Market failure versus Government failure

In forest and nature conservation

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Summary

Forests provide many functions that are of great importance, however deforestation and forest degradation threat the existence of many forests around the world. Natural resources may theoretically be managed by markets or by governments. Yet, these approaches may be tampered by market failure and government failure respectively. Because of these failures the actual values to allocate land may not be optimal. Failures like these may lead to inefficient land use and missed opportunities for economic development. Moreover, market and government failures can also be the reason why in some countries and regions forest growth is unnecessarily delayed. The aim of this study is to gain more insight in the role of market and government failure in forest and nature conservation and management.

A market fails when it is not efficient and thus unable to reach desirable outcomes in the use of resources. In literature different potential causes of market failure are mentioned (e.g. information problems and the occurrence of externalities). Markets for natural resources differ from other market types. They, for instance, deal with goods that have no monetary value and they deal with high uncertainties. The recommendation by economists and others to solve market failure typically is for government actions to combat such failure. The government on the other hand can fail as well. A number of reasons for government failures are mentioned in literature (e.g. the principle-agent problem and problems with science). What happens after government failure occurs is unclear. I suspect that the process of market and government failure in natural resource management is an ongoing process where the market takes over when the government fails and vice versa.

First, this study explores the evolution in natural resource policy. Second, it investigates the reason for policy changes (i.e. market failure, government failure or another reason). And third, if there are differences in respect to the policy process for different types of natural resources. In order to investigate this, an explorative case study is undertaken. Two case studies in the USA are examined; one in the forestry sector and another in the fisheries sector. The study is based on a literature study.

In the evolution of both sectors, the market predominates in the beginning but soon fails in the management of natural resources. The government intervenes but is not able to correct these failures efficiently and fails as well. As a result multi-level (international policies) and multi-actor (civil society) governance forms emerge in the fisheries sector and multi-actor (civil society) governance forms in the forestry sector. These new forms of governance try to correct both market and government failures. After this the market or the government takes over again.

Similarities between the sectors are that they both deal with failing sustainable yield approaches. Economic values are for a long period seen as more important than ecological values, however there is a shift towards a more conservation oriented approach in the 1990's as a result of governance interferences. Differences are that the fisheries sector deals with higher rates of uncertainty resulting in the idea of unlimited fish stocks for a long time period. Forests are divided into privately owned and federal or state owned forests, while in the fisheries sector such a division is not made. The fisheries

sector seems to be more focused on the creation of sustainable fish population levels, while the forestry sector focusses in its federal or state owned forests more on the preservation of specific ecosystems.

This study concludes natural resource management is not only an interactive process of market failure and government failure. The development of multi-actor (civil society) and multi-level (international policies) governance forms have tried to correct failures from the market and the government. Other important outcomes are: (1) important problems in the management of natural resources are caused by information problems, problems with scientific research and a focus on economical values, (2) besides the government and the market, new forms of governance emerge in order to correct both market and government failures, and (3) governance measurements may not be efficient in the management of natural resources and therefore future research on governance failure is necessary.

Preface

In September 2012 I started my master thesis at the Forest and Nature Conservation Policy Group (FNP) at Wageningen University. After some ups and downs, the making of this thesis finally came to an end. Thankfully I received help along the way and therefore I would like to make use of this preface to thank the people who helped me and supported me for these past eleven months.

First of all I would like to thank my supervisors, Marjanke Hoogstra-Klein and Freerk Wiersum for their time and valuable inputs and for bringing my thesis to a higher level. Thank you for helping and supporting me in this past period.

Furthermore, I want to thank my friends for taking my mind of my thesis when necessary and for giving me helpful advice.

Finally, I would like to thank my family for all the help, support and encouragements they gave me during the finalization of my study.

1. Introduction

1.1 Background

Throughout history the primary function of forests has been the providence of natural resources. Forests were exploited for timber or non-timber forest products. People used the forest, for example, for hunting activities or for the collection of other types of food, like berries. This function is called the economic function of forests and is nowadays still a dominant interest everywhere (Führer, 2000). Besides the economic function, forests provide other functions as well. Forest can protect lands from for instance soil erosion, avalanches in mountain areas, coastal protection or from contamination of ground and spring water (Führer, 2000). For instance, mangrove forests reduce the wave energy and therefore coastal erosion will decrease. The agricultural land that lies behind the mangroves is more protected and suffers less from water erosion (Othman, 1994). Moreover, forests contain the habitat of a considerable part of the world's flora and fauna. In National Parks, the preservation of (a certain) biodiversity is one of the main purposes. Another function is the recreational function of forests. For example, forests are used increasingly by urban populations for recreation purposes. As incomes have increased, the demand for leisure activities has also risen throughout history (Tietenberg, 2006). Besides typical functions, forests can provide human welfare benefits. Examples of these benefits can be climate, landscape, hydrology, water and air quality, CO_2 sequestration and aesthetics (Führer, 2000). Plantations and protective forests have only one function, namely respectively an economic and ecological function. But, the majority of forests however does not only have one single function but are multifunctional (Führer, 2000).

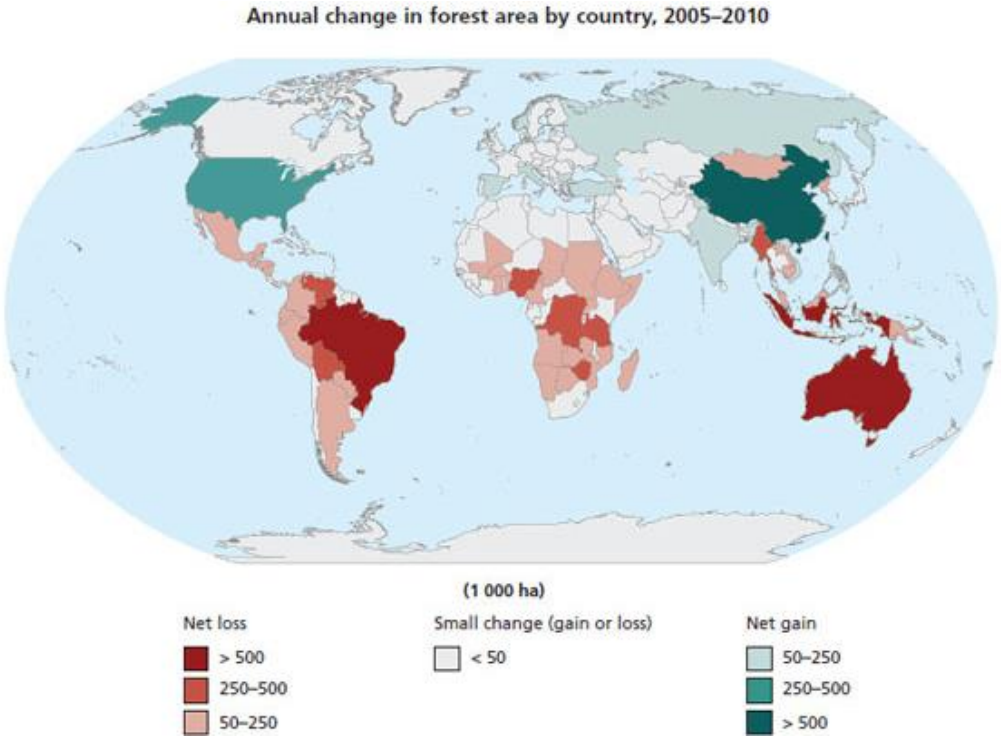

Figure 1.1: Annual forest change in forest area by country, 2005-2010 (FAO).

Forests provide many functions that are of great importance, however forest degradation threats the existence of many forests around the world (Figure 1.1). Many discussions occur about how to use forests the best way. At the moment still numerous forests areas are at risk. Many forest functions are not used and maintained correctly. For instance, tourism can cause littering and overcrowding of areas and because of timber production, overexploitation of forests may take place. As a result of this, degradation and even decline of forest ecosystems may occur.

Over the past 50 years resource degradation has increased considerably (Acheson, 2006). Research shows that the total forest cover of a country will change over time (Barbier et al., 2000). Over the last decade around 13 million hectares of forest per year were converted into other land-use types or were lost because of natural causes (FAO, 2010). Conversion of land into other land-use types happens because, first a country will develop socially and economically. Technology is improved and the need for natural resources increases. Resources are extracted at a high rate and land is needed for development. As a result forest ecosystems will generally degrade and even decline. After this period, more money is available for the protection of natural resources and sustainability is found more important. The trend eventually could be reversed and therefore forest ecosystems will recover again (Barbier et al., 2000). Several aspects can cause deforestation or forest degradation. Barbier et al. (2000) mentions that forest changes are interrelated with changes from other land use types. When a forest disappears it is because the forest is converted into other forms of land use. For instance, forest often has to make room for agricultural lands or urban development. The value of land is therefore an important reason why forests may decline. The value of land will eventually determine what land use type will be chosen. Moreover, another important point is time; forest cover may change over time as the value of one land use relative to the value of its competing use changes over time. Decisions whether forest land should be converted or extracted are influenced by either the market or the government. The market may for instance find agricultural land more profitable compared to forest land or wants to extract timber from forest for its profit. The government may decide forest land should be preserved for recreational reasons. Forest decline can be influenced by wrong decision made by the government or the market. Government and/or market failures may occur (Barbier et al., 2000). Because of these failures the actual values to allocate land may not be optimal. Failures may lead to inefficient land use and missed opportunities for economic development. Moreover, market and government failures can be the reason why in some countries and regions forest growth is unnecessarily delayed (Barbier et al., 2000). The reason of deforestation and forest degradation, the occurrence of market and government failures, will be the main focus of this study.

1.2 Problem statement

For several decades a debate has been going on in the forestry sector on the relative virtues of the free market as opposed to state intervention in the protection of forest ecosystems. In theory, there are two types of economies, free markets and planned economies. Both types do not exist in reality; most economies are a mixture of both, called a mixed economy. Hence, there are differences between countries related to the amount of free market and planned economy elements in their economy. In a

pure free market economy, no government intervention takes place at all. Everything is based on market mechanisms, so all decisions are conducted by demand and supply. Profit is the driver for decisions that are made. In a pure planned economy, the government has all power and therefore makes all decisions. In this case demand and supply are not important, demand still exists but supply is not related to the demand. The government implements decisions through command- and control mechanisms. But, as mentioned before none of these scenarios have ever actually existed. In reality there is a private and a public sector for which the proportion of both sectors differs per country. In the forestry sector there are state owned and privately owned forests. About 80% of the world's forests are owned by the state (Zhang et al., 1999). Since the early 1980's there has been a trend towards reducing public state ownership and enhancing the private sector. Privatization is widely used as the main strategy to reduce government participation and control (Laarman, 1996).

Supporters of the free market theory see the occurrence of property rights as highly important, because resource users are dependent on their own resources. When resources decline, their wealth will decline as well (Anderson and Leal, 2001). Recently, market-based mechanisms have got much attention as a mechanism to counteract deforestation (Pagiola et al., 2002). Market-based mechanisms are regulations that encourage behavior through the market rather than through explicit directives from governments (Stavins, 2003). Through market-based mechanisms environmental services are sold. An example of a market-based mechanism is eco-labeling, like Forest Stewardship Council (FSC) for timber products. Many believe market-based mechanisms can provide powerful incentives and efficient means of conserving forests and the public goods they provide (Pagiola et al., 2002; Landell-Mills, 2002). Free market economists believe market-based mechanisms are an effective way to protect the environment and to promote economic efficiency while saving money. It is seen that policy makers in the forestry sector are implementing more market-based mechanisms and therefore decreasing command- and control systems. Especially governments with a money shortage, which are looking for innovative ways to give the private sector more responsibility for forest protection, are interested in market-based approaches (Landell-Mills, 2002).
Still, there are also doubts about market-based approaches. There is a lack of knowledge about market-based mechanisms as to why such markets have not emerged in the past and whether markets and the process through which they evolve are desirable (Landell-Mills, 2002). Moreover, markets are much seen as a threat and the cause of environmental problems (Anderson and Leal, 2001). Even supporters of the free market theory have doubts about letting markets completely determine how and when natural resources should be used (Anderson and Leal, 2001). Markets may act too rational and therefore will only take into account the monetary value of resources. As a result of this, forest resources may be overexploited and less (monetary) valuably resources, like wildlife habitat, will be forgotten. An example of a market failure is seen in for instance the conversion of natural forest into plantations. Timber might be sustainably extracted, many wildlife habitats are lost. While the occurrence of property rights is seen as highly important, they often do not exist. For instance fish are not owned and are free to be fished by anyone. This is an important reason for government intervention as the government implements rules and regulations to manage those natural resources.

Others believe the government is able to govern natural resources in a better way than the market. The government can control and protect resources by instruments like subsidies, taxes, laws and regulations, whereas markets cannot. Also the government is not guided by monetary values alone and therefore could protect non-monetary value resources in a better way, like the protection of endangered species. Governments have taken responsibility for the protection and management of natural resources, by for instance the creation of protected areas. But not only market failures may occur. The government has failed in many cases as well (Wolf, 1986). Governments often lack sufficient information about which services are important and how to provide them. Also, governments often lack the money to pay for protecting areas. Besides this, governments can be influenced by political pressure, such as lobbying by agricultural or industrial interests that would profit from forest extraction (Pagiola et al., 2002). Moreover, supporters of the free market theory emphasize planned economies are negatively perceived by people because of negative incentive associated with regulations and taxes (Anderson and Leal, 2001).
It is not easy to say if natural ecosystems are better managed by market or by government incentives. Both management by the market and the government could have advantages, but both can also fail in the protection of natural ecosystems.

1.3 Research objective

Natural resources may theoretically be managed by markets or by governments. Yet, these approaches may be tampered by market failure and government failure respectively. The aim of this study is to gain more insight in the role of market and government failure in forest and nature conservation and management.

So far, similar studies about whether and how natural resource policies are influenced by market failure and government failure have not been conducted. Therefore an accurate theory is still lacking and more research has to be done first before a research question can be determined. So first, the theoretical framework will explain different concepts concerning this study. After this a research hypothesis and research questions will be determined in section 2.3.

2. Theoretical framework

The theoretical framework explains different concepts that form the basis of this study. First, the concepts of market and market failure are explained. It describes why dealing with markets for natural resources is difficult and what important complications are typical for these markets. It is often claimed that to overcome such failures, government actions are needed. However, also government failures may occur. For this reason the concept of government failure is explained after this. Third and last, a hypothetical model is presented that describes market and government failure as a cyclical process.

2.1 Markets

2.1.1 What is a market?

A market symbolizes demand and supply, buyers and sellers, competition and exchange (Rosenbaum, 2000). However in general, the term market is often used in the socio-economic way as a location, namely a market as a marketplace that takes place in a city or town (Rosenbaum, 2000; Hoogstra-Klein, 2013). The term market is often used differently in the literature. Economists and other social scientists use a wide range of variety in definitions of the concept of a market (Rosenbaum, 2000; Hoogstra-Klein, 2013). As mentioned before, a market can be seen as a location. This can be a typical marketplace in a town or city, but it can also be seen as a much larger geographical area in which exchanges of the same good take place (Rosenbaum, 2000). On the other hand, many definitions of markets do not mention a location, these are only focussed on an interface between sellers and buyers (Hoogstra-Klein, 2013). Thus these scientist see the market as something that can be observed (Rosenbaum, 2000; Hoogstra-Klein, 2013). Others do not see a market as something that is observational, so what a market is. These scientists focus on the function of the market, so what the market does (Rosenbaum, 2000).

A market can be described from a neoclassical economics perspective. This perspective predominates literature about markets in general as well as forestry markets (Hoogstra-Klein, 2013). According to Hoogstra-Klein (2013) a market in neoclassical economics is an abstract concept that describes how goods, resources and services are efficiently allocated. These goods, resources and services can be efficiently allocated by means of demand and supply (Figure 2.1). The demand curve represents how much, in quantity, a good or service is wanted by buyers for a certain price. The demand of buyers will decrease when the price increases. The supply curve describes how much a market can offer. It represents how much, in quantity, of a certain good or service a producer is willing to supply for a certain price. Hence, producers are willing to supply a higher quantity when the price they acquire is higher (Hoogstra-Klein, 2013). A market equilibrium occurs at the intersection of the demand and supply curve. At this point an optimal market allocation exists. The market is most efficient at this point as the demand of goods or services is equal to the supply of goods and services. Thus, producers sell all goods or services provided and consumers obtain all goods or services they demand (Hoogstra-Klein, 2013).

A critical side of seeing a market by means of demand and supply is that it can be seen as too abstract. Scientists state in neoclassical economics the reality is not represented because it, for instance, does not take into account social aspects (Hoogstra-Klein, 2013).

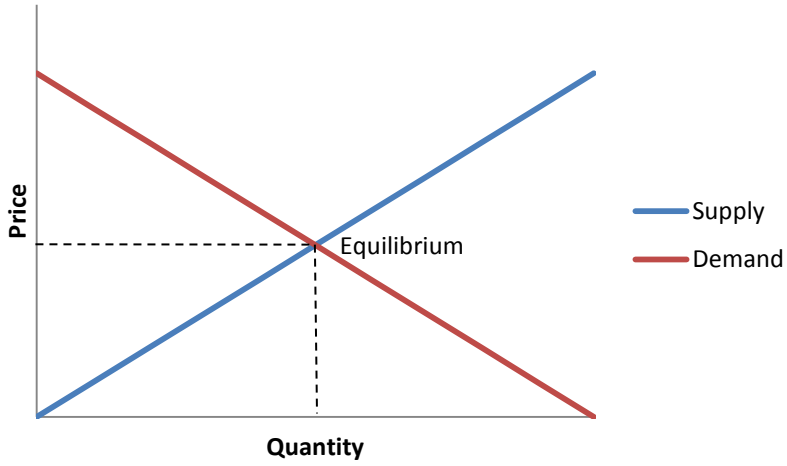

Figure 2.1: Demand and supply curve

While different views exist on what a market is, this study focusses on a market as seen in the neoclassical economics. Therefore a market is seen as an allocation mechanism as described above. The market regulates the allocation of resources, which means the market regulates what and in which quantity goods are produced, which combinations of resource inputs are used for the production and how outputs of goods are distributed between persons (Perman et al., 2003).
Exchange is the key concept in almost all definitions of a market (Rosenbaum, 2000). Furthermore, any definition of a market should make it possible to distinguish markets from any other social form, like for instance hierarchies or central planning (Rosenbaum, 2000). According to Tietenberg (2006) a market can only be efficient when property right systems are exclusive, transferable, and enforceable. Exclusivity means that all costs and benefits should be acquired by only the owner, either directly or indirectly by sale to others. Moreover, transferability describes that the property rights should be voluntarily transferable from one owner to another. And last, enforceability means that property rights are not allowed to be involuntarily seized or encroached by others. A market can only be efficient when all three characteristics are in order because only then the owner of a resource has a powerful incentive to use that resource efficiently (Tietenberg, 2006).

2.1.2 Market failure

However, markets not always function efficiently. Market failure arises when the allocation of resources is not Pareto optimal (Winston, 2006). The allocation of resources describes what goods are produced, in which quantity those goods are produced, which combinations of resource inputs are used for the production and how outputs of goods are distributed between persons (Perman et al., 2003). Pareto optimality means that it is not possible to make one individual better off, without making another

individual worse off. A market fails when it is not efficient and so unable to reach desirable outcomes in the use of resources (Datta-Chaudhuri, 1990). Different authors mention different potential causes of market failure in the literature. Main causes of market failure described are: market power, imperfect information, externalities or public goods (Winston, 2006; Tietenberg, 2006; Andrew 2008; Le grand, 1991). Others also mention incomplete property rights (Perman et al., 2003; Acheson, 2006; Tietenberg, 2006), no existence of markets (Perman et al., 2003) and the 'second best' problem (Andrew, 2008).

Market power

A possible cause of market failure is the occurrence of market power (Andrew, 2008; Winston, 2006). A producer who possesses market power has the ability to set prices. An efficient market consists of a large amount of buyers and sellers. Therefore competition between producers is possible and prices and quantity of products and services are regulated by the market. When this is not the case and only one producer or a small number of producers is active on the market, respectively a monopoly or an oligopoly arises which causes failures (Andrew, 2008; Winston, 2006; Acheson, 2006). A consequence of market power and monopolies is the formation of high barriers to entry (Acheson, 2006) and the creation of economies of scale (Andrew, 2008; Le Grand, 1991). High barriers to entry make it difficult for a new producer to enter a certain market. Economies of scale, or increasing returns to scale, occurs when the average production costs decrease when the scale of production decreases. As a result, large producers will benefit from economies of scale and therefore monopolies may arise (Le Grand, 1991). Economies of scale occur for example in the transport sector were transporting a single product is much more expensive in comparison to a large amount of products.

Information problems

Many market failures arise because of information problems (Andrew, 2008; Winston, 2006; Perman et al., 2003; Le Grand, 1991). Imperfect, incomplete and uncertain information is a general problem because market participants who do not have certain complete and objective information are not able to make optimal decisions. Therefore, the market is inefficient which leads to failures (Andrew, 2008). Another problem arises when market participants have unequal access to information. The information is in this case imbalanced between consumers and producers (Le Grand, 1991). This phenomenon is also called asymmetric access to information, which has as a result the insider-trading problem. When the insider-trading problem occurs, one market participant is better informed than other participants. This will result in higher profits for the informed participant in expense of the other participants (Andrew, 2008).

Externalities

Externalities or spillovers are unintentional effects caused by producers and consumers. When an externality occurs, a third party who is not involved is affected by other producers or consumers (Le Grand, 1991). Externalities can be positive as well as negative. A market can only be efficient when actions of participants do not affect the welfare of others (Winston, 2006). Therefore externalities are one of the causes of market failure (Sandmo, 2000; Andrew, 2008; Winston, 2006; Perman et al., 2003; Acheson, 2006; Le Grand, 1991). Emissions and noise are examples of negative externalities. Negative externalities can emerge on every level. The use of fertilizers in the agricultural sector can, for example,

cause a decrease in water quality. This can be an issue locally as well as nationally. Internationally, negative externalities from for example uncoordinated commercial exploitation of tropical rain forest can be connected to changes in climate (Sandmo, 2000). Externalities often occur with the consumption of common and public goods (Table 2.1).

Non-private goods

Markets are only able to be efficient when all goods and services are private goods, so when a market consists of public or common goods, market failures can occur (Andrew, 2008; Winston, 2006; Perman et al., 2003; Le Grand, 1991). Goods are classified by two types of characteristics, namely rivalry and excludability (Table 2.1) (Perman et al., 2003). Rivalry describes whether a good is consumed at the expense of someone else. Rivalry occurs for example when you buy a book, and therefore this book cannot be bought by another person. Excludability describes whether consumers can be prevented from consuming the good. For instance when reading a book in the library, people who do not have a membership can be excluded.

Table 2.1: Classification for different types of goods (Perman et al., 2003)

	Excludable	**Non-excludable**
Rivalrous	**Private good** Ice cream	**Common good** Ocean fishery (outside territorial waters)
Non-rivalrous	**Congestible resources** Pivate parks, Wilderness area	**Public good** Defence

Many problems concerning the management of natural resources are caused by the common-pool nature of these resources (Acheson, 2006). Common-pool resources or common goods are non-excludible and rival. Examples of common-pool resources are: forests (or timber), fish and wildlife stocks, water, air and grasslands (Acheson, 2006). Nobody can be excluded from these resources and as a result these resources can be overexploited by a large number of people. Markets for public goods may attract free-rider problems (Andrew, 2008; Perman et al., 2003). Free riders are those who use goods or services and obtain benefits without paying costs for it. In natural resource management the free-rider problem is an important cause of a failing market.

No existence of markets

The existence of a market for goods and services is essential because when no market exists the market system is not able to produce an efficient allocation of resources (Perman et el., 2003). No market exists for some natural resources such as air (Acheson, 2006).

Incomplete private property rights

The presence of private property rights then again is necessary for the existence of a market (Perman et al., 2003; Acheson, 2006). Perman et al. (2003) defines private property rights as “a bundle of characteristics that convey certain powers to the owner of the right”. Especially for natural resources the

existence of private property rights is of great importance. Research shows that private property owners are willing to protect and invest in their private property rather than people are willing to do this for non-private property. This is because owners are assured that only they receive the benefits of their actions (Acheson, 2006). Moreover, private property rights stimulate efficient use of resources, because owners are free to use them so they are able to get the highest income and are able to reject less productive options (Acheson, 2006). The occurrence of no private property rights is often connected to the previous cause of market failure, no existence of markets. When no market exists automatically none owns a market and so a property. Besides, when resources are seen as public or common goods incomplete private property rights exist and therefore these two causes of market failures are also related to each other.

Second-best problem

The second best problem is another cause of an failing market (Andrew, 2008; Perman et al., 2003). The second best problem deals with the phenomenon that when correcting a certain market failure, but at the same time letting another be, will not necessarily lead to an improved welfare. For example when a monopoly is prevented production can increase because of an increasing amount of producers. As a consequence the pollution rate can increase and the overall welfare will not be improved.

2.1.3 Markets for natural resources

During recent years environmental protection was given much more attention in economic policy (Sandmo, 2000). Attention is given to local, national and global issues and concerns natural and human-made aspects of the environment. Markets for natural resources differ from other market types. A normal market economy is driven by profit incentives whereas markets for natural resources mainly have to deal with goods that are free, so they have no monetary value (Sandmo, 2000).

There are several difficulties when dealing with natural resource economics and markets. Generally natural resources deal with long time horizons, making it difficult to predict future benefits and costs. Benefits and some costs from goods occur in the future and therefore can be calculated by using present values. In order to calculate these future values a certain discount rate needs to be used. The calculation of future benefits and costs is very complicated because many uncertainties can occur. A complication may be that it is unknown what kind of benefits may occur in the future. This is also the case for negative effects on goods and services, for example acid rain. It is still unknown what effect acid rain will have on lakes and rivers as well as on human health. Another problem is that it is unknown what the current and future costs of policies will be and which discount rate should be used to calculate net present values (Pindyck, 2007). In some cases, markets have to deal with risks, mainly in the management of natural resources such as forests. The forestry sector deals with for instance weather conditions, storms and fires which can have a major impact on the costs and benefits. Pindyck (2007) mentions three important complications that are typical for natural resource policy and are less important in other policy decisions. The policy deals with highly non-linear cost and benefit functions, irreversibility and very long time horizons. First, the relation between damage done to the environment and pollution rates are not linear, that is why the future is difficult to predict. Another difficulty is that it is unknown if a 'tipping point' from a small damage to a disastrous damage exists, and if it exists, where the location of that point is.

Second, environmental damage is most of the time completely or partly irreversible. For instance, clear-cutting of forests may leave a permanent effect. Moreover, reduction of degradation by policies almost always imposes sunk costs on society. Sunk costs are costs that are already made and cannot be undone. The last complication is that natural resource policies have to deal with very long time horizons. For example forest management can contain clear-cutting practices that can influence the area for decades. Long time horizons have a great impact on the uncertainty in the natural resource sector (Pindyck, 2007).

2.2 Government failure

The recommendation by economists and others to solve market failure typically is for government actions to combat such failure. In theory, governments have several tools to correct market failures and improve microeconomic efficiency (Winston, 2006). Le Grand (1991) mentions three ways of government involvement, namely: (1) provision, (2) subsidy or taxation, and (3) regulation. The government is able to provide goods or services itself, through owning and operating agencies and by hiring employees. In the forest and nature sector an example of this is state forestry services that own land and are under the control of the government. The government can use taxes and subsidies for increasing or lowering prices of resources and thereby influencing markets and people. In the Netherlands, subsidies are for example provided by the government to farmers to thereby stimulate nature management and protection. At last governments can regulate resources by influencing the structure of the market, by regulating the production and distribution of resources or by regulating the quantity, quality and/or price of resources (Le Grand, 1991). Provision, subsidy and taxation, and regulation may all cause the government to be inefficient and all three may cause inequity (Le Grand, 1991).

Government involvement, however, may not always lead to an efficient functioning; governments can fail as well as markets. Government failure occurs when the government is not efficient enough in solving the problem of market failure or when the government should not have intervened at all (Winston, 2006). A number of reasons for government failures are mentioned in literature, namely: the principle-agent problem (Acheson, 2006), information problems (Andrew, 2008; Acheson, 2006; Le Grand, 1991), a mix of social and economic goals (Andrew, 2008), poor management resulting from weak incentives (Andrew, 2008), problems with science (Acheson, 2006) and engineering and top-down management (Acheson, 2006).

Principle-agent problem

Agency problems are seen as the most important reason why governments fail (Acheson, 2006). Government officials are supposed to make decisions that serve the public, but some will be motivated by their own interest. The problem is their own interest may differ from the public's interest. This phenomenon is also called the principle-agent problem. Examples range from voting for decisions that do not serve the public to bribery and corruption (Acheson, 2006).

Information problems

Similar to market failure, a government may also fail as a result of information problems (Andrew, 2008; Winston, 2006; Acheson, 2006). Government failure deals with problems which are similar as well as a

little different from those causing market failures. Just like markets, governments can have difficulties in gaining access to real time information (Andrew, 2008). Moreover, asymmetrical information can cause problems for governments. With asymmetrical information is meant the forwarding of information from the bottom of the hierarchy to the top, to policy and decision makers. During transmission of information it can get simplified and distorted and as a result of this the top policy and decision makers can receive and implement faulty information (Acheson, 2006).

Mix of goals

Governments have different types of goals, ranging from social to economic goals. Most governments believe some market regulations are needed to avoid that certain market participants who possess special knowledge are able to benefit at the expense of market participants who are uninformed. Governments will use regulations to protect those in society that could be hurt by the unrestricted market behavior of others (Andrew, 2008). On the other hand, an efficient market is useful for the allocation of scare economic resources. Most governments are aware that too much government regulation will be inefficient for those markets and may negatively affect scare economic resources. Consequently a mix of goals is needed but as described above, a wrong amount of intervention can lead to a sub-optimal situation (Andrew, 2008).

Poor management and weak incentives

Another reason why governments may fail is because of poor management resulting from weak incentives and poor design (Andrew, 2008; Perman et al., 2003). Governments lack the existence of price mechanisms with which markets work. The production costs are not linked to the income that sustains it (Le Grand, 1991). Costs are financed by sources such as taxes. Weak incentives can be a large problem for the management of natural resources. Poor management of resources is caused by the fact that governments are not focused on obtaining high profits and therefore not enough money is received to hire well trained managers (Andrew, 2008).

Problems with science

The management of resources fails in many cases because of mistakes made by scientists and engineers. Wrong advice from scientists may have great consequences. Examples of failures in nature management are for instance the importation of foreign fast growing trees which were not able to grow well in their new habitat, and wrong estimations of fish stocks which led to overfishing problems. Namely as a result of several fish stock miscalculations, fishermen gave little support to the government's management plans which led to increased enforcement problems (Acheson, 2006).

Top-down management

Especially in the management of natural resources, a top down management approach can have negative effects on the management (Acheson, 2006). It is said that decentralized governments are able to manage resources like forests, fisheries and irrigation systems better compared to centralized governments. Centralized and hierarchical governments have the tendency to implement the same regulations for large areas and do not take into account large variations between smaller areas. These large scale regulations may result in opposition and hostility from local government officials. They are

unable to unable influence the decision making process because of a lack of power. Another problem is that governments may lack knowledge to make good decisions. This problem is related to government failures cause by asymmetrical information and problems with science. Policy makers lack good information in order to make the right management decisions. As a result incorrect changes in technology, rules and subsidies are implemented. This may direct resource users to act in a way that may have great negative effects on those resources (Acheson, 2006).

Research suggests that consequences of government failure may have a greater negative effect on welfare compared to market failure (Winston, 2006). Welfare costs may be noticeably greater as a consequence of government failure. In the USA government intervention has led to unnecessary costs because no serious market failure existed. Additionally, government policies could have improved resource allocation in several situations in a much more efficient way (Winston, 2006).

2.3 Free markets versus government interference

Various authors have acknowledged that in the case of markets versus governments it is not a choice between perfect markets and imperfect governments or (vice versa) between imperfect markets and perfect governments. However, both markets and governments have the tendency to be imperfect (Wolf, 1986). Literature is often focussed on an imperfect market where the government should intervene to correct these market failures (Figure 2.2) (Winston, 2006).

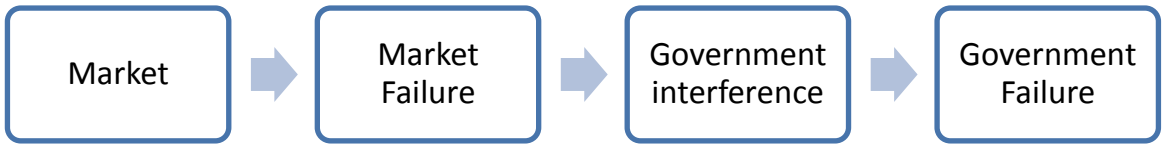

Figure 2.2: The process that market may lead to government interference/ failure.

But still, in studies on imperfect market and government processes less attention is paid to government failure while this phenomenon does occur (Wolf, 1986). In contrast to Figure 2.2, I suspect that when government interference occurs, there may occur government failures and because of this the market will take over again from the government to correct its failures. Thus, I suspect that the process of market and government failure is an ongoing continual cyclical process as illustrated Figure 2.3.

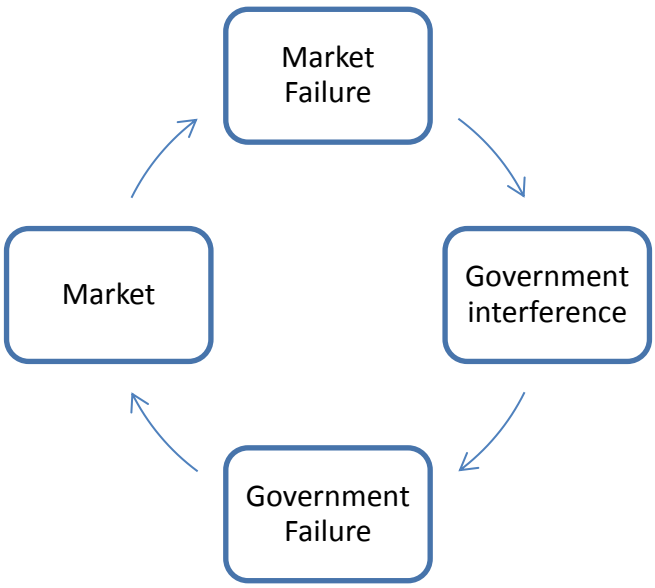

Figure 2.3: Hypothesis that describes the process of market and government failure as an ongoing cycle process.

In this paper, I therefore examine the following hypothesis:

> *The process of market and government failure in natural resource management is an ongoing process where the market takes over when the government fails and vice versa.*

I assume that the government will never take over from the market completely and vice versa. Therefore the hypothesis does not refer to a cyclic process of free and planned economies but it describes a mixed economy. Market and government elements will always occur but the proportion between them will differ in time. So, when the market or government takes over, this means that the market:government ratio in this situation will change compared to the situation before.

In order to investigate this, the following questions will be examined in this study:

1. *What evolution in natural resource policy occurred?*
2. *What was the reason for policy changes; was it market failure, government failure or did it have another reason?*
3. *Are there differences in respect to the policy process for different types of natural resources?*

3. Methodology

In this chapter the methodology of this study will be described. This is done by first describing the research approach, so what is done. After this, in the data collection and data analysis sections it is described how information is obtained and how it is analyzed.

3.1 Research approach

The aim of this study is to gain more insight in the role of market and government failure in forest and nature conservation and management. In order to reach this aim an explorative case study is undertaken. By using an explorative case study a better in-depth understanding of the topic can be obtained. This type of study is used when not much is known about a topic (Yin, 1981). Thus far, this is the case for research about the process of market and government failure in the management of natural resources. While the concept of market failure is frequently mentioned in literature, both markets and governments have the tendency to be imperfect (Wolf, 1986). Moreover, what happens after the occurrence of government failure is rarely mentioned in literature.

In this study, case studies are used to obtain detailed information about specific areas and sectors. This way, this study is able to focus more in-depth to get a better understanding of the topic. According to Eisenhardt (1989) a case study is "*a research strategy which focusses on understanding the dynamics present within single settings*". Case studies can involve either single, with or without numerous levels of analysis, or multiple cases (Eisenhardt, 1989). For this study, multiple cases are chosen to be able to compare different cases instead of only looking at a single case. Chosen is to compare a case in the forestry sector to another similar sector, namely the fisheries sector. In order to be able to analyze the process of market and government failure in a better way, a case in the forestry sector is compared to a case in the fisheries sector. The starting point of this study was deforestation or forest degradation as a result of market and government failures. Because both sectors are dealing with the management of natural resources, the problem of forest resource degradation can be extended to the problem of natural resource degradation. As a result of looking at both the forestry and the fisheries sector, the process of government and market failure in natural resource management can be investigated. Moreover both sectors can be compared to examine difference or similarities between them.

Both cases in this study are situated in the same country, namely in the United States. This is done because in this way two different sectors can be compared without dealing with major differences such as different government systems. By comparing two sectors, it can be seen if and how the forestry sector differs from another sector and the other way around. The fisheries sector is chosen because this sector is quite similar to the forestry sector. Both sectors deal with natural resources that are considered as public goods and both sectors deal with threats of overexploitation and resource degradation.

When using case studies, qualitative and/or quantitative information can be used (Yin, 1981; Eisenhardt, 1989). While quantitative research uses statistical analysis and numerical data, qualitative focusses on social data and words (Eisenhardt, 1989). In this research a qualitative analysis is conducted.

3.2 Elaboration of research areas

This study consists of two research areas (Table 3.1). (1) The state of Oregon is located northwestern part of the USA. In Oregon the forestry sector plays an important role in the economic development of the state. Besides this, Oregon is well known for its many clashes between environmentalists and the logging industry. The forest contains stands of old-growth forest and many flora and fauna species, at the same time the dominant tree species is the Douglas-fir which is a highly valuable timber species in the USA. (2) The marine fishing industry in the USA was for a long period led by the idea that fish stocks were unlimited and as a result overfishing occurred at high levels. The focus of this case will be on the New England area. New England is situated at the northeast side of the USA. Fish populations in this area are frequently fluctuating over time and the area is dealing with many overfished stocks.

Table 3.1: Overview of studied cases

Country	Sector	Case	Description
USA	Forestry	Oregon	Forest industry
USA	Fisheries	Main focus on New England	The commercial, marine fishing industry up to 200 miles offshore

In order to obtain valuable information, the choice of cases is based on the amount of information available. The amount of historical data related to the cases was important because this way a large time frame of happenings in the area can be investigated. Moreover, these cases are chosen because interesting events have happened or are still happening which are significant for this research.

3.3 Data collection method

When a case study analysis is used, the obtained information may come from fieldwork, archival records, verbal reports, observations, or any combination of these (Yin, 1981). This study is based on a literature study. Information about the selected cases were gathered, analyzed and evaluated. Historical data is gathered to get a good overview of past activities and happenings in the selected cases. Also, current information about the cases is gathered and analyzed.

For each case a main book is selected to give a good overview of the most important events in time. Next to these books articles about the specific area and/or sector are analyzed in order to explain events more clearly. The selection of books was based on whether the book provides general information about the forestry and fisheries sector over a long period of time, from the start of the industry to relatively current information. It is a deliberate choice to focus on more general information instead of detailed information. Because this study is a explorative study, going too much into detail will not be relevant as not much is known yet about the subject. The objective of this study is to examine the process of market and government failure over time and therefore it is important to look at the most important events over a long time period in a general way instead of looking only at a small and detailed period.

3.4 Data analysis

To determine how markets and governments have managed natural resources over time, a qualitative analysis was carried out to analyze the case studies. There are two ways of analyzing case studies, namely a within-case analysis and a cross-case analysis (Eisenhardt, 1989; Yin, 1981). A within-case analysis can provide knowledge of the data and will generate a preliminary understanding about the characteristics of a case. A cross-case analysis compares different cases and forces you to come to new ways of thinking (Eisenhardt, 1989). A within case analysis gives researchers a good insight of each case and accelerates a cross-case analysis (Eisenhardt, 1989). In this study, first a within case analysis is carried out. This way a better insight is generated per case.

For each case important events in time are analyzed from the beginning of the industry to the current situation. Each case is divided into time periods which are set based on key events. Each period starts at a key event, an event which was a reason for a change the evolution of management policy. After this, turning points are determined which show in what year a clear change in management policy actually took place. For each period is examined if the market or the government predominates in that period by looking at who played a larger role in the key events. Examined is what has caused a certain turning point, was it because of a market failure, government failure or did it have another reason. The turning points are linked to the possible causes of market or government failure mentioned in the theoretical framework.

Finally, a cross-case analysis is done to get a better insight in the basic trends in policy evolution. The forestry sector is compared to the fisheries sector to assess whether the basic trends in policy evolution are similar or not. Moreover, it is examined if the forestry sector can learn from failures or successes from the fisheries sector or the other way around.

4. Results

In this result chapter an historical analysis of the evolution in forest policy in Oregon and fisheries policy in the USA will be presented. First both evolutions will be described chronologically, one will address the forestry sector and another the fisheries sector. After this both cases will be analyzed individually in order to gain better knowledge of the main factors for policy changes and how they relate to government and market failures. Finally, the cases will be compared with each other.

4.1 Evolution of forest policy in Oregon

This case concerns the development of the forest industry policy in the state Oregon located in the northwest of the United States.

4.1.1 Events in time

Stable forest resources (1800-1890)

The first European settlers came to Oregon because of the occurrence of gold in the area. In the beginning, settlers meant to clear-cut the region because they believed timber had little use. A low timber demand and a high need for agricultural land existed (Andrews and Kutara, 2005). Timber was extracted to its maximum, but with primitive tools and a small population, forest resources did not suffer much. In 1827 the Northwest first sawmill came to Oregon in order to process the clear-cut timber (Prudham, 2005). Later however the demand for timber increased as a result of a need for better quality housing (Andrews and Kutara, 2005).

Upcoming timber industry (1890-1924)

Because of a high abundance of timber, large timber companies from the east moved to Oregon and other western states to extract timber at a much larger rate in the late 19th century (Conway and Wells, 1994). So far, the market regulated the amount of timber extracted from the area. However not all were satisfied with what happened on this market and the first concerns about the rate of timber extraction emerged. The first nature conservation groups arose in the late 1800s because of concern about exploitation of not just timber, but all natural resources. In 1905 the US government decided to take action to conserve forest resources and to stabilize markets by establishing the USDA Forest Service (Conway and Wells, 1994; Campbell et al., 2003).

Despite the establishment of the USDA Forest Service, the market still continued to determine timber production. In 1906 an earthquake happened in San Francisco and in order to restore the city the market's timber demand increased rapidly. Another project for which a large amount of timber was needed was the creation of a railroad between Oregon and California (Prudham, 2005). Large amounts of timber were extracted from Oregon in order to meet the increased demand. In 1911 the Oregon Department of Forestry was established. Forest fires threatened Oregon's forests and the department of forestry was created to prevent fire impacts (Campbell et al., 2003).

Establishment of first federal lands (1924-1944)

In 1924 the Clarke-McNary Act was created in order to give the government more influence in the management of natural resources. Prior to the US Depression (1929) and the New Deal (1933-1934), the state played a minor role in timber extraction from public lands. In this period, federal forest policy mainly used a cooperative approach to regulate private forests. Federal forest policies to prevent overexploitation consisted generally of voluntary programs of coordinated federal research and funding, relying on incentives rather than command and control regulations concerning forest practices. While the timber industry actively tried to avoid any federal interventions on private lands, others wanted a much more aggressive intervention of the federal state to better protect forest resources. Another reason for wanting more federal interventions was to sustainably manage forest resources in order to create a stabilized community (Drielsma et al., 1990). Arguments of these 'more government intervention' supporters led to the Clarke-McNary Act of 1924. This act helped the state to purchase forest land by making it easier for the forest service to buy land from private owners who were willing to sell and convert it into federal land. This way the forest services owned much more land themselves, so they were able to protect forests in these lands. The act describes federal land should be free of industrial logging. The act however did not contain any direct regulations concerning forest practices in private lands. Therefore the federal state was still not able to regulate private forest practices. This was mainly a result of intensive lobbying from the private timber industry (Prudham, 2005). In this period, management of private companies continues in the same way. They are led by market demand. The government plays a minor role and therefore in private lands, they intervene only by fire management and weak regulations. So, private lands are not so much influenced by government interferences. The market demand does, at the moment, not have an influence on the growing number of public lands established with the help of the Clarke-McNary Act of 1924. The government controls what happens on these public lands.

Often it is said that a market that has too much market power and as a result economies of scale, cannot operate efficiently. However a lack of market power and economies of scale is as well bad for an industry. Particularly prior to World War II, this occurred in the timber industry. The industry was quite fragmented and therefore not functioning correctly. The sector consisted of many producers. Moreover, there were large divergences of interest between large and small operators. For this reason, it was difficult and sometimes impossible for the timber sector to form a singular opinion and therefore to speak with a single voice. Because of this lack of cohesion, the industry's lobbying and political coordination suffered and did not function properly. As a result of these minimal economies of scale low capital requirements were needed for entry into the timber industry. Due to a fragmented sector and low barriers of entry, repeated attempts to control overproduction in the area have failed (Prudham, 2005).

Occurrence of a timber boom (1944-1964)

The policy that prohibited timber extraction in public lands changed with the establishment of the Sustained Yield Management Act of 1944. The act consisted of a federal timber sale program. This meant that the state would now be allowed to sell timber from their forest lands. As mentioned above, the state had just obtained vast amounts of land, which were free of industrial logging, during the Clarke-

McNary Act. Now the state would sell timber from their lands because of the high amount of money it would provide to the government and therefore being good for the economy (Prudham, 2005). The Sustained Yield Management Act had a large influence on federal lands. As a result of a government intervention, public lands now also depended on the market demand. In this period the main objective of public lands was no longer the protection of ecosystems but the boosting of the state's economy. The market gained its influence because of the implementation of the act in 1944.

After World War II, and in some areas already starting in 1940, a large timber boom occurred which lasted until the mid-1960s (Conway and Wells, 1994; Prudham, 2005). This timber boom was mainly sustained by the area's vast federal public forest lands, which were still managed according to the principles of sustained-yield management. Sustainable-yield forest management did have some major ecological downsides which led to forest degradation. Old growth forests disappeared because of rotation periods which were too short to regenerate old-growth forests. The sustained-yield model only looked at forests as mere assemblages of timber volumes and therefore did not take into account the major differences between old-growth and young-growth forests and the distinctive ecosystems they contain. The model does not considerate ecological communities that are dependent on diverse and unique ecosystems, like old-growth forests (Prudham, 2005).

Upcoming environmental movements (1964-1980)

In the mid-1960s an environmental movement arose and its growing influence resulted in an increase in conservation-oriented federal forest management laws (Conway and Wells, 1994). During the mid-1960s and 1970s the government implemented a number of acts concerning the forestry sector. In 1964 the Wilderness Act was implemented. This act consisted of a definition describing wilderness to better protect wilderness areas in federal lands. Another act implemented in this period was the National Environmental Policy Act of 1970. This act ensured that environmental and economic impacts were analyzed. The Oregon State Forest Practice Act of 1971 (effective in 1972) set minimum standards for reforestation, road construction and maintenance, timber harvesting, chemical application, and slash disposal in state and private forest lands. In 1973 the Endangered Species Act and the Oregon Land Conservation and Development Act, respectively protected endangered and threatened species and their habitat, and Oregon's most productive forest and farm lands. Other acts were the Forest and Rangeland Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976. And last in this period the Forest and Rangeland Renewable Resource Research Act of 1978 (Campbell et al., 2003). Land use in national forests changed after this period in some situations. Because of environmental lawsuits, timber extraction was now prohibited in some parts of the federal forest lands. Moreover, federal lands were converted into wilderness and other protected areas (Conway and Wells, 1994). By the 1970 old-growth forests were largely exhausted on forest lands (Prudham, 2005). Consequently of old-growth forest disappearing, environmental movements arose. This resulted in a semi conservation-oriented management with still place for economic growth, but now also conservation measurements were taken, like the creation of protected areas in public lands.

During the late 1960s and early 1970s several failures that occurred in reforestation practices were brought to light. Because of the sustained-yield regulations, forest industries had to replant trees after

timber extraction since 1941 (Oregon Department of Forestry, 2010). These eco-regulations resulted in an emerging reforestation industry. At first reforestation was done by aerial seeding. This way however failed and so the only way to replant trees was by manually planting seedlings. The reforestation industry deals with many problems leading to failures in reforestation. Reforestation is done mainly because of regulations and political pressures to reforests and not by direct incentives to grow trees; therefore the industry has a low priority (mainly in the beginning). Another problem is that workers are mostly seasonal workers, so they lack certain knowledge. Also, workers plant seedlings in very remote areas, therefore it is difficult to monitor them and abuses can take place without detection. Workers also get paid per piece, these piece wages make workers set up a trade-off between pace and costs of tree planting on the one hand and the success of reforestation on the other. They for instance throw away seedling or plant them in an improper way to increase their wages. Still, contractors did not take any action to reduce these failures until growing evidence of reforestation failures appeared during the late 1960s and early 1970s. Contractors were compelled to more carefully control their planters by increased regulatory and political pressure on firms and public agencies to improve their results. As a result, tree-planting cooperatives were formed where every worker owned a stake in the company. Consequently workers stayed from season to season, creating more knowledge, and workers worked harder because they got a share of the total profit and workers monitored their fellow workers because they were all managers now. There also was a shift in this period from per tree contracts to per acre contracts (Prudham, 2005).

More efficient timber industry (1980-1990)

In the early 1980s the timber industry was in a large recession. Many timber companies went bankrupt and many people lost their jobs. As a result of the recession, a more efficient industry was formed that employed fewer, but more productive workers in order to save the industry. A lower employment rate in the forestry industry existed while at the same time harvest levels increased (Conway and Wells, 1994). According to Conway and Wells (1994) people lost their jobs because of inefficient mills that got closed, improved skills of workers, layoffs, and increased capital investment in manufacturing technology. Despite the recession in the 1980s, timber extraction still increased and old-growth forests were still declining. Government regulations have not been successful in order to protect the threatened old-growth forest ecosystems.

Still, environmental movements disagreed with what happened in both the market and the government. The first important environmental protests to put a halt to industrial logging in old-growth forests happened in 1983. Activists buried themselves in the ground to halt extension of a logging road in Siskiyou National Park in Southwestern Oregon. These protest did not have a major impact at that moment because it happened far away from any media and political centers, however it was the first environmental group that not only protested against industrial logging, but also against the declining legitimacy of a policy regime that had underpinned management of federal forests for most of the post-WW II era, namely the maximum sustained-yield forest management. The state hold on to the sustained-yield management model of the late 1930s because of its apparent success for the timber industry and economy, however it did not take into account any ecological values (Prudham, 2005).

Spotted owl discussion (1990-current)

In 1990 the northern spotted owl was added to the list of threatened species under the Endangered species act by the US fish and wildlife service. This addition had a major impact on the timber industry in the area. The northern spotted owl is a species that needs old-growth forests for its survival and therefore its addition to the list of threatened species ensured that old-growth forests would be protected from logging. Environmentalists protested for reductions in public timber sales, but also for new ecological research, and the creation of new studies concerning old-growth ecosystems, to so highlight the diversity of life in older forests. Environmentalists thought the government and the market had failed because of a shortage of information and research. In 1993 the Northwest Forest Conference was held in Portland, discussing the old-growth issue. Following the conference, a plan eventually was adapted which called for a reduction in annual probable timber sale quantities (the PSO). In Oregon, Washington and California this meant a decrease of roughly 75 percent compared with levels characteristic of the 1980s. An important shift was seen in the way people looked at forested areas. No longer were they seen as a livelihood but instead they were seen as an integral to leisure. On the other hand this way of thinking was not supported by everyone. Forest industry workers fell abandoned by government forest policy and offended by environmentalists that did not take into account workers and their families. They also pointed out the high costs connected to the protection of spotted owls. The protection of one pair of spotted owls would mean setting aside approximately four hundred to eight hundred hectares of old-growth, which in the mid-1980s was worth about 4 to 8 million dollars in timber alone. The economical downside of the new regulation resulted in many pressures not only from the industry site, but also from the governmental site (Prudham, 2005).

After the spotted owl was listed as an endangered species in 1990, timber extraction in state and federal owned forests dropped dramatically (OFRI, 2012). In eastern Oregon the timber extraction on private lands initially increased. But, since private lands were only a small part of the total forested land area, many mills were closed because the timber supply could not sustain them (OFRI, 2012). Currently 35% of forestland in Oregon is privately owned, 3% is state-owned and 59% is owned by the federal government (Oregon Department of Forestry, 2013). It is however questionable if the declining timber industry was a result of the spotted owl discussions or if the demand for timber products was decreasing as a result of the recessions in the 1980s and 2008 (Prudham, 2005; OFRI, 2012).

4.1.2 Preliminary conclusion on the evolution in forest policy development in Oregon

Over time, government and market influences determine the state of forest resources in many ways. Both market and government failure can cause ecological as well as economic and social failures. In general, the market had the upper hand in the beginning. In 1924 the federal government bought a vast amount of land were timber production was banned. However, in private lands the market kept dominating. After the Second World War when there was a lack of money, the government again allowed timber production on public lands to meet the high market demand and improve the economy. A shift towards more government intervention however occurred in the 1960s and 1970s when the government implemented a large amount of acts as a result of protests by environmental movements. In

1990 a larger intervention from the government took place also as a result of protests by environmentalists.

Throughout time, market failures happened regularly. Those market failures often occurred because the industries only looked at forests as a source of income and did not take into account ecological values. As a result, forest degradation took place. Especially the exhaustion of old-growth forests led to many protests by environmentalists because of the unique biodiversity in those forests. The government failed in correcting market failures and often used weak regulations that had little effect. A reason of this is the intensive lobbying by the timber industry, making the government supporting the timber industry. Also failures occurred because regulations were badly carried out by the market as was seen in for instance reforestation of forests. Over the years the economic value was most important, however a shift occurred after 1990 when also ecological values became much more important. In Oregon the timber industry is very powerful and therefore is able to influence many decisions concerning forest management practices. Later on lobbying and protests of environmental organizations had a much stronger effect on forest management practices. In Oregon many conflicts between the timber industry (and its workers) and environmental organizations occurred. It seems when something is positive for the environment, it is bad for the economy and vice versa. For instance as was seen in 1990 when old-growth forests were better protected, timber sales had to decline.

4.2 Evolution of fisheries policy in the USA

This case will describe the commercial fishing industry in the United States. It will include marine fisheries up to 200 miles offshore. To clarify, some examples will be given from the New England area located at the northeast coast of the United States.

4.2.1 Events in time

Beginning of fisheries (1500-1871)

The first fishing activities in the United States started in the early 1500s, when settlers started fishing cod at the eastern coast. In the 1600s, whaling became very popular in many high seas (Lackey, 2005). Until the 1870s, the U.S. government did not intervene with the fisheries sector in any way. The minimum amount of fish caught depended on the market demand and the maximum number of exploited fish depended on what fishermen were able to catch with the fishing gear they owned (Weber, 2002). In the late 1800s, large scale fisheries emerged as a result of improved fishing boats and techniques (Lackey, 2005).

Need for scientific research (1971-1940)

The first government involvement in fisheries happened in 1871 with the establishment of the U.S. Fish and Fisheries Commission. A lack of knowledge existed about were and how to fish the best way. Therefore, the U.S. Fish and Fisheries Commission's goal was only to obtain better scientific research. Though, research was only about how to improve the fishing industry by focusing on new fishing locations and by specifying which fishing gear best to use where and when. Research to improve fisheries management seldom received any support. The main reason for this was because fish populations were seen as unlimited. Fish populations were not believed to be under threat and there was no need for any management measures (Weber, 2002). The government did not really implement any harvest regulations and the harvest regulations that did exist were functioning poorly, because the scientific research behind those regulations was poor. Another reason was that because of public pressures to continue heavy fishing, regulations were often modest and poorly enforced (Lackey, 2005). The main problem in fisheries was believed to be the competition between fishermen. Fishermen targeted the same fish species or were fishing in the same location, this competition led to conflicts between the fishermen (Weber, 2002). In this period the market led the fishing industry. The government did intervene but only with the goal of providing more scientific research. The government failed however in regulating harvests because it was not seen as important and market demands for fish were high.

Enhancement of the economy and growing competition for resources (1940-1950)

During the Second World War, in 1940, a reorganization of several agencies concerning fisheries took place to boost the U.S. economy. The U.S. Fish and Fisheries commission was merged with the Biological Survey and now formed the Fish and Wildlife Service. The reorganization took place because of an increasing need for food and supplies during the wartime. The new named Fish and Wildlife Service's main job in the beginning was not really to act as a manager of wildlife, the service had to be focused more on the management of a wartime economy in order to meet the high demand for food and to

improve the economy. Hence, research focused on increasing the production from existing fisheries and discovering new fishing locations (Weber, 2002).

Especially after World War II, the role of the federal government was not only to locate new fisheries by obtaining scientific research but also to stimulate the market by increasing the economic viability of the fishing industry. By promoting the fishing industry, the U.S government wanted to maintain leadership in the world. The United States expected that when the war ended, they had to compete with fishing fleets from foreign countries. They expected rising conflicts between countries concerning fisheries and therefore they anticipated a growing competition over fish populations as countries sought to rebuild from the war and feed their growing populations (Weber, 2002). Higher seas near the U.S. border were free for everyone to use, no one could be excluded. The U.S. government's concerns turned out to be correct as after the war the intensity of commercial fisheries increased rapidly (Lackey, 2005). Many foreign fishing fleets came to the U.S. (Weber, 2002). As a result of these international conflicts, several international organizations and agreements were created. The U.S. entered several international agreements that focused on promoting conservation and maximizing utilization of marine fisheries. One of the international organizations the United States entered was the International Commission for Northwest Atlantic Fisheries (ICNAF). This organization was created to manage fisheries in the northwest Atlantic. However, many of these international agreements failed because the decisions of a treaty organization were only binding for the countries that agreed to be bound by them (Weber, 2002).

The market still led the fishing industry just like in the years before and market demands for fish increased. The government however extended its scientific research in this period, from improving catches to boosting the whole economy by providing research. Competition with foreign fleets led to the United States cooperating with different countries to deal with problems in common seas.

First sustainable yield theory (1950-1960)

In the early 1950s, scientific research about fisheries management was increasingly considered as very important (Lackey, 2005). Theories about fisheries management changed with the development of maximum sustained yield. The theory of maximum sustained yield was adopted because of two reasons, not only to avoid overexploitation, but also more importantly to ensure that the country received maximum benefits from its fisheries. The theory was adapted partly for conservation measures but mainly in order to support the market. Maximum sustained yield describes the largest annual catch or yield that can continuously be taken from a population of fish under existing environmental conditions. It was seen as a priority by both the fishing industry and the government that fish populations were to be reduced by using the maximum sustained yield theory, because it was believed that this would increase fish populations after some time. Assumed was a fish population would produce the most fish at about half its unexploited population size. Large amounts of fish had to be caught in order to make more food available and so increase food populations. The theory of maximum sustained yield does however have some limitations. The theory does not take into account environmental fluctuations and interactions between populations. Moreover, the ocean's productivity level estimates grew because of the continued belief that fish populations were limited. These limitations led to many warnings of several scientists, but as the majority still assumed fish populations were limitless, the government did not feel the need to

react to them (Weber, 2002). The government kept focusing on exploiting fish populations to its maximum instead of preventing fish stocks of being overexploited. As in the 1950s and 1960s, the market had high demands for cheap fish products and the federal government strived a large economic growth. Hence, exploitation was expanded rapidly in order to satisfy public and private needs. No longer was the government's role only to obtain scientific research. Now another role was to assist the fishing industry financially, to increase the quantity and quality of the fishing fleet in order to stimulate the market (Weber, 2002). The government still did not take into account overexploitation enough despite warnings from scientists, the conservation measurements in the maximum sustained yield theory failed. Market demands stayed high and the government kept supporting the market, now also financially.

In 1956, the Fish and Wildlife Act was implemented by the federal government. The fishing industry had to adapt to this act. In order to do so, the federal government assisted the fleet through product and technology development, marketing, and financial assistance. The Fish and Wildlife Act of 1956 put federal fish and wildlife activities under the same roof for the first time since 1940 by reorganizing the bureau of Sport Fisheries and Wildlife and the bureau of Commercial Fisheries. Both became part of the US Fish and Wildlife Service (Weber, 2002).

Growing management concerns (1960-1976)

In the 1960s, a growing number of scientists began to question the way wildlife populations were being managed. Instead of focusing on one species at the time, scientists emphasized a more ecosystem perspective and also a more precautionary approach in the exploitation of wildlife. In the late 1960s and early 1970s there were growing environmental concerns of both the general public and the government (Weber, 2002). Animal activists led campaigns which led to the passage of the Marine Mammal Protection Act (MMPA) in 1972. This act described that extraction of marine mammals would be prohibited, with few exceptions, unless there was proof that no harm would be done to the population. Unlike previous federal policies, this act was based on a precautionary approach and looked at the conservation side of fisheries management instead of focusing on the fishing industry. The responsibility of the Marine Mammal Protection Act was placed on the federal government (Weber, 2002). Since marine wildlife species do not stay within the boundaries of one country, many similar international agreements were formed. However, these international agreements did not always function properly.

An example of such a failure was seen in 1961, when 61 Russian trawlers threatened fish populations in New England. The Russian fishing boats were modern and build to catch large amounts of fish, the U.S. fleet however mainly consisted of small boats build before the Second World War. In 1965 the New England haddock population increased rapidly because of favorable conditions. As a result Russian fishermen caught such a large amount of haddock it led to the threatening of haddock and consequently other fish species. The ICNAF did adopt restriction on haddock catches, but because the Soviet Union did not become a member until 1969 they were not bound to the ICNAF regulations. Russian fishermen were free to catch fish near the U.S. boarder and were not restricted to regulations of the ICNAF. This event led to a lot of negative reactions from both the New England fishermen and government agencies towards the ICNAF because they failed to protect the U.S. fishing fleet from foreign fleets (Weber, 2002).

A reason of failures is that countries that are not members of an agreement can still ignore regulations. Particularly since the early 1970s, the US has attempted to strengthen the implementation of international agreements by imposing economic sanctions on countries which did not cooperate, as was done with for instance on countries that did not follow treaties like the International Convention for the Regulation of Whaling (Weber, 2002). For the first time the government implemented an act that only concerned the protection of fisheries. Because of protests from environmentalists a precautionary approach was adopted in the management of fisheries.

Other protests were about high rates of by-catch. Fishermen discard part of their catch that is non-marketable. However, the fishing gear used can injure or kill these unwanted fish species. By-catch may not have any economic value, discarded fish are often of great importance for the ecosystem because they for instance function as a food source for other fish species. Protests from environmental movements arose about the unwanted catch of dolphins in tuna fishing. These protests led to consumer boycotting and a demand for tuna products for which no dolphins were endangered (Lackey, 2005).

Attempt to counteract common pool nature of fisheries (1976-1985)

As mentioned before, in the 1960's the International Commission on Northwest Atlantic Fisheries failed to protect New England fish stock from foreign fishing fleets. The United Nations negotiated about a new common international law of sea. However, the U.S. government was pushed by the fishing industry to come to a solution as soon as possible. As a result, the U.S. government tried to take control instead of waiting for an international solution. In 1976 this led to the passage of the Magnuson-Stevens Fisheries Conservation and Management Act. This act extended U.S. jurisdiction over marine fisheries up to 200 miles offshore, creating exclusive rights of fishery within those 200 miles. Now, most fisheries were managed by individual states up to 3 miles offshore and between 3 and 200 miles offshore most fisheries were to be managed by the federal government, the National Marine Fisheries Service (NMFS). The government extended its influence in fisheries. Management within these boundaries was based on plans that met the act's national standards which were created by regional fishery management councils. With the implementation of the Magnuson-Stevens Act, fisheries policy made a major change from a limited role of the federal government in the management of marine fisheries to a much larger role. First fisheries were mostly unmanaged but after the implementation of the Magnuson-Stevens Act the federal government became a lot more involved in fisheries management. The NMFS's previous main role was mainly advisory, they obtained scientific research and assisted the industry. After implementation of the act the NMFS, together with fisheries management councils, suddenly had to manage commercial and recreational fisheries in federal waters (Weber, 2002).

After implementation of the Magnuson-Stevens Act, foreign fishing fleets were not prohibited to fish in U.S. waters. Strict regulations were established for foreign fleets fishing in U.S. waters, which meant they were only allowed to fish if the country's own fishermen were not able to catch all fish that were determined to be available. Foreign fleets could catch the remaining amount of fish, which is determined according to the sustained yield theory and identified by a council. Moreover, fishermen had to pay a permit fee as well as a fee for maintaining U.S. observers aboard while in the U.S. zone. But still, the act created tensions. Negative points concerning the Magnuson-Stevens Act were that the management

system created by the act was very complex, a lack of critical information, conservation standards were too weak, and still too much focus was on expansion of the fishing fleet (Weber, 2002). For example, tensions in New England led to weak management because of conflicts between the act's conservation standards and the expansion of fisheries. In the late 1980s, weak management led to a decline fish stocks. Still, the federal government as well as the market did not believe there was much need for the protection of fish stocks and therefore federal policy still kept promoting increased exploitation (Weber, 2002). The act did succeed in boosting the U.S. economy but still was not able to put a halt to overexploitation of fisheries.

Meanwhile the United Nations adopted the Law of the Sea Convention (Lackey, 2005). The United Nations created the Exclusive Economic Zone (EEZ), an area comparable to the zone created by the Magnuson-Stevens Act (Weber, 2002). In 1982, most nations adopted this Law of the Sea Convention. In 1983, the U.S. the Magnuson-Stevens Act's extended federal zone was renamed to the EEZ, which made the U.S. terminology consisted with international practice under the United Nations Law of the Sea (Weber, 2002; Lackey, 2005). Still, fishing pressure in the exclusive economic zones stayed high after the Law of the Sea Convention because foreign fleets were replaced by domestic fleets (Lackey, 2005).

In the period after the implementation of the Magnuson-Stevens Act in 1976, the federal government continued previous policies that promoted the expansion of the U.S. fishing fleet. The government failed to correct overfishing caused by high market demands. As a result, exploitation increased rapidly and overfished fisheries increased dramatically. At the same time even greater competition among fishermen occurred.

Increasing concerns about fisheries management (1985-1990)

By the late 1980s New England fisheries had to deal with many cases of overfished fish stocks. However, the majority of scientists was still claiming that the ocean was limitless, like in the 1960s. But other scientists are now urging for greater caution and reliance on an ecosystem perspective (Weber, 2002). Greater caution was created by means of the concept of the precautionary principle. This concept describes decisions can contain a considerable uncertainty and therefore it is important that fisheries managers include caution in their decision making. The perspective of ecosystem management takes into account the whole ecosystem, including the ecological, social and economic side. However, ecosystem management in fisheries is still not realized and a universally accepted definition does not yet exist (Lackey, 2005).

At the same time, conservationists and animal rights activists started increasing protests concerning fisheries management. Campaigns about whaling and seal hunting led to a stop on seal hunting nationally and led to an international global moratorium on commercial whaling. Research about the management of fisheries got additional support in the late 1980s. This was because the consequences of inadequate management became visible when overfished fish stocks were causing economic declines (Weber, 2002).

As already mentioned above, federal policy and practice were generally based on the belief that the ocean's productivity was almost unlimited. Therefore fish were exploited for maximum production and utilization. The government only intervened in order to increase the capacity of fishing fleets because fishing was assumed to be sustainable in the absence of significant evidence it was not. This view however changed by the 1990s (Weber, 2002).

View of unlimited fish stocks changed (1990-current)

After much mismanagement in fisheries, like the collapse of New England groundfish, raising protests from conservation organizations and growing concerns from the government and scientists about traditional management occurred. The government now focused on a precautionary approach in fisheries management. In 1993 conservation organizations and several fishing groups formed a network to promote improvement of the Magnuson-Stevens Act. This resulted in a fundamental change in politics.

In 1996 the network was successful when protests led to the Sustainable Fisheries Act. This new policy included plans to rebuild depleted fish populations. Besides this, the act corrected the optimum yield which in the past had led to biologically unsustainable exploitation levels. The Sustainable Fisheries Act took into account measurements to reduce by-catch and measurements to better protect essential fish habitats by reducing the negative effects of fisheries. At last, the act ensured that the government no longer financed the expansion of fishing fleets (Weber, 2002).

In the 1990s there existed an overall growing recognition of the consequences of poor information on the impact on ecosystems caused by the fishing industry. Consequently to protests by conservationists, the U.S. government adopted precautionary policies to put a restriction on the capture of marine mammals in fisheries. Meanwhile, in 1995 the United Nations also implemented a precautionary approach by prohibiting high seas drift net fishing to decrease the negative impact the ecosystem (Weber, 2002).

4.2.2 Preliminary conclusion on the evolution in fisheries policy in the USA

Throughout history fisheries in the United States were mainly driven by the market. When the government first intervened in 1871 it was to provide scientific information to increase harvest levels. Later government interference remained in order to promote the market and to boost the economy. Especially at the end and after the Second World War when there was a lack of money and a high demand for food, the government's goal was to assist the market. First this was done by only providing information but later the government also assisted the market financially. Apparently the market failed to meet up to the high demands for fish by themselves and therefore the government felt that they had to intervene in order to enhance the economy. The government however partly failed in doing so, because fish populations were soon being overexploited. The government as well as the market lacked knowledge about the long term effects of their high harvest levels. Also they were more concerned about economic values and did not take into account ecological values. In the 1970s the first environmental protests arose consisting of scientists, government agents and the general public. As a result of these protests conservation based acts were implemented by the government. Yet, the

government kept promoting exploitation. In the 1990s the view of the government changed towards a more conservationists view with the establishment of the Sustainable Fisheries Act. After this point government interference was no longer only focused on assisting the market to exploit the highest amount of fish. Now the government saw the negative effects on fish populations based on their past actions and took measurements to prevent overexploitation.

International organizations and agreements had a large impact on what happened in the fishing industry. After the Second World War ended, fishing fleets had to compete with foreign fleets. Because of the common pool nature of fisheries everyone was allowed to fish wherever they pleased. Fish do not keep to national boundaries and therefore international agreements were important.

4.3 Analysis of the two policy development pathways

When looking at the results of the analysis of policy evolution, several important turning points can be determined in time. At these points a change in management policy occurred. The government determines how much influence the market has by implementing its policy. Therefore this part focusses on policy development pathways. Figure 4.1 illustrates the most important turning points in time for both sectors. It also illustrates whether the market or the government predominated in a specific period. Yet, some periods experienced a gradual change and it was not possible to determine what approach predominated in a specific period and therefore not all periods are classified as more market or government influence.

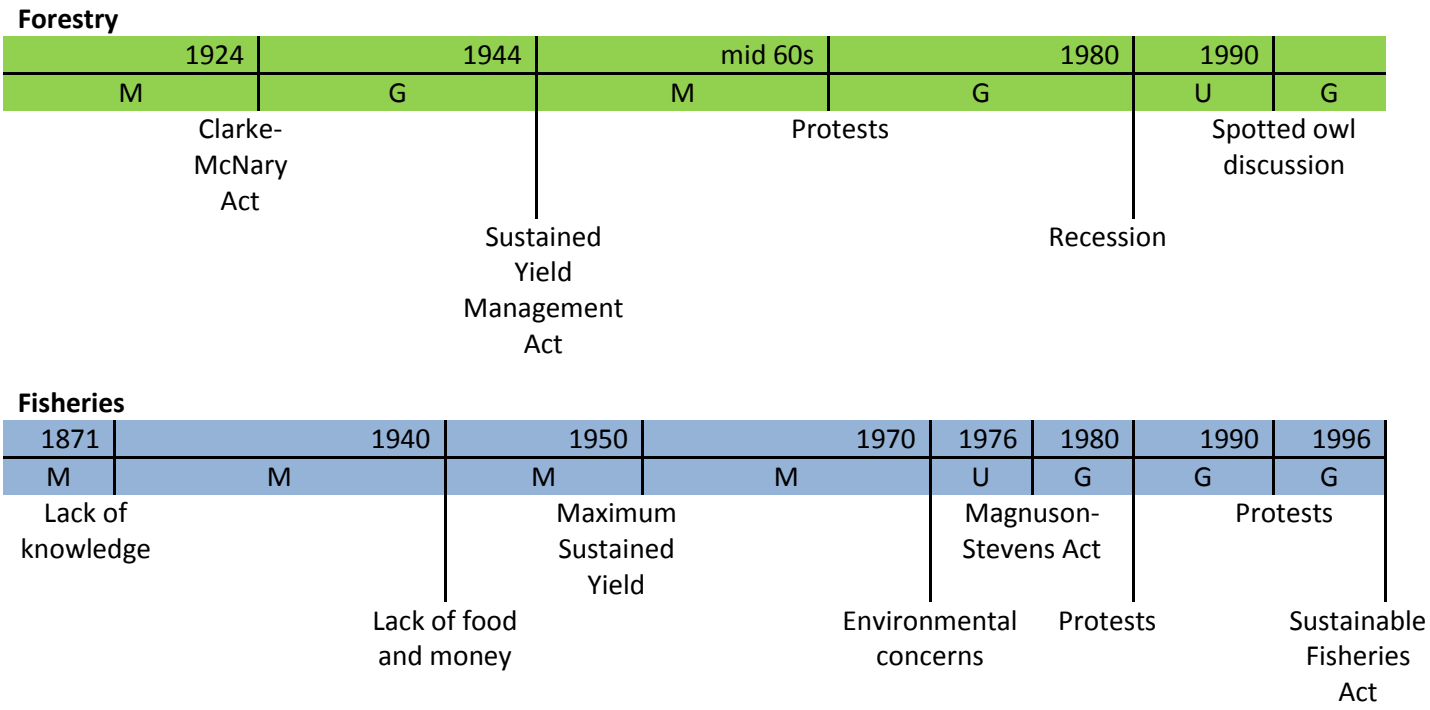

Figure 4.1: The timelines show what approach predominated in a specific period. It also shows whether the market or the government caused a turning point in management policy. The upper timeline reflects the forestry sector in Oregon and the lower timeline reflects the fisheries sector in the United States. Section 'M' indicates that the market predominated and section 'G' indicates the government predominated in that period. Section 'U' marks a period of gradual change.

4.3.1 Analysis of the evolution of forest policy

In the forestry case different periods between more government influence and more market influence are seen throughout history. In 1924 the first shift towards more influence of the government took place. The reason for this shift was because there were growing concerns about high timber exploitation rates. The market had failed to protect forest resources because the forestry industry found economic values more important than ecological values. Still, the government only intervened in the newly established public lands. In those public lands timber exploitation temporarily stopped, but in private

lands overexploitation continued. There was a shift back to more market influence in 1944, when the government introduced the Sustained Yield Management Act. The reason for this change was because there was a lack of money due to the Second World War. The timber industry could provide extra money to sustain that lack of money and a shift occurred towards more market influences. Government or market failure did not influence the change in this period. The execution of the Sustained Yield Management Act failed in the extraction of sustainable harvest levels. Problems with science caused miscalculations for maximum sustained yield, leading to harvest levels which were too high. A change towards more market influences was the consequence of government failure. After a period were the market played a larger role, the market again failed in protecting forest resources. Old-growth forests were depleting as a result of overexploitation. The government's role in this period was to meet the high market demand for timber caused by the war and consequently not to protect forest resources. The government deliberately choose to support the market in order to restore the economy. In the mid-1960s the first environmental movements arose because both the government and the market had failed to stop overexploitation and protect ecosystems. As a result of the upcoming environmental protests, the government created a number of acts in order to protect resources. Due to a recession in 1980, the timber industry started to work more efficiently and harvested more timber. Decision-makers still found it better to sustain the economy instead of protecting forest ecosystems. Government interferences still did not correct the market and again environmental protests arose. In 1990 environmental protests reached its highest point with the spotted owl discussion. Environmental protests led to more government intervention protecting forest ecosystems who now halted logging in old-growth forests. Throughout this case the government got highly influenced by industry pressures caused by intensive industry lobbying.

Seen is in the evolution of forest policy that the market predominates in the beginning but soon fails in the management of natural resources and as a result forests a declining. The government intervenes but is not able to or will correct the market. On the one hand the government finds it better to support the market and consequently the economy and on the other hand it fails in, for instance, using correct scientific research. After this, the market will take over again and the process repeats itself. However the market and the government are not the only actors in this process. Environmental groups try to urge the market and the government towards a more conservation approach of natural resources.

4.3.2 Analysis of the evolution of fisheries policy

In the fisheries case, the first interference of the government was seen in 1871 when the market lacked knowledge in order to grow. The market failed because of incomplete information about how to fish in the most efficient way. The government supported the market by obtaining scientific research in order to improve catches. Due to incorrect research the government was not able to correct the market completely. Fisheries were seen as unlimited and were therefore extracted to its maximum. The government failed in correcting the market and only facilitated fish exploitation. The market kept predominating the fisheries sector and the government did not intervene in fisheries management. In 1940, the Second World War caused a lack of food and money. The government intervened again by supporting the market to meet up to these high market demands and to boost the U.S. economy. A shift towards more government influences was the consequence of a need for money and for that reason the

fishing industry was supported by the government. Fisheries no longer had to compete for fish within the domestic industry alone, competition extended internationally when foreign fishing fleets started fishing near the U.S. coast. Because of the common pool nature of fisheries, none could be excluded which led to high harvest levels. The market failed in the protection of those common goods and as a result the United States had to get involved in international organizations and agreements. In 1950 scientists introduced the theory of maximum sustained yield. This theory helped the market to meet the high demand for cheap fish products, and again the government supported the market. The government failed, because of wrong estimates of fish stocks. Fish were harvested at unsustainable levels leading to overfishing. In the 1950s the government did not only obtained scientific research but also assisted the market financially. Environmental protests arose in the 1970s because both the market and the government failed in the protection of ecological values by only considering the economic side of fisheries. As a result of the protests, the government took measurements in order to conserve natural resources for the first time. However the government failed and kept promoting exploitation. In 1976 the Magnuson Stevens Act was implemented, consequently the government took over the leading role from the market and gained a management role in fisheries. Yet, the government still promoted the market in order to boost the economy. However it failed as uncertain information about the abundance of fisheries led to overfishing. Again protests arose in order to put a halt to overexploitation, these led to more research about sustainable fisheries management. In the 1990s protests successfully made a change in fisheries management. The government was now convinced that previous actions in fisheries caused many environmental failures. The government no longer financed the fishing industry and took measurements against overexploitation.

In the evolution of the fisheries sector the market predominates in the beginning. It was believed until the 1990s the protection of resources was not necessary because they were believed not to be under threat. Therefore the government kept supporting the market that could not sustain the market demand on its own. The market is not able to manage natural resources correctly and the government has to intervene several times in order to correct these failures. Yet, the government is not able to correct these failures efficiently and fails as well. Both the market and the government are not able to manage natural resources correctly. As a result, international agreements and later also multi-actor protests try to correct these failures.

4.3.3 Major causes of evolution in forestry and fishery policy

As mentioned in the theory of this study, there are several causes for government and market failures. A number of these causes are seen over time in either the forestry sector or the fisheries sector or in both. Table 4.1 and 4.2 give an overview of the different types of market and government failure mentioned in literature. Table 4.3 gives an overview of other causes of changes in management policy. The tables show if such a cause occurred in the evolution of forest and fisheries policy and whether it led to an important change in policy. Additionally it shows when in time a certain cause led to a policy change or turning point as assigned in figure 4.1.

Table 4.1: Overview of potential causes for policy changes caused by market failure in the forestry sector and fisheries sector and whether these causes led to a turning point in the evolution of policy and when.

Market failure	Did it occur		Did it directly led to a turning point		When		Remarks	
	Forest	Fish	Forest	Fish	Forest	Fish	Forest	Fish
Market power	Yes	No	No	No	-	-	Lack of market power and low barriers to entry	-
Information problems	Yes	Yes	No	Yes	-	1871	Establishment of the USDA Forest Service	Establishment of the U.S. Fish and Fisheries Commission
Externalities	Yes	Yes	Yes	Yes	1990	1996	Effect of logging on e.g. Spotted owl	By-catch in fishing nets
Non-private goods	No	Yes	No	Yes	-	1976	-	Clarke-McNary Act
No existence of markets	No	No	No	No	-	-	-	-
Incomplete private property rights	No	Yes	No	No	-	-	-	No private waters
Second-best problem	No	No	No	No	-	-	-	-

Failures found in this study can be linked to several potential causes of market failures found in literature (Table 4.1). Not market power, but a lack of market power led to low barriers to entry in the forestry sector. Because of this, attempts to control overproduction failed. In the fisheries sector market power did not take place. The occurrence of information problems from the market happened for both sectors at the beginning of the evolution of forestry and fisheries policy. At this time not much was known about the best way to exploit natural resources. For the forestry sector this did not lead to any major changes in management policies. Though in the fisheries sector it encouraged the government to take action. The government obtained additional research to make the market more efficient. The problem of negative externalities took place over the whole period for both cases. Fisheries caused for instance unwanted by-

catch and it damaged sea ecosystems. The forest industry threatened the biodiversity, for instance by logging old-growth forests which degraded the spotted owl's habitat. In both cases externalities led to protests against government and market failures. Externalities led to management changes in respectively 1996 and 1990 when the government became to see ecosystem protection as much more important than before. The existence of non-private goods was a major issue in the fisheries sector because the common good nature of seas that were free for everyone to enter. As foreign fishing fleets could not be excluded, catches could not be regulated by the government. In order to gain back the right to implement regulations, the U.S government implemented a zone (later called the EEZ). Private property rights within the forestry sector were present, as forests are classified as state owned and privately owned forests. The fisheries sector on the other hand had incomplete private property rights as no private waters exist. These incomplete private property rights are causing failures within the sector. Fishermen do not own any waters and even if they did, fish are not 'fixed' resources like trees and therefore they do not stay inside a particular area. For this reason fishermen feel less responsible and do not feel the need to invest in an area. No existence of markets and the second-best problem did not seem to have occurred significantly in this study for both cases.

Besides market failures, government failures occurred over time. These failures also led to some changes in policy in the evolutions (Table 4.2). The principle-agent problem occurred for both sectors. Governmental officials were in both cases at times motivated by their own interest. In the forestry sector this was seen when the government was guided by lobbying from the timber industry. However, this changed in the mid-1960s when environmental organizations and the public started to protest against the current management. The government now took an interest in not only the timber industry and so economic benefits but also in the general public. In the fisheries sector, the principle-agent problem resulted in the fact that the government was only willing to listen to research that served in their best interest, namely research that stated that resources were not under threat. Also here protests from environmental movements and the public resulted in management policy changes towards a more public interest view.

The market and the government faced information problems. For both sectors, the government implemented sustainable yield regulations which were based on incorrect research. The sustainable yield models led to yields that were too high resulting in a degradation of natural resources in 1944 and 1950. Because of protests management policy changed in the 1990s. In the forestry and the fisheries sector the government dealt with a mix of goals. In both sectors the government only implemented weak regulations in order to not negatively affect the economy. The fisheries sector had some problems with science. Wrong advice from scientists led to miscalculations of fish stocks and gave the impression that fish stocks were unlimited. Those mistakes led to degradation of several fish populations. Mistakes were corrected in 1996 when new, more sustainable regulations were implemented. The forestry sector did as well deal with problems with science. The sustained-yield regulations did not take into account any ecological values. The problem of poor management and weak incentives and the problem of top-down management did not occur in both sectors.

Table 4.2: Overview of potential causes for policy changes caused by government failure in the forestry sector and fisheries sector and whether these causes led to a turning point in the evolution of policy and when.

Government failure	Did it occur		Did it directly led to a turning point		When		Remarks	
	Forest	Fish	Forest	Fish	Forest	Fish	Forest	Fish
Principle-agent problem	Yes	Yes	Yes	Yes	Mid 1960s	-	Lobbying from timber industry	Ignoring scientists
Information problems	Yes	Yes	Yes	Yes	1990	1996	Incorrect sustainable yield levels	Incorrect sustainable yield levels
Mix of goals	Yes	Yes	No	No	-	-	Weak regulations to not negatively affect the economy	Weak regulations to not negatively affect the economy
Poor management and weak incentives	No	No	No	No	-	-	-	-
Problems with science	Yes	Yes	Yes	Yes	Mid 1960s	1950, 1996	SYM did not take into account ecological values	Fish stocks are limited
Top-down management	No	No	-	-	-	-	-	-

Beside typical market and government failures, changes in management policy were also caused by other reasons (Table 4.3). In the policy evolution of the fisheries sector international policies were the reason for turning points. The USA joint international agreements in order to protect their fish stocks against foreign fishing fleets, however those international agreements also included conservation measurements. Both in the evolution of the forestry sector and the fisheries sector numerous protests took place. In the forestry sector environmental movements protested against overexploitation in old-growth forests. In the fisheries case environmentalists, but also scientists and people from the industry and the government protested to stop overfishing and to protect ecological values.

Table 4.3: Overview of potential other causes for policy changes in the forestry sector and fisheries sector and whether these causes led to a turning point in the evolution of policy and when.

Other causes	Did it occur		Did it directly led to a turning point		When		Remarks	
	Forest	Fish	Forest	Fish	Forest	Fish	Forest	Fish
International policy Multi-level	No	Yes	No	Yes	-	1940, 1970	-	International agreements
Civil society Multi-actor	Yes	Yes	Yes	Yes	Mid 1960s, 1990	1980, 1990, 1996	Protest by environmental groups	Led to the Sustainable Fisheries Act

4.3.4 Comparison between the two policy evolutions

This study shows several similarities between the two cases. The forestry and the fisheries case both start with only market influences, but over time the government increases its role in the management of natural resources. Theories about maximum sustained yield are developed around 1950. In both cases the theory about maximum sustained yield fails in making the sector sustainable, resources are exploited at harvest levels which are too high because of wrong information concerning sustainable levels. In both cases it is clear that the market is clearly oriented on the economic side, instead of also taking into account ecological values. The government intervenes because it tries to stimulate the market in order to enhance the economy. Enhancement of the market happened in both cases, but in the fisheries case it appears to be more clearly. In the forestry case the government does intervene more strictly between 1924 and 1944 and during the mid-1960s in order to protect ecological values. However in both periods the government is not successful in its efforts to protect forest resources because financial reasons force the government to support the market. It is interesting to see that in both cases other actors start to cause important turning points towards more conservation measurements around the mid-1960s and 1970s and are in both sectors a lot more successful in the 1990s. As a result of their protests, the government and the market start to take into account conservation of natural resources. Those other actors try to correct both market and government failures. Shifts between more government intervention and more market influences seem to depend generally on two events. When there is a lack of money, the government allows the market to take control in order to restore the economy. After some time, exploitation of resources reaches a certain level when multi-actor (e.g. environmentalists and scientists) and multi-level groups (international agreements) start protests against what happens in the market and the government. After this the market and/or the government will take over again.

Besides similarities, this study also shows a number of differences when comparing both cases. The government seems to play a bigger role in the forestry case. That the government plays a smaller role in the fisheries case could be a result of the common pool nature of fisheries. Another reason could be the occurrence of wrong scientific research in the fisheries sector. A high uncertainty exists in fisheries

management and before 1990 the government still did not consider this uncertainty. The idea of unlimited fish populations stayed evident until 1990 while in the forestry case the idea of unlimited resources already disappeared in the early 1900s. Another difference is the influence by international organizations. In the fisheries case international influences are of a higher importance because fish pass national borders and actions of foreign markets and governments will influence fish populations within national waters. Another difference is that forests are divided into privately owned and state or federal owned forests while seas do not have this division.

In the last twenty years a shift towards a more conservation approach is seen in both policy evolutions. The fisheries sector seems to be focussed on a sustainable fishing industry in order to be able to generate an economic stability for the future. Fish stocks are being kept at sustainable levels. Besides containing an economic stability the fisheries sector tries to sustain an ecological stability by reducing by-catch and by protecting fish habitats. The forestry sector focusses in its state and federal owned forests more on the conservation of specific species. Timber extraction declined significantly in these areas in order to protect old-growth forests. In private forests timber stands are being kept at sustainable levels. Overall, the fisheries sector focusses more on sustainable levels of natural resources, while the forestry sector focusses more on the protection of specific natural resources (in federal and state owned forests).

5. Discussion

The discussion is divided into three sections. First, the theoretical framework used in this study will be reflected upon. Second, the findings of this study will be linked to existing literature. Finally, the methodology used for this study will be discussed.

5.1 Reflection on the theoretical framework

The theoretical framework describes both the market and the government have the tendency to fail (Wolf, 1986). Winston (2006) states that a market fails when the allocation of resources is not optimal. The market is not efficient and unable to reach a desirable outcome (Datta-Chaudhuri, 1990). The government can correct the problem of market failure to so improve market efficiency (Winston, 2006). The government however can also fail in correcting the market. According to Winston (2006) government failure occurs when the government is not efficient enough in solving the problem of market failure or when the government should not have intervened at all.

Literature mentions a number of potential causes for market and government failure. The causes of failures that were described in the theoretical framework were not meant especially for the management of natural resources. One might expect the management of natural resources deals with other causes of market and government failures. However this study shows the general causes are quite similar to causes found in the analyzed cases.

Sandmo (2000) mentioned markets for natural resources differ from other market types. A normal market is driven by profit incentives whereas markets for natural resources mainly have to deal with goods that have no monetary value. This phenomenon was seen in this study where the protection of natural resources was seen as less important because it did not generated any money in the short term. Another important difference is that sectors like the forestry and the fisheries sector have to deal with a high uncertainty (Pindyck, 2007). This was also seen in the results of this study. Mainly in the fisheries sector, a high uncertainty resulted in many failures in management. Overall the theoretical framework did proved to be helpful in explaining the results.

Yet, the theoretical framework used in this study did have some limitations. It was only focused on market and government failures as a reason for changes in policies, while this study showed some additional reasons. After government or market failures, new governance actors emerged and intervened to correct failures caused by both the market and the government. The concept of governance describes a collaboration between the government, market and civil society actors in the decision making process (Hajer et al., 2004). Collaborations may occur horizontally and vertically as was seen in this study. Two forms of governance can be distinguished in the two policy evolutions, namely multi-actor and multi-level governance. Multi-actor governance is the increased influence of for instance citizens, scientists and civil society organizations. Multi-level governance describes the influence of different levels of government, like the influence of international policies (Breeman et al., 2009). As a result, the process of market and government failure in natural resource management is not an ongoing process where the market takes over when the government fails and vice versa. New governance actors

may intervene when the market or the government fails. A new figure can be derived from this (Figure 5.1).

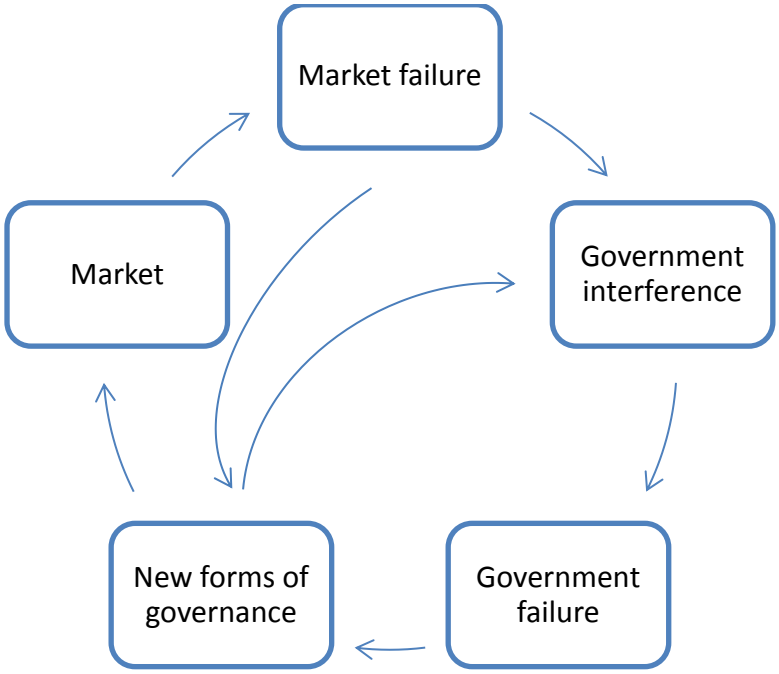

Figure 5.1: The process of market failure and government failure including the interference of new governance actors.

5.2 Reflection on the results

In this study the occurrence of new governance actors seem to be able to correct market and government failures quite successfully when it comes to the protection of natural ecosystems. However governance interference did not completely lead to a perfect outcome in this study. When in 1990 the spotted owl was listed as an endangered species, exploitation of timber declined drastically in Oregon. This seems to be a positive outcome. Yet, a decline in timber extraction in Oregon did lead to a number of negative consequences. It threatened the community stability the government wanted to establish with the creation of state forests. After 1990, the timber industry collapsed and as a result sawmills were closed and jobs were lost (OFRI, 2012). In state forests, timber production was almost put to a halt. According to the Oregon Forest Resources Institute, a combination of minimizing harvest and the supressing of forest fires leads to "*choked forests where too many trees compete for scarce water and nutrients. The trees weaken and become vulnerable to insect infestation. Many trees die, creating the potential for huge, calamitous fires* (OFRI, 2012)." In the evolution of the fisheries sector the USA joined international agreements. However, those international agreements are only binding for the countries that agreed to be bound by them (Weber, 2002). So, it seems governance interference can fail just like government and market failures. Jessop (2000) mentions that governance failure should not be

neglected as governance mechanisms might not be more efficient than market or government mechanisms.

This study was based on a neoclassical economics perspective. Here a market is seen as an abstract concept that describes how goods, resources and services are efficiently allocated. From this perspective the hypotheses was formed that states the process of market and government failure is an ongoing continual cyclical process as was seen in figure 2.3. Yet this research shows using the neoclassical economic perspective could not explain the process of market and government correctly. Instead of the market and government, other actors were of a major importance in the management of natural resources (figure 5.1). The (new) institutional economics perspective is based on the view that institutions, structures of individuals that collaborate, take part in the economy (Rutherfort, 2001). This was seen in the results of this study were civil society and organizations were part of the process of market and government failure. This perspective seems to be better in explaining the results.

One of the intentions of this study was to investigate if the forestry sector learn from the fisheries sector and vice versa. Yet, whether the forestry sector and the fisheries sector can really learn from each other in the management of natural resources is questionable. Many failures in the fisheries sector were caused by the common pool nature of fisheries while in the forestry sector this did not lead to any problems because property rights can be established. The forest sector deals with fewer uncertainties compared to the fisheries sector.
Management policy in federal and state owned forests is based on the protection of specific natural resources while management policy in the fisheries sector is more based on the creation of sustainable fish stocks. Here the forestry sector could learn from the fisheries sector by focussing less on the protection of specific types of forest (old-growth) but rather to create a dynamic ecosystem were ecological values are being preserved and also economic values could be enhanced. However this is a choice between preserving natural resources and creating dynamic ecosystems. In Oregon both is done, by the division between privately owned forests (dynamic ecosystem) and federal and state owned forests (preservation of specific ecosystems). The fisheries sector could in this respect learn from the forestry sector by creating more preservation areas in order to protect specific ecosystems.

5.3 Reflection on the methodology

The problem of forest degradation as a result of market and government failures was the starting point of this study. In order to be able to analyze the process of market and government failure in a better way, a case in the forestry sector was compared to a case in the fisheries sector. Because both sectors are dealing with the management of natural resources, the problem of forest resources degradation could be extended to the problem of natural resource degradation. As a result of looking at both the forestry and the fisheries sector, the process of government and market failure in natural resource management was investigated. The methodology of this study has a number of limitations. Due to time, only one case per sector could be analyzed and moreover only one country could be studied. For this reason it is difficult to apply the results of this study on other management policies.

For this study the forestry sector in the state Oregon, USA was analyzed. Whether Oregon is a representative state for the rest of the United States is questionable. Oregon's forests differ from eastern and southern US forests. Oregon currently has relatively high amounts of forests because it has been preserved well in the past. Forests for timber production are approximately the same size as in the east and the south, while Oregon has vaster amounts of forest lands in total. Moreover, Oregon consists predominantly of public forests, while in the eastern and southern part of the US private forests are predominant (Forest Service, 2001). However the many differences compared to other parts of the USA, Oregon was a very interesting state to analyze because of high influences from both the government and the market. Also many policy changes have happened over time as a result of collisions between conservationists and the timber industry.
For the fisheries sector the analysis was mainly focused on federal seas. Because fisheries are based on many international regulations, this was representative for other fisheries. The study also could have focused on state waters, but this would be less representative and also not enough information was available in order to gain sufficient results. The results of this study could be used in order to provide general knowledge about market and government failures. Yet, because a lack of time forestry and fishery sectors in other countries could not be analyzed and therefore it is uncertain if the outcome of this study could be applied on other countries.

In order to gain more insight in market and government failures a literature study was conducted. Hence historical data could be analyzed to get a good overview of what has happened in the cases over a long time period. However using a literature study has a negative side, as by doing a literature study secondary data has to be used. Secondary data might be incorrect and therefore the reliability of the author has to be decided. In this study the author might for instance work for the government and might be prejudiced. Another disadvantage is that research found often is not focused on a study's specific subject. Information can therefore be missing leading to gaps in your research. This study was an explorative study and analyzed historical data. Hence the use of a literature study in this research is very helpful because much secondary historical information is available. This study did not focus on detailed information but had a much more general focus and therefore the use of secondary data was valuable.

For this study the data went back to the beginning of both sectors. Another way of gaining more insight in market and government failures could have been to look at a much shorter time period. When analyzing a period of for instance twenty years, the analysis could have been more in-depth or a greater number of cases could have been analyzed within the same time. Also more recent data could be more representative for current management policies. However this study was an explorative study and by looking at a policy evolution over a longer time period, the process of market and government failure could be explained in a better way.

6. Conclusions

This study has attempted to gain more insight in the functioning of markets and governments in forest and nature conservation and management. It is examined if the process of market and government failure in natural resource management is an ongoing process where the market takes over when the government fails and vice versa. A main conclusion and a number of other important outcomes are derived from this study.

This study has examined if the process of market and government failure regarding resource management is an ongoing process where the market takes over again when the government fails and vice versa. The market has a tendency to fail in the management of natural resources. As a result the government intervenes in order to correct or support the market. Yet, similar to the market, the government has failed in correcting market failures. Yet the hypothesis does not seem to be completely correct as resource management is not only an interactive process of market failure and government failure. Consequently of a failing market and government, new forms of governance appeared in order to correct these failures. The development of multi-actor (civil society) and multi-level (international policies) governance forms have tried to correct failures from the market and the government.

A number of other important outcomes are obtained from this study. Information problems and problems with scientific research are important causes of failures in natural resource management. This study shows that many failures could have been prevented when better information was available beforehand. This was seen for instance in the reforestation measurements in the forestry sector and in incorrect catch rates in fisheries that led to overexploitation. Also sustained yield regulations did not take into account ecological values. Because of high uncertainties in natural resource management consequences are difficult to detect in an early state.

Management policy for both the forestry and the fisheries sector was mainly driven by money incentives. When a lack of money occurred, the governments shifted from the protection of natural resources to the exploitation of resources to boost the economy. The government and the market focused more on economical values instead of on ecological values. As a result, often no interest in the protection of natural resources existed and therefore they were exploited with rates that were too high.

Although the concept of governance is already mentioned by numerous authors, this study has described to process towards it. Besides market and government failures, governance measurements may not be efficient in the management of natural resources as well. The concept of governance failure is not yet often mentioned in literature, and the concept of governance failure in the management of natural resources even less. Therefore future research on this topic is necessary in order to explain if and in what forms governance failure may occur. Also, if or when governance failure occurs, what will happen after it and who will try to correct it.

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