using two ways. First in consultation with supervisor Marjanke Hoogstra-Klein, PhD student Jilske de Bruin-van Selm and Ir. Jim van Laar a group of interviewees was selected using purposive sampling. "*Purposive sampling techniques are primarily used in qualitative studies and may be defined as selecting units (e.g., individuals, groups of individuals, institutions) based on specific purposes associated with answering a research study's questions*" (Teddlie and Yu, 2007, p. 77). The advantage of purposive sampling is that a relatively complete picture of the whole research population can be obtained investigating only a small part of the population. Secondly, snowball sampling was used asking interviewees at the end of interview if they have suggestions for other relevant interviewees. At this point the interviewee know what the content of the interview was and could decide whether they knew people in their network that would be interesting to interview. Besides an interviewee is selected because of his or her knowledge and expertise on forest and nature management and often specifically planning there was another important criteria. Important was that the interviewees and organizations interviewed formed a cross-section of all Dutch forest and nature management organizations. When a potential interviewee was selected they were invited by sending them an e-mail. The mail provided them with basic information about the research, and the reason why they had been chosen as a potential interviewee. A list of interviewees can be found in appendix A. The percentages of profession and type of organization of the interviewees are shown in respectively figure 1 and figure 2.

Respondents selected for the survey had to meet the same selection criteria as the interviewees. The group of respondents includes employees from governmental, private and conservation organizations,

knowledges institutes and consultancy firms. The different positions respondent fulfilled are; manager, expert, project leader, steward, director or researcher. The survey was held anonymous and therefor only the type of organization the respondent is working for and the job he or she fulfilled within this organization is familiar. The percentages of profession and type of organization of the respondents are shown in respectively figure 3 and figure 4.

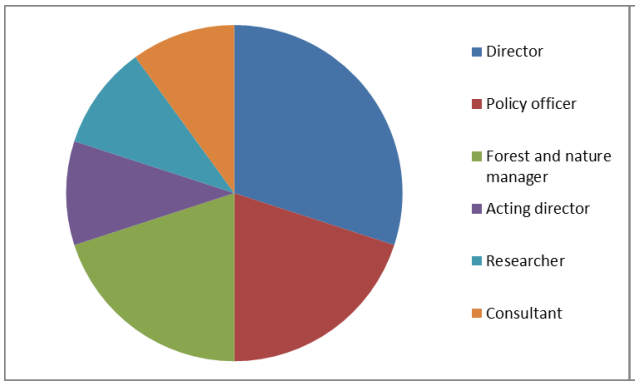

Figure 1: percentages of profession of the interviewees (n=10)

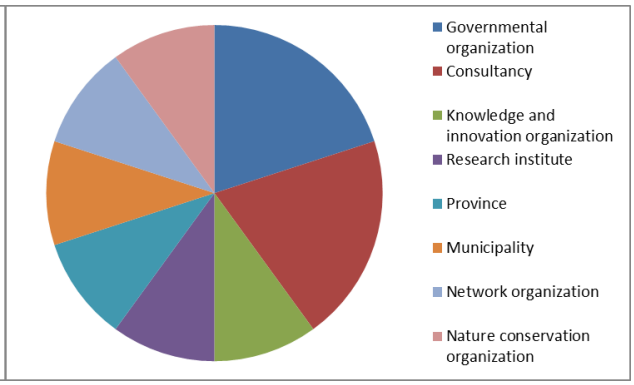

Figure 2: percentages of organization type of the interviewees (n=10)

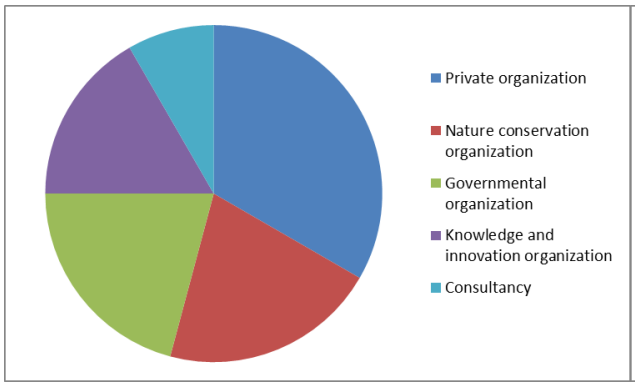

Figure 3: percentages of profession of the survey respondents (n=23)

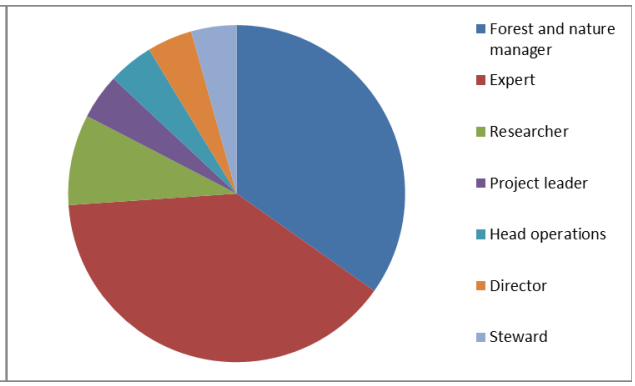

Figure 4: percentages of organization type of the survey respondents (n=24)

3.3 Data analysis

For analysing the interviews a qualitative data analysis is performed. Qualitative data analysis is systematically processing data into results and conclusions to answer the research questions posed (Boeije et al., 2009). According to Kumar (2011, p. 277) there are broadly speaking three ways how the results from a qualitative research can be written down; "*developing a narrative to describe a situation, episode, event or instance; identifying the main themes that emerge from your field notes or transcription of your in-depth interviews and writing about them, quoting extensively in verbatim format; and in addition to above, also quantify the main themes in order to provide their prevalence and thus significance*". For the qualitative data analysis in this study the main themes that emerge from the interview transcripts are described as the second way Kumar (2011) describes. In order to write about the content analysis was needed: "*content analysis means analysing the contents of interviews or observational field notes in order to identify the main themes that emerge from the responses given by your respondents or the observations notes made by you*" (Kumar, 2011, p. 278). Mayring (2014)

emphasize that; "*content analysis is not a standardized instrument that always remains the same; it must be fitted to suit the particular object or material in question and constructed especially for the issue at hand*" (Mayring, 2014, p. 39). For this research inductive and deductive reasoning and open coding were used for the analysis of the interviews. "*Inductive analysis refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher*" (Thomas, 2006, p.238). Inductive reasoning was used for the interview questions about forest and nature management in general because there were no direct linkages with the theoretical framework. For the interview questions specifically on scenario planning more deductive coding is used because of the preliminary knowledge of scenario planning theory. According to Elo and Kyngäs (2008) "deductive content analysis is used when the structure of analysis is operationalized on the basis of previous knowledge and the purpose of the study is theory testing" (Elo and Kyngäs, 2008, p. 109). The interview questions mainly focussed on exploring how the ascribed functions to scenario planning in literature relate forest and nature management. The questions also focussed on the potential opportunities and threats foreseen for scenario planning. For the entire analysis of the interviews open coding was used while working with the program atlas.ti. Open coding is "*the analytic process through which concepts are identified and their properties and dimensions are discovered in data*" (Service, 2009, p. 101). "Open coding is complete when the analyst begins to see the possibility of a theory that can embrace all of the data" (Walker and Myrick, 2006). Open coding allowed formulating codes and categories of codes that were specifically useful for answering the research questions. The survey results were not extensively analysed but the outcome was clearly presented using bar graphs which can be found in appendix D.

4. Results

In this chapter the results of this study are presented. The transcribed interviews and surveys were analyzed and discussed here guided by the sub-questions that were posed. First it is discussed what is considered successful forest and nature management (4.1). Secondly, there is discussed what essential factors are to be successful in forest and nature management (4.2). Thirdly three potential challenges to forest and nature management organizations are addressed (4.3). Next the current use and knowledge of scenario planning by forest and nature management organizations is discussed (4.4). Lastly the potential opportunities (4.5) and bottlenecks (4.6) of scenario planning interviewees foresee are presented.

4.1. Successful forest and nature management

All interviewees agree forest and nature management should be considered successful when goals set are achieved or management contributed to achieving them. The survey respondents were less consentient when being asked whether they agree on this statement, about 57% of the survey respondents agree, 17% do not agree and 26% are neutral. An interviewee who is the director of a network organization stated: "*Forest and nature management is successful if it contributes to achieving the set goals. Each individual organization will determine what these goals are*". A survey respondent who is a forest and nature manager at a governmental organization agrees on the statement but emphasizes that: "*You should not be too tenacious here, sometimes other goals than planned are achieved but your management still has been successful*". According to the interviewees there is a wide variety in goals a forest and nature management organization can set. What goal a forest and nature management organization set depends on what the mission of the organization is according to the interviewees. The mission of an organization is determined by several things according to the interviewees. The mission of an organization can for example depends on the area size they are conserving and if it is a private or a governmental organization. An example of what the mission of a forest and nature management organization can be is: production of timber, focusing on high production of wood and low management costs, paying no attention to other functions of forest. On the other hand the mission can be to create attractive nature to society with a high biodiversity. Four interviewees named that forest and nature management has, regardless the goals, a wide variety of functions and services it should fulfil. The mission of an organization determines where the balance between these different functions and services and products is. An interviewee who is a forest and nature manager at a municipality quotes: "*Keeping a good balance here is important; one may not be to the expense of another. Eventually the mission of an organization will determine the goals set and how the balance will in functions, services and products will be*".

4.2. Essential factors for successful forest and nature management

The interviewees consider different factors to be essential for the successfulness of forest and nature management organizations. These factors are: (1) stability and flexibility, (2) knowledge and expertise and (3) communication and cooperation. These factors are like preconditions for successfulness, meaning that missing one of them results in a forest and nature management organization being unsuccessful.

4.2.1. Stability and flexibility

This category is a broad category where stability and flexibility relate to different aspects in forest and nature management. Stability and flexibility are recurring terms when different aspects of forest and

nature management are discussed with the interviewees. Stability is considered to be very important because of the long term developments and slow dynamics of forest and nature. Therefore stability within an organization is essential meaning there is a need to have goals which can only be slowly changing. Having stable goals includes not going along with all new developments. At the same time the interviewees argue forest and nature management organizations should be flexible, meaning they should be able to react to these new developments when needed. Stability and flexibility are often named in the same sentence referring to short- and long term thinking. Forest and nature management organizations are always dealing, working and thinking about the long term future. While thinking about the long term future it is important that forest and nature managers are able to shift between long term thinking and today's acting. How can long term thinking be translated in today's acting? More than 60% of the survey respondent strongly agreed and 25% agreed that having both a short and long term vision is essential for being successful as a forest and nature manager. An interviewee who is a forest and nature manager at a governmental organization stated: "*Forest and nature managers should be able to shift to think about what I am doing today, what it means for tomorrow but also for the after tomorrow. Tomorrow is in forest and nature management terms a decade*". Flexibility in forest and nature management is needed to think about what could happen between today and the terms an organization is planning for, and to think about how this can be incorporate in the management plan. Therefore both stability and flexibility are therefore important in forest and nature management. They seem contradictory at first sight but when they are both applied in balance a balance they are complementary. This balance between stability and flexibility is essential for the successfulness of forest and nature management, being able to find this balance as a forest and nature manager testifies for their knowledge and expertise according to the interviewees.

4.2.2. Knowledge and expertise

Forest and nature managers should have expertise and possess broad knowledge in order to be successful. Over 90% of the survey respondents agreed knowledge and expertise are import for the successfulness of a forest and nature manager. Knowledge is about possessing knowledge where expertise is about the skills needed to be a forest and nature manager. Interviewees think differently about what the expertise and knowledge of a forest and nature manager should include. There are no contradictory things named but there is discussion about what is more important. To start with, it is argued that the knowledge and expertise of a forest and nature manager goes further than having ecological knowledge about how forest and nature develops and how this development can be managed. The knowledge and expertise of a successful forest and nature manager should be broader, because forest and nature not only has an ecological function. An interviewee who is the director of a knowledge and innovation organization refers to the classical trinity of sustainable management which includes social, ecological and economical functions. Therefore forest and nature managers should also have expertise about the social and economic aspects of forest and nature.

Interviewees argue that knowledge is a resource which can be possessed in different ways. First of all the interviewees emphasize that good quality education is important to possess essential knowledge. Secondly it is important that sharing knowledge among managers is an important way of gaining access to knowledge. It is argued that there is a lot of knowledge available but forest and nature managers do not always have access to this information or are not aware this relevant knowledge is available. When being asked if knowledge is sufficiently available an interviewee who is a director of a network organization

stated: "*Maybe knowledge is sufficiently available but what is most important is that it reaches the right people. Do these people have access to knowledge already or have the possibility to get access*?" Especially smaller organizations have problems to access new knowledge. They are less likely to be involved in a network where knowledge is available and shared. Sharing knowledge among forest and nature management organizations is done too little according to interviewees. It is said that many organizations are operating from their own 'little island' and there is limited contact between organizations. Interviewees argue that organizations and managers can learn a lot from each other but this is not always happening because there is no priority, time or money to arrange meetings. Furthermore, forest and nature managers should be willing to obtain new knowledge. It is argued that forest and nature managers are not always willing to, or have insight in what the added value of new knowledge is. Interviewees think sharing knowledge is always useful, even if you do not agree with each other. The experiences of meeting other managers result in what is called extra luggage for a manager. Subsequently, this extra luggage will become part of a manager's knowledge and expertise.

Different things a forest and nature manager should have knowledge about in order to be successful are named. First of all managers should have knowledge about the limits of the system, which provides insight in what the results of an organizations management is. Secondly a manager should have knowledge about the area it is working in. This includes knowledge about all different actors and factors influencing this area. It is essential management fits and is appropriate within a certain area. Thirdly a manager should have knowledge about the set goals and how management activities contribute to achieving these goals. This knowledge is important for creating management plans and evaluating management practices. Lastly it is emphasized that forest and nature managers should have knowledge and be up to date on relevant new insights and developments. This is important because management might need to be adapted.

4.2.3. Communication and cooperation

Communication and cooperation are factors which cannot be seen separately. Three types of communication and cooperation can be distinguished from the data: (1) communication and cooperation with society; (2) communication and cooperation with the forest and nature management sector; and (3) communication with other sectors.

Communication with society is considered essential according to the interviewees because of two reasons. First of all communication with society is needed to stimulate support from society for forest and nature management practices. Secondly, it is important to communicate to society about their role in the environment and stimulate awareness for this role. An interviewee who is a policy officer at a province explains people will not always understand why processes of nature development take such a long time and results are not seen immediately. It is therefore important to communicate with society about what management practices are planned, what the reasoning is for these management practices and what results can be expected. An interviewee who is a policy officer at a governmental organization recognizes a similar development; people tend to think egocentric about forest and nature and have a wrong perception and idea about the role of nature. This respondent continues that forest and nature fulfil a lot of social and economic functions people are not aware of. As a result, nature does not receive the support it needs. Two interviewees, one who is an acting director at a nature conservation organization and one who is a director at a consultancy organizations mention the same example illustrating the lack of

awareness from society: they state that everyone wants wooden furniture while they are not aware what big impact this have on nature.

Communication within the forest and nature management sector and with other sectors is named as important in the interviews for the successfulness of forest and nature management. Communication and cooperation are considered to be strongly connected here. One purpose of communication within the sector is sharing knowledge states an interviewee who is a forest and nature manager at a municipality. This respondent mentions there is a lot of knowledge available in the sector but it can be difficult to access or obtain access to it. Better communication and cooperation within and with other sectors, sharing experiences and knowledge, will contribute to the total efficiency of the forest and nature management sector. An interviewee who is a policy officer at a governmental organization explains for example that the forest and nature management sector can play a big role in the green economy. This interviewee argues there is a mutual interest here because they should both feel strongly connected to sustainability issues. What is needed to seize the opportunities is better cooperation and alignment between these sectors. Cooperation with other sectors, like the chemical and energy sector, is important to oversee the bigger picture and deal with the future social challenges. An interviewee who is a policy officer at a province explains what benefits an improvement of cooperation can yield; improvement of cooperation is important for trust, cooperation will also work out better when you know what you can expect from each other.

4.3. Possible challenges to forest and nature management organizations

The interviewees were asked about three possible challenges to forest and nature management organizations. The possible challenges the interviewees were asked about are; (1) dealing with uncertainty, (2) setting realistic goals and (3) setting up a management plan.

4.3.1. Dealing with uncertainties

The interviewees all agree that uncertainty strongly relates to forest and nature management. An interviewee who is an acting director at a nature conservation organization stated that uncertainty is inherent to forest and nature management. When the interviewees were asked if uncertainty therefore also is a challenge they all answered in a similar way: uncertainty is a challenge in a positive way in forest and nature management. This is because uncertainty and forest and nature management are so inseparably connected that forest and nature management is all about dealing with this uncertainty. From the survey respondents about 75% agreed with uncertainty being a challenge in forest and nature management and less than 10% did not agree. A survey respondent who is a forest and nature manager at a governmental organization stated: "*Uncertainty is a given fact in nature; you have to deal with it or anticipate to it*". Two things were named by the interviewees what makes forest and nature management and uncertainty inherent to each other. First of all uncertainty is high because of the long terms that needs to be dealt with in forest and nature management. Secondly, uncertainty is high because of the many factors there are with an uncertain character influencing forest and nature.

Interviewees were also asked how forest and nature managers deal with the challenges that come with uncertainty. The challenge is to accept uncertainty and deal with it most adequately. The answer on how to do this is by intertwining flexibility into an organizations management plan, in order to be able to react

and anticipate to uncertainties. A survey respondent who is an expert at a steward office stated: "*Risks should be spread and you should not put all your eggs in one basket*". A management plan should be both robust and flexible. This implies that a management plan should be most robust relative to what is expected to happen while at the same time it is flexible in order to react and anticipate to uncertainties. It is emphasized that it is not possible to overcome uncertainties, but when forest and nature management organizations pay attention to uncertainties and use the knowledge and experience they possess, uncertainty can be challenged.

4.3.2. Setting realistic goals

The interviewees argue that setting realistic goals in forest and nature management is a challenge, especially because of the high uncertainty. An interviewee who is a consultant at a consultancy organization quotes: "*It is curious to state that forest and nature managers set unrealistic goals, however it is impossible to think what we have to do over thirty years*". To explain this quote; forest and nature managers set realistic goals using the knowledge and expertise they possess, however it is impossible to be a hundred percent sure these goals will come out realistic in thirty years. Since interviewees generally think, considering the uncertainties they are familiar with, forest and nature managers set realistic goals uncertainty should not be a problem for setting goals. It is impossible to know today if a long term goal set by a forest and nature management organization is actually realistic in the future. However, it should be realistic with the knowledge and expertise the organization possess at the moment of setting the goal. An interviewee who is an acting director at a nature conservation organization argues that it is not a problem if you are not totally sure if a goal is realistic. The interviewee quotes: "*In forest and nature management you should be allowed to dream. Dreams are for the long term and are an inspiration*". The interviewee explains therefore that whether a goal is realistic is less important, what is important is that you are able to recall why you have set those goals at that moment in time. The steps an organization takes on the short term in the direction of the goal set should be realistic. These steps should be evaluated afterwards to check whether they have brought the desired results. When the desired results are not achieved, it should be evaluated whether the long term goal is still realistic at this moment or need to be adapted. It is important to rethink what reasoning was used to set the current long term goals when evaluating them and deciding to adapt them.

Because long term goals are also important to serve as inspiration it is argued to be careful with judging forest and nature management organizations for not reaching their long term goals. Judging these organizations for not achieving the set goals will result in less ambitious goals. Making clear agreements on the ambitiousness of goals and what if they appeared to be too ambitious is therefore important.

4.3.3. Setting up a management plan

Interviewees named different possible challenges for organizations in the process of setting up a management plan. The opinions of the survey respondent whether setting up a management plan is a challenge are divided: a little bit more than 50% think it is a challenge, about 20% do not think it is a challenge and the rest is neutral. One survey respondent who is a forest and nature manager at a governmental organization quotes: "*It is part of the job but it serves to support practice. One will see it as a challenge where another will see it as a burden*". One interviewee who is a director at a consultancy organization argues that when the set goals are clear and the people setting up the management plan

have sufficient expertise, setting up a management plan should not be a challenge. Interviewees have similar ideas about what a management plan should include. One interviewee who is a consultant at a consultancy organization summarizes these ideas by stating that a management plan should answer the following questions: What do we have? What do we want? And how should we do that? The basic aspects of a management plan are universal but there is room for a free interpretation of what a management plan should include. It is argued that room for free interpretation is important because a management plan should fit within an individual organization. The interpretation of what a management plan should include is for example dependent on the management philosophy of an organization.

An interviewee who is a consultant at a consultancy organization argue that it is important that who is going to implement the management plan has also been involved in setting up the management plan. It is argued that when this have not been the case there is a bigger chance the management plan is not used correctly, or not used at all. Besides, it is an advantage the implementers already know and understand what is in the management plan. The content of the management plan should be clear but also flexible to new developments and uncertainties. It is important a management plan stimulates to keep thinking about the content and is not focused on making the user follow the plan blindly. The interviewee who is a consultant at a consultancy quotes: "*The worst answer someone can give when being asked what are you doing is I am doing what the management plan says. You should always have a clear argumentation for what you are doing; this is where we have agreed upon is not a valid argument*". A management plan should not be a static document because it is part of the management cycle. Interviewees argue that the management cycle consists of four steps: plan, do, check, and act. Planning should be a continues process.

There are different opinions among interviewees how a management plan should be used. First of all it is argued that a management plan is useful because it is linked to the set goals. Besides setting up a management plan is useful for the think and learn effect. Setting up a management plan forces people to think together about the questions; what do we have? What do we want? And how should we do that? The effect of doing so is strongly underestimated according to an interviewee who is a forest and nature manager at a governmental organization. An interviewee who is a consultant at a consultancy argues that when a management plan is set up you should put it away and not look at it again. This interviewee explains that people who are responsible for carrying out the management plan know what is in there and therefore do not have to look in it again. Others emphasize the potentials of using a management plan after it is finished. They point out the learning effect of monitoring and evaluating a management plan.

4.4. Current use and knowledge about scenario planning

When being asked whether they are familiar with scenario planning as a planning tool or not, eight out of ten interview respondents answered 'yes'. This is in contrast with the survey results where almost 60% answered no to this question. Not all the interviewees who said to be familiar with scenario planning did use scenario planning as well. The interviewees who said to be familiar with scenario planning but did not use it were familiar with scenario planning by reading or hearing about it. Three interviewees said to have actually used scenario planning. They used scenario planning methods for research, policy-making and strategic planning.

When interviewees who said to be familiar with scenario planning were asked what they thought scenario planning is, two different ideas were recurring. The first idea is that a scenario is a possible future, determined by how different factors will develop. Scenario planning is about using different scenarios for evaluating management practices or thinking of new management practices. The second idea is that scenario planning is about picking a point on the future horizon where you want to be, this is your ambition. A scenario is a possible path that will lead you there; this path is determined by your decisions and actions. One interviewee who is an acting director at nature conservation organization thinks the first idea is actually scenarios and the second idea describes variants. The interviewee explains that a scenario is a possible future and a variant is a set of possible management practices of an organization. Variants can be made explicit since they are controllable, but scenarios will remain implicit since they cannot be controlled. The interviewee explains scenario planning is matching scenarios and variants to consider what management actions will result in the highest yields and the lowest risks.

Interviewees argue that scenario planning is currently barely used in Dutch forest and nature management. The expectations are that there will be no strong increase in the use of scenario planning in Dutch forest and nature management either. One interviewee who is a director at a knowledge and innovation organization explains that scenario planning is too much of an academic term. Especially smaller forest and nature management organizations think and work pragmatically, these organizations will probably consider the terminology of scenario planning as too complicated. However, the interviewee emphasizes that concepts managers use for planning are often pretty similar to those of scenario planning. The interviewee explains that every manager is having ideas about their ambition and how their working environment will develop; only they will not do a big prior analysis, what scenario planning is considered to be. The idea that scenario planning does not fit with the pragmatic way of working and thinking of forest and nature management organizations is shared with other interviewees like the director of a consultancy organization. Despite this, interviewees can think of reasons why forest and nature management organizations could use scenario planning which are discussed next.

4.5. Potential opportunities of scenario planning

When being asked if they foresee potential opportunities for scenario planning in forest and nature management interviewees named the following: (1) thinking about and developing scenarios, (2) comparing different scenarios and (3) using scenarios as communication tool.

4.5.1. Potential opportunities of thinking about and developing scenarios

It is argued that thinking about and developing scenarios can be useful to forest and nature management organizations. The effects of thinking about and developing scenarios will become part of a manager's craftsmanship which will be consciously or unconsciously used when taking decisions. One interviewee who is an acting director at a nature conservation organization stated that thinking about and developing scenarios will help to withdraw organizations from the operational level and helps to get insight in what the actual influencing processes are. The interviewee adds to this that it is useful to take some time to dwell on and think together about possible developments. Using scenario planning as an exercise could create awareness on things that might need to change. Scenario planning also stimulates to think about new things. Scenario planning could make you aware of new things or show the relevance of it. To achieve this interviewees point out that it is essential to look at the bigger picture, which means you should look

further than your own organization. It is argued by an interviewee who is a policy officer at a governmental organization that scenario planning can help to look at the bigger picture. It is helpful here when people from other organizations join the conversation. These could be employees of other forest and nature management organizations as well as from organizations from other sectors. Being able to see the bigger picture helps to see possible connections or shared interests between organizations.

4.5.2. Potential opportunities of comparing different scenarios

Interviewees see potential opportunities when forest and nature management organizations are able to develop different scenarios and compare these. It is mentioned that forest and nature management is often considered to be complex and surrounded by uncertainties. Scenario planning may help to indicate these uncertainties and assess what the scope of these uncertainties is. However, it is strongly emphasized uncertainties will remain uncertain; uncertainties can still go beyond the expected scope. Still it is considered valuable to make the expected scope of uncertainties explicit according to an interviewee who is a policy officer at a province. By doing so, forest and nature management organizations may be able to better interpret the complexity. An interviewee who is a director at a network organization thinks comparing different scenarios provides useful knowledge to forest and nature management organizations. If a forest and nature management organization has elaborated different possible scenarios they have a better insight in what developments can be expected in their working environment. The scenarios can help to reflect on how current forest and nature management withhold to the trends in the working environment according to an interviewee who is an acting director at a nature conservation organization. If the outcome is that current management does not withhold well an organization might consider changing it. An organization may also consider changing their goals based on new information and knowledge from different scenarios. An interviewee who is a policy officer at a province points out that scenario planning may be used to determine the ambition level of an organization.

4.5.3. Potential opportunities for using scenario planning as a communication tool

Several potential opportunities were named by the interviewees to use scenario planning for communication purposes. An interviewee who is an acting director at a nature conservation organization argued that a scenario can be used as a starting point for a conversation. In the conversation should be room to discuss the content of the scenarios and the way they are developed. This is even exactly what should happen according to an interviewee who is a forest and nature manager at a governmental organization, it should trigger people to think together about the future together. If more people are involved in developing scenarios the scenarios will likely become more complete and useful. Another way how scenarios can be useful as a communication tool is to use them to communicate with society and politics. According to an interviewee who is a policy officer at a governmental organization forest and nature management organizations can use scenarios to show that expectations politics and society have from forest and nature are not always. Using scenario can help to show what the consequences will be if it is tried to reach these expectations. It is argued that these way scenarios can be used by forest and nature management organizations to get attention from politics for developments that are occurring in scenarios. Scenarios can be a communication tool to get the support needed from politics and society for their management practices according to an interviewee who is a policy officer at a province.

4.6. Potential bottlenecks of scenario planning

Two potential bottlenecks of scenario planning in forest and nature management were named by the interviewees; (1) the development of scenarios and (2) the applicability of scenarios. Interviewees mention there are points of attention as well which could become bottlenecks as well if users of scenario planning are unaware of them.

4.6.1. Potential bottlenecks for the development of scenarios

Different potential bottlenecks for the development of scenarios by forest and nature management organizations are foreseen. First of all it is argued by an interviewee who is a director of a knowledge and innovation organization that forest and nature managers will probably be too down to earth for using a, what is considered a 'complex', planning tool like scenario planning. This applies specifically for smaller organizations. Smaller organizations tend to think more pragmatically about planning, despite they have ideas about the future and their planning, and they will not use such extensive analyses to come to these ideas. Secondly, and subsequently to the first argument, the development and creation of scenarios might be too much of a struggle for forest and nature management organizations according to an interviewee who is a researcher at a research institute. It is argued that the development and creation of scenarios will take time, effort and money. It is suggested that these resources are already not always sufficiently present. Even if these resources are present, it is expected forest and nature manager will probably not use scenarios because it is not valued as worth the effort. When scenarios have been developed using insufficient resources it is expected these scenarios are not useful. Lastly, scenario planning will be too complex for especially the smaller forest and nature management organizations because there are so many uncertainties and developments to take into account. An interviewee who is a director at a consultancy organization expect that these smaller organizations have no idea where and how to start with scenario planning.

4.6.2. Potential bottlenecks for the applicability of scenarios

Interviewees named different potential bottlenecks for the applicability of scenarios in forest and nature management. First if all an interviewee who is a policy officer at a governmental organization argued that scenarios should be made specific to be useful and make people start moving. This can be difficult for forest and nature managers because it is expected they have difficulties developing and creating scenarios. Secondly, this interviewee thinks a potential bottleneck for the applicability scenarios is that they cannot always be directly translated into prospects for action. This is due to the limited resources or power of organizations. Thirdly, an interviewee who is a consultant at a consultancy organization warns forest and nature management organizations should be aware what different scenarios actually include. The negative consequences of a scenario can easily get underexposed compared to the positive aspects a scenario seems to offer. Forest and nature management organizations may follow what seems to be the most advantageous scenario while it may not be a realistic one. The last potential bottleneck mentioned by an interviewee who is a consultant at a consultancy organization is that scenarios can awake the illusion they take away uncertainties. This suggests that by using scenarios you can 'control' the future. It is mentioned that a scenario can result in prospects for action, but the user should always be aware that scenarios are based on assumptions about uncertainties.

5. Discussion

The discussion chapter comprises of three parts. The first part presents the results of this study while relating them to current literature (5.1). In the second part the theoretical framework used for this research is discussed (5.2) and lastly the methodology of this research will be reviewed (5.3).

5.1. Reflection on the results

5.1.1. Forest and nature management, an uncertain working environment

The aim of this study was to explore the possible added value of scenario planning in Dutch forest and nature management. Theory states that scenario planning is "*a tool for improving decision making against a background of possible future environments*" (Mietzner and Reger, 2005, p. 224). Using scenarios is considered to be especially useful for organizations who are dealing with high uncertainty, instability and unpredictability in their working environment (Amer et al., 2013). The results show that the working environment of forest and nature management is primarily perceived as highly uncertain. All interviewees agree that uncertainty strongly relates to forest and nature management; it is mentioned that uncertainty is inherent to forest and nature management. The results show there are two main explanations for the strong relation between uncertainty and forest and nature management. The first explanation is that uncertainty is high because of the long terms forest and nature managers work with. Convery (1973) and Duerr (1969) argue this is the primarily reason why uncertainty is inherent to forest and nature management. The second explanation is that uncertainty is high, because there are many factors with an uncertain character influencing forest and nature management. It is interesting to compare these results to the results of de Bruin et al. (2015) who studied the perceptions of Dutch forest managers on decision making. Their results show that "*Dutch forest managers generally consider forest management decision making to be complicated (many factors to consider) rather than complex (many uncertain factors to consider)*" (de Bruin et al., 2015, p. 3237). Hoogstra and Schanz (2008) and Amer and Jetter (2013) explain the relation between uncertainty, complexity and long term planning: uncertainty increases when planning further away into the future, complexity will increase as well because more variables will interact. This research has empirically shown that uncertainty in forest and nature management is perceived as high. This is the outcome of both the results and literature about forest and nature management.

5.1.2. Current use of scenario planning in forest and nature management

In literature scenario planning is considered to be useful for organizations who are dealing with high uncertainty, instability and unpredictability in their working environment (Amer et al., 2013). From both the results and literature it can be concluded that the working environment of forest and nature management is characterized as highly uncertain. This conclusion makes scenario planning potentially interesting for forest and nature management organizations. The results show however that in practice scenario planning is barely used in forest and nature management. It is also not expected that the use of scenario planning will increase in the future either. Different articles argue that scenario planning, in contrast to the results, is already being used in forest and nature management (Mohren, 2003; Kuhlman et al., 2006; Arets et al., 2011; Hetemäki, 2014), mostly using quantitative methods for the construction and analyses of scenarios on a large scale (Hoogstra and Schanz, 2008). However, literature also suggests

that a more qualitative approach is specifically interesting for forest and nature management and this approach is not used a lot yet (Hoogstra, 2008). The results show forest and nature managers do not use scenario planning itself, but they do use concepts for planning practices which are similar to concepts used in scenario planning. Forest and nature managers think about their ambitions and how their working environment will develop, only they will not do an extensive prior analysis. The results show the main reason why scenario planning is barely used in forest and nature management is that it is considered as too complicated. In literature this is not specifically mentioned, but it is mentioned there is both conceptual and methodological chaos over scenario planning (Bradfield et al., 2005; Mulvihill and Kramkowski, 2010). This chaos is primarily the result of scenario planning being applied in a high variety of ways in different sectors and disciplines (Van Notten et al., 2003). In literature it is suggested this chaos causes the value of scenario planning is not always recognized: "*Systematizing and organizing the existing literature is a necessary step in developing the field and bringing the value of scenarios to a wider public*" (Varum and Melo, 2010, p. 356). This step might be essential to make scenario planning experienced as less complicated by forest and nature managers. The results show forest and nature managers think and work pragmatically, as they focus on the utility of planning methods. The conceptual and methodological chaos will therefore make it more difficult for forest and nature managers to recognize the utility of scenario planning. Despite the results show forest and nature managers might not directly recognize the added value of scenario planning, there are potential opportunities foreseen.

5.1.3. Potentiality of scenario planning based on success factors

The potential of scenario planning in forest and nature management is discussed here by relating factors considered essential for successfulness forest and nature management to functions ascribed to scenario planning in literature. These functions are in particular interesting to discuss the potential, because they focus on the usefulness of scenario planning. The focus for ascribing functions to scenario planning differ from the focus used for creating scenario typologies. The functions focus on how scenario planning can be useful, while typologies focus on what different scenario approaches are possible. The results show forest and nature management is considered to be successful when goals set are achieved or management practices contribute to achieving these goals. Three categories of factors are considered essential to be successful in forest and nature management, these are: stability and flexibility; knowledge and expertise; and communication and cooperation. In literature there are four main functions ascribed to scenario planning, namely: the explorative and knowledge function; the communication function; the goal-setting function; and the decision making and strategy formation function (Ratcliffe, 2002; van Notten et al., 2003; Bradfield et al., 2005, Kosow and Gaßner, 2008 and Amer et al., 2013).

Stability & flexibility

The results show that stability is important in forest and nature management because of the long term developments and slow dynamics of forest and nature. On the other hand, flexibility in forest and nature management is important to be able to react on new developments. In literature this struggle of both stable and flexible is recognized. Forest and nature manager's work with long term planning and the challenge here is that; "*we know changes will take place, but the exact nature of the changes is uncertain*" (Wanger et al., 2014, p. 32). Millar et al. (2007) mention flexibility is the answer to this "*uncertain but certainly variable future*" (p.2146). The results show that to integrate stability and flexibility into forest and nature management, managers should be able to translate long term thinking into adequate management

practices for today. The decision making and strategy formation function could be potentially useful here. With scenarios, decisions or strategies for the future can be 'tested' on their effectiveness, reliability and robustness (Kosow and Gaßner, 2008). According to Amer et al. (2013) scenarios could improve decisions for future strategy formation. This way scenarios improve the formulation of management practices and test the flexibility of these management practices relative to future scenarios. The results also show that to integrate stability and flexibility, forest and nature managers need to think about what could happen in between today and the terms an organization is planning for. For this matter, the explorative and knowledge function of scenario planning could be potentially useful here. Schoemaker (1995) emphasizes that exploring and gaining knowledge about the future is especially useful when uncertainty is high. Kosow and Gaßner (2008) explain scenarios can serve to systemize the future and get a better understanding of developments, conditions and influences. Bradfield et al. (2005) compare managing the future with puzzling and explain scenario planning helps to make sense of the puzzling situation and improves managers puzzling skills.

Knowledge & expertise

The results show that it is essential a forest and nature manager have broad knowledge and expertise to be successful. Literature endorse that knowledge and expertise is the core for being successful in your profession, also when your profession is managing natural resources like forest and nature (Hansen et al., 1999). The results show that in forest and nature management a broad knowledge is important, because forest and nature has many different functions. Forest and nature has besides an ecological also an economic and social function. For example, besides managing forest and enhancing nature to grow well and have a high biodiversity, also payment is needed for management practices as well as management should take into account the needs and expectations of society. Holling (2001) explains that it is very complex to manage a system with ecological, economic and social functions. De Bruin et al. (2015) states that forest management is perceived rather complicated than complex, because there are many factors to consider. In other literature it is argued that qualitative scenarios could be helpful to deal with the complexity of the future, because "*when developed in a participatory manner, qualitative scenarios allow for inclusion of and discussion about a multitude of factors, perceptions, stakes and values, both in time and space*" (de Bruin et al., 2015, p. 3237). The explorative and knowledge functions ascribed to scenario planning serves contributes to systemization of and getting a better understanding of developments, conditions and influences (Kosow and Gaßner, 2008). With the explorative and knowledge functions, scenarios help forest and nature managers to provide a better understanding of the future. This will improve a managers knowledge of what might happen in the future and defining potential opportunities and dangers. The communication function ascribed to scenario planning could also be useful to improve the knowledge and expertise of forest and nature managers. Scenarios can be used as a communication tool for sharing knowledge and to create a shared understanding of the future (Kosow and Gaßner, 2008). Scenarios can facilitate to share existing knowledge, but also generate new knowledge which can become part of a forest and nature manager's expertise. So functions of scenario planning can potentially improve the knowledge and expertise of forest and nature managers in different ways, this way contributing to their successfulness.

Communication & cooperation

The results show that communication and cooperation are considered as essential for the successfulness of forest and nature management. Forest and nature management organizations should communicate and cooperate mutually as well as with organizations from other sectors. Furthermore, communication and cooperation with politics and the society are considered essential for the successfulness. In literature it is recognized that communication and cooperation in natural resource management become more important because of increasing interests in multifunctional forest and nature (Cubbage et al., 2008). To effectively manage multifunctional forest and nature, increased cooperation between both forest and nature management organizations mutually, and organizations from other sectors, is essential. The results show that cooperation between organizations is considered as important to oversee the bigger picture of multifunctional forest and nature and to deal with future-related challenges. Ratcliffe (2002) mentions that scenarios can be useful here to form a common vocabulary which can be used to effectively communicate over the complexity of future challenges. In literature, communication in forest and nature management is considered as important to, among others, promote sustainable management and raise awareness for forest and nature related issues (Rametsteiner and Simula, 2003). Amer et al. (2013) explain that scenarios can be useful to highlight the consequences of societal behavior and policies, whereby also awareness is raised. The results show that forest and nature managers experience a lack of support, because society and politics tend to think egocentric about forest and nature. It was mentioned that nature managers perceive expectations from society and politics as high and unrealistic, and it is suggested that society and politics are not aware of what the possible consequences of these 'egocentric thoughts' are. Furthermore, politics and society are not all the time aware of all the different functions forest and nature have to fulfil and what management practices are therefore needed. According to van Notten et al. (2003), raising awareness by communicating the consequences is one of the main purposes of scenario planning. The results show that communication and cooperation is also considered to be important for sharing both knowledge and experience in order to learn from one another. In literature, Berkes (2009) states that in environmental management learning-based approaches are proposed to deal with environmental uncertainty. The results show that the working environment of forest and nature management is considered as uncertain. Schoemaker (1991) argues that communication on a topic will expand and enrich the understanding of this topic. By using scenarios to communicate on aspects of the highly uncertain world we are living in, and forest and nature managers are working in, awareness will be raised for. This will result in a better understanding on this topic and helps to think about it in a structured way.

5.1.4. Potential opportunities and threats foreseen for scenario planning

The results show different potential opportunities and threats are foreseen for using scenario planning in forest and nature management. Based on these opportunities and threats, conclusions can be derived on the potential usefulness of scenario planning. Potential threats should be overcome and potential opportunities should be exploited in order for scenario planning to be useful. Kosow and Gaßner (2008) emphasize that only a good understanding of scenarios will result in optimal use. Being aware of both the advantages and disadvantages of scenario planning is essential to make it a good planning technique (O'Brien, 2004).

Potential opportunities

The results show that three potential opportunities are foreseen for using scenario planning in forest and nature management, namely: thinking and developing scenarios, comparing different scenarios, and using scenario as a communication tool. These potential opportunities foreseen can also be compared to the functions ascribed to scenario planning in literature (Kosow and Gaßner, 2008). The fact that the results show opportunities are foreseen for scenario planning, support the theoretically derived relations between scenario functions and success-factors of forest and nature management. The results show the potential opportunity of thinking about and the development of scenarios is to help by: exploring the future, create awareness, overseeing the bigger picture, and see possibilities for cooperation based on shared interests. These are all aspects which are also incorporated in the functions ascribed to literature (e.g. Ratcliffe, 2002; van Notten et al., 2003; Bradfield et al., 2005 and Amer et al., 2013). The results show that comparing different scenarios is a potential opportunity to indicate and assess the scope of uncertainties, interpret the complexity of forest and nature management and reflect on how current management practices withhold to the expected trends and uncertainties. These opportunities most relate to the functions of the decision making and strategy formation of scenario planning. These functions focus on how scenario planning is useful throughout the planning process, by evaluating and testing decisions and strategies on their effectiveness, reliability and robustness (Kosow and Gaßner, 2008, Amer et al., 2013). The last opportunity that was foreseen in the results, is using scenarios as a communication tool to start the conversation and trigger people to think about the future together. Besides, scenarios could be used to communicate with politics and society to create awareness and get support that is necessary. This strongly relates to the aspects of the communication function ascribed to scenario planning in literature (Kosow and Gaßner, 2008; Amer et al., 2013). However, in the results primarily communication possibilities of scenario planning between forest and nature management organizations and politics and society are foreseen. In literature the communication function of scenario planning is also named to be useful for communication within a forest and nature management organization, mutually between forest and nature management organizations as well as with organizations from other sectors. Neilson and Wagner (2000, p. 11) describe that an aim of scenarios is to "*facilitate the art of strategic conversation*". Chermack (2004, p. 302) explains that strategic conversations are a "*dialogue within the organization that leads to continuous organizational learning about key decisions and priorities*". With such opportunities for improved communication scenario planning is potentially useful in forest and nature management.

Potential threats

The results show there are potential threats foreseen for both the development and applicability of scenario planning in forest and nature management. Developing scenarios is considered a complicated task. When applying scenarios, users might not fully understand what a scenario includes, and users might get the illusion to have taken away uncertainties. In literature, ignoring uncertainty in forest and nature management is called irresponsible (Price, 1989). It is recognized in scenario planning literature it is really important to be aware that "*a scenario is not a future reality but a way of foreseeing the future*" (Godet, 2000, p.18). A scenario is a way of foreseeing the future based on assumptions and according to the results forest and nature managers should always be aware of this. The process pitfalls for scenario planning identified by Schoemaker (1998) are focused on why the developing process of scenarios could

be perceived as complicated. The results show it is expected that scenario development in forest and nature management will take too much time, money and effort. Resources which are already being considered as minimally available in forest and nature management. Besides, the results show that scenario planning is considered as complicated, because it is too academic and theoretical. This does not fit with the pragmatic way of thinking and working of most forest and nature management organizations. The process pitfalls identified by Schoemaker (1998) focus on users who are already in the process of developing scenarios. The results showed however that there are already threats or pitfalls to overcome for forest and nature managers before they even start this scenario developing process. The last potential threat foreseen in the results, is that users might not fully understand what scenarios include. This possible weakness is recognized by Mietzner and Reger (2005) because there is too much focus on the most likely scenario during the scenario development. Mietzner and Reger (2005) also warn to be aware of too much wishful thinking when developing scenarios.

5.2. Reflection on the theoretical framework

The theoretical framework provided insight in the concept and methods of scenario planning. The classifications and typologies of scenario planning proved to be interesting for this research. Especially the classification proposed by, among others Börjeson et al. (2006) was useful ,distinguishing three categories; explorative, normative and predictive scenarios. This classification was useful in the current research, because it is based on three possible questions which a manager can pose on the future. This typology explains what scenario planning methods or techniques should be used based on the project goal and which question is posed on the future. This is in contrast to the classification based on the three main schools of techniques proposed by Bradfield et al. (2005). Their classification offers a pre-determined set of techniques you can work with. The approach as proposed by Börjeson et al. (2006) seems to fit better with the pragmatic way of thinking and working of forest and nature managers who are seeking for the specific the utility of a planning tool.

The functions ascribed to scenario planning presented by among others Kosow and Gaßner (2008) proved to be very interesting for this research. The functions could be used to relate to factors considered as essential for the successfulness of forest and nature management. The results show that scenario planning could potentially be functional in forest and nature management by all four functions ascribed to scenario planning in literature. However, the results also show that there is mainly a supportive function foreseen for scenario planning in forest and nature management. Scenario planning could support forest and nature managers in different ways. But it is expected that they will restrain to use scenario planning directly for setting goals, making decisions and form strategies while these are also functions ascribed to scenario planning in literature. The results also show that scenario planning can indirectly contribute, or at least have an influence, on setting goals, making decisions and form strategies. In literature there is general agreement that the functions or purposes of scenario planning defined are very broad. The potential functionality of scenario planning in forest and nature management is possibly best summarized by Bradfield et al. (2005) who compare managing with puzzling. Bradfield et al. (2005) explains that scenario planning is a tool that helps making sense of the puzzling situation and improve a manager puzzling skills.

The potential opportunities foreseen for scenario planning in forest and nature management in the results can be related well to the functions ascribed to scenario planning in literature. The potential threats foreseen for scenario planning only partly match with the pitfalls ascribed to scenario planning in literature. Schoemaker (1998) formulated twenty common pitfalls divided between process and content pitfalls. The pitfalls mentioned in literature all relate to different aspects of the application of scenario planning. However, the results show that the threats foreseen for scenario planning primarily relate to the stages prior to applying scenario planning. The results show that besides forest and nature managers consider developing scenarios as complicated they also warn for misuse and misunderstanding of scenario planning. In literature it is emphasized that a good understanding is important for successfully using scenario planning but subsequently it is not specifically mentioned as a potential threat or pitfall.

5.3. Reflection on methodology

The methodology used for this research contained a number of limitations. The number of interviewees can be questioned, due to limited time just ten people were interviewed. The number of interviewees is not substantial and not all Dutch forest and nature management organizations are included. However, this study has an explorative function and focused on providing insight in the possible added value of scenario planning in forest and nature management. This is done by taking a cross-section of different Dutch forest and nature management organizations, using purposive and snowball sampling. To have a broad focus on the forest and nature management sector people were interviewed from all different type of organizations within the forest and nature management sector. Also all interviewees are directly or indirectly involved with management and planning practices in Dutch forest and nature. Therefore the group of interviewees is an interesting reflection of the studied Dutch forest and nature management sector. Besides, an online survey was sent to and filled in by 24 respondent all representing different professions and type of organizations in Dutch forest and nature management, which strengthens the findings.

There can be thought of possible limitations for the methodology for conducting the interviews and surveys. There is a possibility of an interviewer bias in the interviewees. A major part of the interview questions were specifically on scenario planning, the purpose of these questions was to test the interviewees knowledge and opinion on scenario planning and the perceived usefulness. The first question in the interview focused on whether the interviewee is familiar with scenario planning. Although most interviewees were familiar with scenario planning, their knowledge and insight was mostly limited. This is a first result, but subsequent interview questions focused on how scenario planning could be specifically useful in forest and nature management. Since interviewees did not have full knowledge of scenario planning concepts and methods, the interviewer needed to explain these by relating and referring to scenario planning literature. As result, the semi-structured interviews often became more of a dialogue between interviewer and interviewee in which the interviewer, for example suggested functions ascribed to scenario planning in literature. The interviewee then argued if he or she thought scenario planning could indeed fulfil this function in forest and nature management. As result, interviewees might have answered questions using primarily information and knowledge provided by the interviewer. However, the information provided by the interviewer on scenario planning is based on literature and the interviewees argued for their answers also with the knowledge and expertise they possess on forest and

nature management. A similar limitation also applies to the online survey. About half of the respondents answered not to be familiar with scenario planning while their answers on questions specifically focused on scenario planning were more elaborated. Further research could take the above mentioned possible limitations into account and try to minimize or exclude them. For further research it is possibly interesting to for example use workshops with different scenario planning exercises.

Despite a number of possible limitations, this explorative study results in interesting findings for further research on the use and usefulness of scenario planning in Dutch forest and nature management. Although the outcome of this study might be to a large extent not a surprising one, it has proved that scenario planning can be potentially useful in Dutch forest and nature management. This study provided a better understanding on: why scenario planning is not applied often in (Dutch) forest and nature management, which potential threats should be overcome and, how scenario planning is expected to be specifically useful in (Dutch) forest and nature management according to the results.

6. Conclusion

In this study the possible added value of scenario planning in (Dutch) forest and nature management is explored. It is attempted to give insight in the concepts, methods and techniques of scenario planning and investigate if they are potentially useful in forest and nature management. A number of important outcomes are derived from this study.

With the derived outcomes the main research question of this study can be answered. The main research question was: how could scenario planning be potentially useful to (Dutch) forest and nature management organizations? This study showed that scenario planning could be potentially useful to (Dutch) forest and nature management organizations in different ways. Scenario planning can primarily be useful as a supportive tool in forest and nature management. Scenario planning can support forest and nature management by improving and facilitating among others: learning, communication, cooperation and evaluation. With this supportive function scenario planning contributes to a forest and nature managers expertise, making him or her eventually a more successful manager.

Forest and nature management organizations consider different factors to be essential for being successful, these functions are: stability and flexibility; knowledge and expertise; communication and cooperation. In literature four functions are ascribed to scenario planning, namely: the explorative and knowledge function; the communication function; the goal-setting function; and the decision making and strategy formation function. When comparing these functions to the success factors in forest and nature management interesting similarities are found. These similarities justifies stating scenario planning in theory is potentially useful in forest and nature management.

However, in practice scenario planning seem to be barely used in (Dutch) forest and nature management. Neither is it expected that the use of scenario planning in forest and nature management will increase. It is explained that scenario planning is considered as too complicated for forest and nature managers. A complicated tool like scenario planning would not fit with the pragmatic way of thinking and working most forest and nature managers have.

When scenario planning would be put into practice in forest and nature management there are different opportunities and threats identified. To utilize the theoretical potential of scenario planning in forest and nature management there should be focus on how opportunities can be exploited and threats overcome. The potential opportunities identified are: thinking about and developing scenarios to expand knowledge, compare scenarios to improve understanding and evaluation, and lastly use scenarios for communication purposes. The potential threats identified are: the complicatedness of scenario planning methodology, failure to understand what scenarios mean and lastly the illusion scenarios might awake to have taken away uncertainties.

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Appendices

Appendix A: list of interviewees

Interviewee	Profession	Type of organization
1	Forest and nature manager	Municipality
2	Director	Network organization
3	Acting director	Nature conservation organization
4	Forest and nature manager	Governmental organization
5	Consultant	Consultancy
6	Policy officer	Governmental organization
7	Director	Consultancy
8	Director	Knowledge and innovation organization
9	Researcher	Research institute
10	Policy officer	Province

Appendix B: semi-structured interview

*Interview is translated from Dutch

Introduction:

- Introduction of the interviewer
- Explanation of topic and goal of this research
- Why are you chosen as an interviewee?
- Time calculated for this interview
- Ask permission to take notes and record the interview

Introduction questions:

1. What is your name?
2. What is your profession?
3. What type of organization are you working for

Formal interview questions:

Part I: forest and nature management

1. When do you consider forest and nature management successful?
    - What is essential for successful forest and nature management?
    - Is what is essential sufficiently available at the moment?
        - If yes; is it used optimally to keep improving forest and nature management?
        - If not; what is missing?

2. Do you think the following proposed challenges are actually a challenge in forest and nature management? Explain your answer.
    - Dealing with uncertainty is a challenge in forest and nature management
    - Setting realistic goals is a challenge in forest and nature management
    - Setting up a management plan is a challenge in forest and nature management

3. Do you foresee big challenges for forest and nature managers?
    - How should forest and nature management organizations deal with these challenges?

Part II: scenario planning

4. Are you familiar with scenario planning?
    a) If yes; please explain what you think scenario planning is
    If no; from literature the following definition is drafted:

    "*Scenario planning is een planning methode die wordt gebruikt om een beschrijving van verschillende mogelijke situaties te geven, hierbij wordt gekeken naar hoe verschillende factoren*

zich zullen ontwikkelen ten opzichte van elkaar in een complexe en onzekere toekomst om zo begeleiding te bieden in strategische besluitvorming".

b) Do you think scenario planning can contribute to forest and nature management?
c) What potential opportunities and threats do you foresee?

5. Do you have any suggestions for my research?

Closing

- Summary of the interview
- Thank you for collaborating in this research
- Is it ok to contact you for possible further questions or clarifications
- Do you want to receive the final product of this thesis?

Appendix C: list of survey respondents

Respondent	Profession	Type of organization
1	Forest and nature manager	Private organization
2	Expert	Consultancy
3	Head operations	Private organization
4	Forest and nature manager	Governmental organization
5	Expert	Knowledge and innovation organization
6	Project leader	Consultancy
7	Researcher	Nature conservation organization
8	Expert	Private organization
9	Expert	Knowledge and innovation organization
10	Forest and nature manager	Governmental organization
11	Expert	Nature conservation organization
12	Forest and nature manager	Private organization
13	Forest and nature manager	Private organization
14	Forest and nature manager	Nature conservation organization
15	Forest and nature manager	Governmental organization
16	Researcher	Knowledge and innovation organization
17	Director	Private organization
18	Expert	Governmental organization
19	Steward	Private organization
20	Expert	Knowledge and innovation organization
21	Assistant forest and nature manager	Nature conservation organization
22	Expert	Private organization
23	Expert	Nature conservation organization
24	-	Governmental organization

Appendix D: Survey results

*Questionnaire is translated from Dutch

What type of organization are you working for?

Governmental organization	5 (21.74 %)
Private organization	7 (30.43 %)
Nature conservation organization	5 (21.74 %)
Knowledge institute	4 (17.39 %)
Other, namely;	2 (8.7 %)

n = 23
# 23

What is your profession?

Director	0 (0 %)
Forest and nature manager	7 (31.82 %)
Expert	8 (36.36 %)
Other, namely;	7 (31.82 %)

n = 22
# 22

Forest and nature management is successful when set goals are achieved

Strongly disagree	1 (4.35 %)
Disagree	3 (13.04 %)
Neutral	6 (26.09 %)
Agree	12 (52.17 %)
Strongly agree	1 (4.35 %)

n = 23
# 23

The following aspects should be incorporated in the goals of forest and nature management organizations
Social interests

Strongly disagree	3 (12.5 %)
Disagree	1 (4.17 %)
Neutral	5 (20.83 %)
Agree	7 (29.17 %)
Strongly agree	8 (33.33 %)

n = 24
# 24

The following aspects should be incorporated in the goals of forest and nature management organizations
Ecological interests

Strongly disagree	3 (12.5 %)
Disagree	0 (0 %)
Neutral	2 (8.33 %)
Agree	4 (16.67 %)
Strongly agree	15 (62.5 %)

n = 24
# 24

The following aspects should be incorporated in the goals of forest and nature management organizations
Economic interests

Strongly disagree	3 (12.5 %)
Disagree	2 (8.33 %)
Neutral	7 (29.17 %)
Agree	4 (16.67 %)
Strongly agree	8 (33.33 %)

n = 24
# 24

The following aspects are important for a forest and nature manager tot o successful
Knowledge and expertise

Strongly disagree	1 (4.17 %)
Disagree	0 (0 %)
Neutral	1 (4.17 %)
Agree	4 (16.67 %)
Strongly agree	18 (75 %)

n = 24
# 24

The following aspects are important for a forest and nature manager tot o successful
Support from society

Strongly disagree	0 (0 %)
Disagree	2 (8.33 %)
Neutral	7 (29.17 %)
Agree	8 (33.33 %)
Strongly agree	7 (29.17 %)

n = 24
# 24

The following aspects are important for a forest and nature manager tot o successful
Short and long term vision

Strongly disagree	1 (4.17 %)
Disagree	1 (4.17 %)
Neutral	1 (4.17 %)
Agree	6 (25 %)
Strongly agree	15 (62.5 %)

n = 24
# 24

Dealing with uncertainty is a challenge in forest and nature management

Strongly disagree	1 (4.76 %)
Disagree	1 (4.76 %)
Neutral	3 (14.29 %)
Agree	9 (42.86 %)
Strongly agree	7 (33.33 %)

n = 21
# 21

Setting realistic goals is a challenge in forest and nature management

Strongly disagree	1 (4.17 %)
Disagree	3 (12.5 %)
Neutral	1 (4.17 %)
Agree	17 (70.83 %)
Strongly agree	2 (8.33 %)

n = 24
# 24

Setting up a management plan is a challenge in forest and nature management

Strongly disagree	1 (4.17 %)
Disagree	4 (16.67 %)
Neutral	6 (25 %)
Agree	10 (41.67 %)
Strongly agree	3 (12.5 %)

n = 24
# 24

Are you familiar with scenario planning?

Yes, namely trough;	10 (41.67 %)
No, see defintion below	14 (58.33 %)

n = 24
# 24

Scenario planning can contribute to forest and nature management by: Increasing knowledge and understanding

Strongly disagree	0 (0 %)
Disagree	1 (4.17 %)
Neutral	5 (20.83 %)
Agree	13 (54.17 %)
Strongly agree	1 (4.17 %)
I don’t know	4 (16.67 %)

n = 24
# 24

Scenario planning can contribute to forest and nature management by: Improving and facilitating communication

Strongly disagree	0 (0 %)
Disagree	1 (4.17 %)
Neutral	3 (12.5 %)
Agree	10 (41.67 %)
Strongly agree	3 (12.5 %)
I don’t know	7 (29.17 %)

n = 24
# 24

Scenario planning can contribute to forest and nature management by: help to set goals

Strongly disagree	0 (0 %)
Disagree	3 (12.5 %)
Neutral	2 (8.33 %)
Agree	12 (50 %)
Strongly agree	3 (12.5 %)
I don't know	4 (16.67 %)

n = 24
# 24

Scenario planning can contribute to forest and nature management by: help to formulate a strategy

Strongly disagree	0 (0 %)
Disagree	2 (8.33 %)
Neutral	1 (4.17 %)
Agree	14 (58.33 %)
Strongly agree	3 (12.5 %)
I don't know	4 (16.67 %)

n = 24
# 24

n = number of respondent who have seen the question
# = number of respondents who have answered the question