A COMPARATIVE ANALYSIS OF THE ROLE OF INSURANCE COMPANIES IN FLOOD RISK MANAGEMENT

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A.H. Wesselink,
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Author: Annelise Helena Wesselink

Studentnr.: 0602833
November 2013
Msc. in Spatial Planning (European Spatial and Environmental Planning)
Nijmegen School of Management, Radboud University Nijmegen

Supervisor: Prof. dr. P. Ache

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Abstract

In the Netherlands, a flood prone area, until recently no flood insurance was offered because flood risk in the Netherlands was considered to be too big of a risk to be carried by the insurance industry. However, in almost all European countries flood insurance is part of flood risk management. This observation led to the main research question: *'What role insurance companies can play to contribute to Dutch flood risk management.'* In respect of this main research question a comparative analysis is carried out that takes into account other structures of compensation (via flood insurance) in England, the USA and Belgium. Based on the theoretical concepts relating to Beck's Risk Society theory and concepts of risk management, and insurance an analysis has been carried out to derive the contribution of the insurance industry to flood risk management and its influence on spatial planning involved in the process of flood risk management. The role the insurance industry plays depends highly on the framework and the responsibility taken by the government in the particular country. Furthermore of importance is the existing culture in relation to solidarity and individual responsibility. Based on an analysis of the (lack of) contribution of the insurance industry to flood risk management, lessons could be learned for a possible Dutch situation in which flood insurance would be introduced.

Chapter 1 - Introduction

Floods are natural phenomena that endanger lives, cause human tragedy, lead to economic losses and environmental damage. Flooding is the most common natural hazard and third most damaging globally after storms and earthquakes (Keenan, 2012). Since the beginning of time people have tried to prevent the impact of floods and tried to limit their impacts by using the best measures available. Some countries rarely experience flood problems while others, like the Netherlands, have to 'Live with Water' and so design their society with and around water and flood risk. In a country like the Netherlands flood protection has to be a first priority over everything else. Already since the middle ages the Dutch people had to adjust and intervene in the water environment to suit their needs and requirements (Raadgever et al., 2011, p. 64). The Netherlands have a long coastline and in addition is situated on the delta of three major rivers: The Rhine, the Meuse and the Scheldt. Due to the location of the country, large parts of the Netherlands (which literally means the low lands) are flat and located near or below sea level which makes the country severely susceptible to flooding. With climate change and an increase in urbanisation flood risk will increase.

Flood and planning are having an intricate relation. Recently, under the expectation of increasing flood risks, the water-management community advocated a more important position for water management in national spatial planning in the Netherlands (Van den Brink et al., 2013). The possibilities for dealing with very high river discharges should become one of the guiding principles for national spatial planning (Tol et al., 2003, 576). The main actor concerned with river flood protection is Rijkswaterstaat (National Water Authority), normally employing protective technical measures. However, floods and flood risk can only be reduced effectively if, in addition to these technical measures, spatial planning regulates land use in areas endangered by floods. In addition to adapted water management, risk management and land use decisions are decisive for the future impact of flood events.

At the moment in the Netherlands the government provides most of the damage measures taken. Flood insurance is left out as an actor that contributes to measures of prevention, protection or after-care. Insurance companies pulled out of the markets after the flood disaster in 1953 that hit the South-West of the Netherlands, the Dutch government in agreement with the insurance companies decided that the consequences of floods are too big to be carried by insurance companies. Although in other countries for example the UK, Belgium, France and Germany and the USA insurance companies do play a role in taking measures against flooding (Botzen & Van den Bergh 2008, 423).

Discussion about the insurability of catastrophes rose again in the 1990's. The Dutch government introduced the Calamities and Compensation Act (Wet tegemoetkoming Schade bij rampen en ongevallen, 1998). This law, besides providing security in case a flood event has taken place, creates uncertainty about the amount of damage that will be compensated in case of an event (Botzen & Aerts, 2011). Under pressure of the European open market and the pressure of climate change the discussion continued. In September 2012, since 1953, the first Dutch insurance for flood damage entered the market. The 'Neerlandse' insurance

company insures damage caused by catastrophes, like earthquakes, terrorism and floods for house-owners, up to €75.000,- (Neerlandse Verzekeringen).

Previous studies showed the economic relevance of involving insurance companies in compensating damage caused by floods (Botzen & Aerts, 2011; Botzen & Van den Bergh, 2008). In a period, where the Dutch government wants to cut her expenses while flood risk management requires investments, it is interesting to involve flood insurance form an economic point of view. More importantly, these studies also show that insurance companies can do more than only providing economic assistance after a flood has caused damage, especially in assisting spatial planning in relation to risk management. Therefore in this thesis examined is what influence can flood insurance exert in flood risk management from a spatial planning perspective.

1.1.Research objective & research question

In this thesis my research objective is to examine how the use of insurance companies can contribute to Dutch flood risk management. In relation to this research objective my main research question is as follows:

"What role can insurance companies play to contribute to Dutch flood risk management based on experiences abroad? "

Sub questions to answer this questions are:

1. How are the assed countries in relation to their institutional framework and flood risk policy to be compared to the Dutch situation?
2. What contributions deliver insurance companies in England , Belgium and the USA to flood risk management?
3. What is the result of the taken measures in England, Belgium and the USA?
4. Could these measures be useful and effective for Dutch policy on adaptive flood risk management?
5. And if so, what would be an effective structure?

This thesis will result in a comparative analysis if and how insurance companies could contribute to Dutch flood risk management. To be able to analyse the contribution of insurance companies, examined will be the role of insurance companies in flood risk management in countries where flood insurance is available.

1.2. Societal and Scientific Relevance

Climate change is an unavoidable development that will increase flood risk at the present moment and in the near future. The Netherlands, which is a densely populated and urbanized country which needs to adjust to living with water, especially in relation to spatial planning. In areas that are assessed as high risk of flood shouldn't be allowed for building. For example, very present is the case in Nijmegen. The river Waal will be get a bypass exactly in the nearby

village Lent which has huge implications for the inhabitants, the infrastructure crossing the Waal at Lent to Nijmegen etc. Therefore the role of spatial planning in flood risk management can't be under estimated.
Furthermore the dominate role of government in the flood risk management in history is interesting in a time, especially in the Netherlands, were privatization in many sectors take place like in public transport and healthcare. In addition the Dutch government wants to cut her expenses while flood risk management requires investments. The involvement of private parties therefore seems to be useful from an economic point of view. In contradiction to this the Dutch government has decided recently to hold on to its prohibition for insurance for flood damage. In run-up to this discussion at government level economic studies showed the economic relevance of involving insurance companies.

Previous studies by Botzen and Van den Berg (2008), Aerts (2009) and Botzen & Aerts (2011) have shown there is a demand for flood insurance in the Netherlands. Furthermore do they stress a need for flood insurance in the Netherlands to cope with flood damage. Also comparisons with other countries have been researched by Botzen and Van den Bergh (2008). Following on to their research indicating systems of flood insurance in other countries, this thesis aims to examine the specific role of the insurance industry to the flood risk policy and management system of the countries in which flood insurance is available. This insight would give a clearer idea if and how to implement flood insurance to reach an effective structure for the case of the Netherlands.

1.3. Structure of the thesis

This thesis will begin with a chapter 2 'setting the scene of Dutch flood risk management'. The aim of this chapter is first to introduce you to the Dutch history and current framework of flood risk management. Secondly does this chapter provide a basis for the comparative analysis carried out in Chapter 5. Furthermore does this Chapter show the societal relevance of this thesis. Chapter 3 will explain the theoretical concepts of the Risk Society on the one hand and the basic concepts of flood risk management and the insurance industry on the other hand. These concepts will provide the framework for analysis. In Chapter 4 the methodology used in this thesis will be explained and points of philosophy, conceptual model, research methods and analysis are discussed. Chapter 5 will show an empirical analysis of the data. This chapter is separated into three parts, one discussing the analysis of the collected data, a second part showing the ouput of data and a third part which links the empirical analysis to the research questions. And finally in Chapter 6 the conclusions and reflections will be presented.

Chapter 2 - Setting the Scene, Dutch flood risk management

This chapters aim is twofold. One is to set the scene and introduce you to the Netherlands, her flood risk community and her flood risk policies. This also shows the societal relevance of this research for the Dutch society. Secondly, this chapter provides a fundament for the comparative analysis in chapter 4 of this thesis.

2.1. Introduction to the Netherlands and her flood risk management

Figure 1 Blue areas are threatened for flooding by sea or rivers (Unie van de Waterschappen 2008)

The level of flood protection along rivers in the Netherlands is among the highest in the world. This is not surprising since the Netherlands experience a high flood risk. The Netherlands is a delta in North-West Europe with a surface of 41.526 km2 and has a population over 16 million inhabitants. The population density is high with 495 inhabitants per km2 (CBS). The Netherlands has a long coastline and is situated in the delta of the Rhine, Scheldt and Meuse rivers. Both the long coastline and the delta of three major rivers makes the Netherlands particularly vulnerable to sea level rise, increasing river discharges and increasing salt intrusion. Besides the vulnerable situation of the Netherlands, also 35% of the land is below sea level. Without flood protection about 60% of the country would be flooded (Deltacommissie, 2008). And even more important 55% of the Gross Domestic Product in The Netherlands is produced in 55% of the land surface area which is also flood prone (Slomp 2012, 13). Therefore flood damage would be large. Estimated flood damage only for the protected economic strong area, South Holland, is 400 billion euro's. (Slomp 2012, 14).

The Netherlands has a long tradition of intensive land reclamation and flood protection (J. Spits, 2010). 'Living with water' as the Dutch say, requires a complex array of authorities that manage the water. As early as the 11th and 12th century, local communities started to organize themselves to manage water systems on regional level (Kuks, 2002). Farmers joined together to optimize the water management for their agriculture land use. The rulers recognized these local groups as competent water authorities and the regional organizations of farmers developed in democratic stakeholder organisations consisting of elected representatives from local farming communities (Kuks, 2002). Until the 19th century these regional water authorities stayed independent from national developments. However, in 18th

century central coordination was needed in order to create new land. In the 16th century windmills were built to reclamate land. This development led to the establishment of a state water authority 'Rijkswaterstaat' (free translation, National Water Authority). Rijkswaterstaat became the leading agency for the large-scale construction of a flood protection infrastructure, like dikes, as well as for large land reclamation projects. According to Kuks (2002, 2) it is this period, the beginning of the 19th century and the start of the monarchy in 1814, where a centralized approach of water management started.

2.1.1. The administrative-political structure of the Netherlands

The Netherlands is usually described as a decentralised unitary state. It has three government layers: the central, provincial and municipal government. Furthermore there is a functional layer of government designated especially for water management, namely the water boards. The Netherlands consist of 12 provinces, each province is divided in a various amount of municipalities. In total there are about 400 municipalities, though merging processes are taking place at the moment (CBS).

The 12 provinces and municipalities have responsibilities related to provincial and local spatial planning and have a role in flood protection in relation to setting the standards for secondary dike systems and construction permits for large infrastructure projects like dikes (Slomp 2012, 35).

At national level the institute of 'Rijkswaterstaat', as central agency for river management, carries out and implements the water policy for the whole of the Netherlands (Janssen, 2008, 350). Rijkswaterstaat was established in 1789 and resides under the Ministry of Infrastructure and Environment. Though, other ministries are involved in policy making as well when it concerns their responsibilities, like for example agriculture and spatial planning (Kuks, 2002, p. 2). Since Rijkswaterstaat is under the command of the national government it receives funding from the Dutch national tax system and from European subsidies. Rijkswaterstaat's primary task is to maintain and manage the large freshwater bodies and the major shipping routes on road and water in the Netherlands (Rijkswaterstaat - Over ons). The water engineering departments of Rijkswaterstaat take care of all state waters and the state water infrastructure which includes the main rivers, canals, coastal waters and estuaries, the territorial seas and the inland IJsselmeer. The provinces have jurisdiction of the regional navigable waters, and municipalities for local waters like harbours and city canal systems. The other waters fall under the jurisdiction of the water boards (Kuks, 2002, 3).

The functional government layer of water boards originates from the local farming communities in the 11th century. The water boards have as sole purpose taking care of water management and flood protection. They carry responsibility for the smaller freshwater bodies like ditches, brooks, canals or regional rivers and have the super-visioning task regarding the polders. Until the beginning of the 19th century people disagreed whether water boards were public or private bodies. In the constitution of 1848 was stipulated that water boards were public organisations (Dicke, 2001, 96). Since, water boards have a democratic structure, have legal rights and have a self-supporting tax system (Janssen, 2008, 350). At the moment 25

water boards exist. Also the water boards have been exposed heavily to merging processes the past decade, taking into account 10 years ago still 55 water boards existed.

Up until the 1950s the four government layers worked pretty autonomously. After World War II the four government layers have been cooperating more than before (Kuks, 2002, 3). Especially in relation to problems that are not restricted to the regional administrative borders, cooperation among the water boards, Rijkswaterstaat, the provinces and municipalities takes place (Janssen, 2008, 351). This cooperation is also required by means of law, see figure 3. Central government takes the initiative in policy making and decentral authorities cooperate by additional policy making and implementation within the national framework.

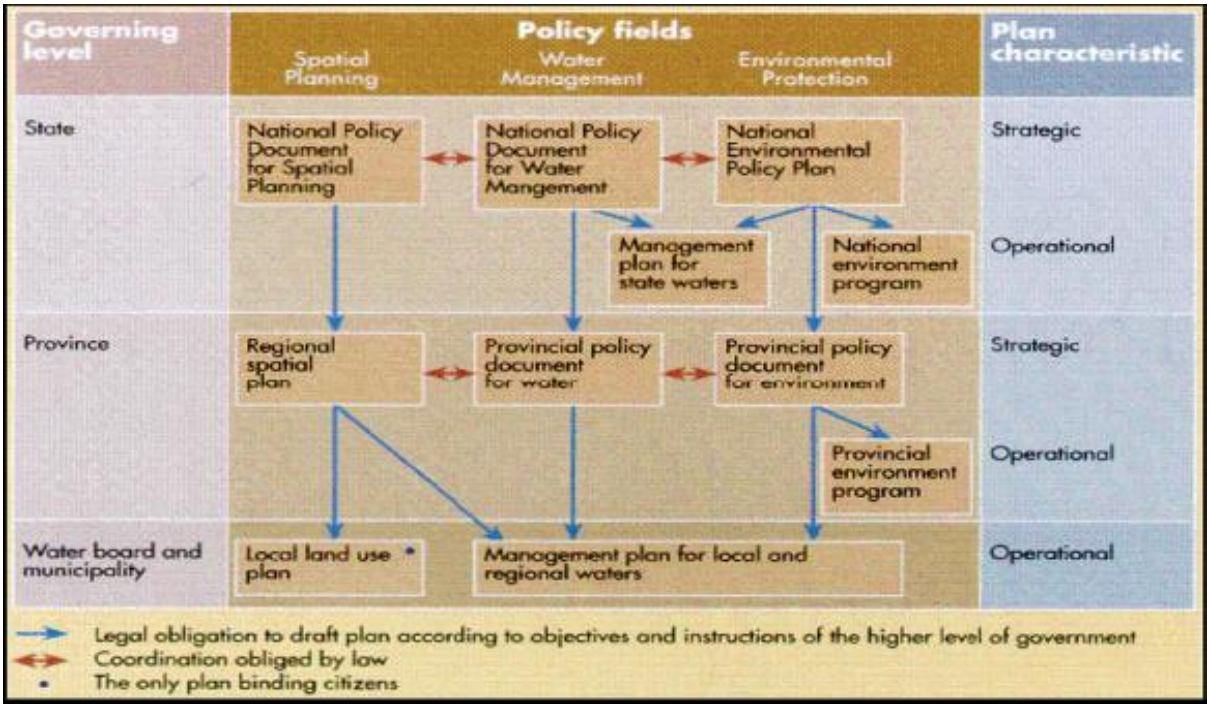

Figure 2 Required co-operation of government layers in the Netherlands (Rijkswaterstaat, 2006).

The average annual costs for flood defence and water management are 5 billion Euros. On average a household has to pay 150 euros in general and regional taxes. (Unie van de Waterschappen 2008)

2.1.2. Implementation and actors

Primary responsibility in the Netherlands for flood protection measures lies with the Rijkswaterstaat and the water boards. However, for the implementation processes they depend highly on many other actors such as municipalities, provinces, water boards, private land owners and NGO's (Janssen, 2008, 352). This results in the Dutch famous consensus culture in which all interest are balanced out. The name of this famous consensus culture even originates from the reclamation projects the Dutch did, they call it the "poldermodel" (Janssen, 2008, 352)).

2.1.3. Legal Framework

The Flood Defence Act (1995) is the most important legal document concerning the mitigation of large- scale flood risks in the Netherlands. This act lays down responsibilities for flood risk management as well as design standards for primary flood defences. On a five year basis all primary flood defences have to be controlled on their 'general hydraulic condition'. The standards can change over time and the Minister of Public Works and Water Management is responsible for issuing these standards. The Provincial Executives are responsible for supervising all primary flood defences within their territories. Also the Water boards play an important role as supervisors of flood defences and they provide information about the status of their flood defences to Provincial Executives (Jongejan 2007, 3).

Jongejan (2007) describes that the Flood Defence Act is a good example of cost-benefit analysis applied in Dutch flood risk management. Design standards for flood defences vary throughout the country. Investments in flood defence are balanced against the discounted expected value of future losses. As a consequence of the economic basis of the design standards for flood defences, the probability of flood varies across dike rings and depend largely on potential economic damage. The most valuable regions are thus best protected. This approach was introduced in the 1950s by the Delta Committee after the devastating flood of 1953 (Jongejan 2007, 4).

In 1995, as reaction to extreme river discharges in 1993 and 1995, the 'Deltaplan Great Rivers' was quickly set. This resulted in the strengthening of 900 km of dikes and levees before the year 2000 (Unie van de Waterschappen 2008). After a few years this Act was incorporated in the Flood Defence Act.

The Calamities and Compensation Act (1998) ('Wet Tegemoetkoming Schade bij Rampen en Zware Ongevallen, or WTS) provides the Dutch legal framework for damage compensation to Dutch citizens in case of severe uninsurable losses. It is a question of solidarity rather than a formal rule that legally sets how much compensation will be paid (article 5 WTS). The level of compensation is thereby highly uncertain. Based on the fact that the WTS also lacks rules and procedures for actual compensation Jongejan (2007) argues that government assistance is likely to be haphazard and dictated by political considerations when disaster strikes, especially since little thought has been given to the question how to deal with multi-billion euro floods. Jongejan (2007) sees the Calamities Compensation Act, as it is now, not as an adequate solution for dealing with large-scale losses caused by floods (Jongejan 2007, 19).

Furthermore of importance for Dutch flood risk management is legislation from the European Union, e.g. the European Flood Risk Directive (2007/60/EC). This Directive requires Member States to assess the (potential) flood prone areas, chart the flood extent and assets and humans at risk in these areas and take adequate and coordinated measures to reduce this flood risk. Furthermore reinforces this Directive the rights of the public to have access to this information and to directly influence the planning process.

In addition to this Directive the Water Framework Directive influences Dutch Flood Risk

Management. The Water Framework Directive focusses, among other things, on aligning flood risk and river basis management plans and availability of assessments, maps and plans for the public (Unie van de Waterschappen 2008).

2.1.4. Policies and instruments

Dutch flood risk management is based on the 'Multi-layer safety concept'. This concept can be separated into three layers and can be retrieved in the described policies and instruments. The first layer pays attention to the basics of flood risk management; flood protection and flood defences. The second layer relates to spatial planning measures that reduce the impact of flooding like stopping development in flood prone unprotected areas or specific building codes. The third layer focus lays on how to respond to a flood and relates to flood alert, evacuation, response and recovery (Slomp 2012, 21).

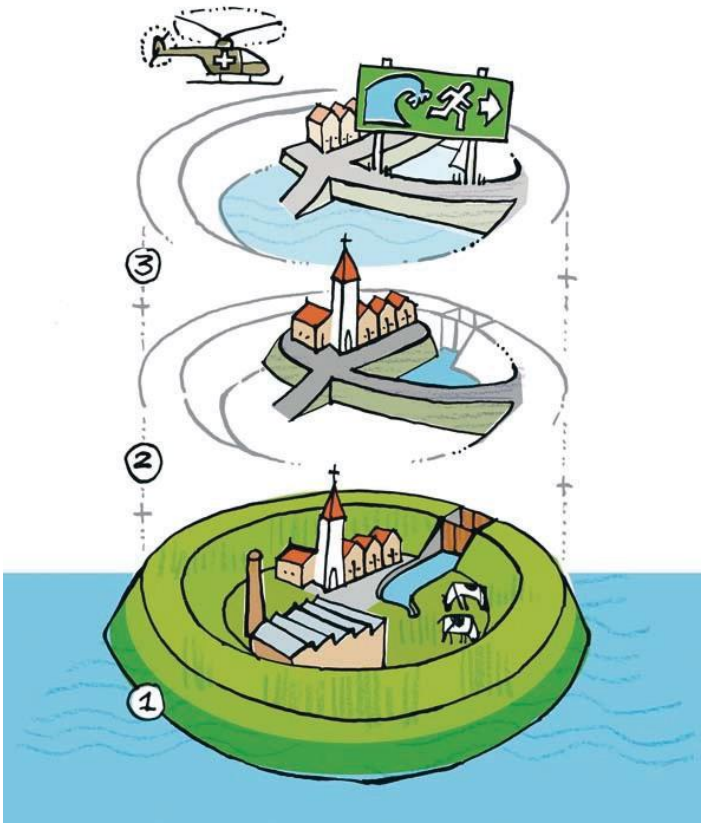

Figure 3 Multi-Layer Safety Concept (Slomp 2012, 21)

The first layer of the multi-layered concept has always been addressed in Dutch flood risk management. Flood risk management in the Netherlands has always focused on prevention by constructing and maintaining dikes. Since 1400 AD, the Dutch started to construct dikes, resulting a closed pattern of dikes. Today, this pattern of dikes is largely unchanged and consists of 53 dike-rings for the whole country (Klijn et al. 2004, p. 142). As a result the river systems in the delta are constrained by embankments into a narrow corset (Spits et al., 2010). The height and strength of the dikes have increased over the course of history. Initially this

meant adapting to the last-experienced flood level. From the 1950s onwards a more scientific approach has been followed. Design and standards for the most primary dikes are legally set in the Dutch Flood Defences Act. These standards are set very strict and are based on a cost-benefit analysis. These standards result for example in the fact that a flood risk for dike ring 14, which has the highest density of population in the Netherlands and is economically highly important, is accepted with a return period of 100,000 years, and this is linked to a to a return period for design water levels of 10,000 years. For less populated areas like the Northern part of the Netherlands, return periods for design water levels are set at 4000 years (Slomp 2012, 38) and the dikes along the main rivers must all be built for a 1/1250 year design flood (Baan & Klijn 2004).

The decades after the worst flood in the Dutch history of 1953 are marked by technological solutions which focussed on flood prevention, with special focus on flood risk from the sea. The developments in flood protection and the lack of serious floods has led to the strong belief among society, that the Dutch are perfectly safe from flooding events. In policy-making the attention moved away from the consequences of a flood, so the third layer of the multi-layered safety was not regarded as important (Bockarjova, Veen & Geurts 2009, Baan & Klijn 2004)

The situation changed when higher water levels arose in the 1990s, the whole system of flood protection came into question. In 1993 and 1995, some areas in the river forelands of the Meuse River were flooded due to high river discharges. Moreover, dike-ring areas along the Meuse and Rhine in the Netherlands were threatened with flooding in 1995. Almost 250,000 people had to be evacuated, because the authorities felt that the dikes would not hold. Furthermore in 1994 and 1998, the western part of the Netherlands was particularly affected by water logging- also known as surface runoff-, problems due to heavy rainfall. The heavy rainfall events in these years resulted in damage to crops and several buildings (Neuvel & Brink 2009). The consequences of these two events lead to the concept of risk being re-introduced as a part of the flood risk management policy in the Netherlands. As a reaction to these events, a dike-reinforcement programme was implemented. The flood events, together with the water-logging events, also triggered a new national flood management policy, which addressed the need for more physical space for water. This is when the second layer came into sight. It was argued that the likelihood of a river flood should also be reduced through spatial measures rather than heightening the dikes. These spatial measures in combination with dike reinforcements, reduce the probability of flooding. Examples of such spatial measures are the removal of obstacles from the floodplains, dike relocation, the restriction of land for construction and commercial activities in the river forelands, the construction of water retention areas and the construction of bypasses or secondary channels to circumvent urban bottlenecks. A new national policy, called the 'Spatial Planning Key Decision Room for the River' and a corresponding implementation programme, provided the basis for the implementation of these measures in a joint effort of the ministry, provinces, municipalities, water boards and non-governmental stakeholders (Most & Wehrung 2005).

Also in relation to the second layer of the multi-layered safety policy in 2003 a new policy instrument was introduced, called the 'Water Assessment' (Watertoets). This instrument is based on the Dutch Flood Defence Act, and was introduced to ensure that water interests were taken into account in spatial plans and decision-making. The Water Assessment intended to connect the different and sometimes divided domains of water management and spatial planning. The Water Assessment tried to improve communication between water managers and the spatial planners (Neuvel & Brink 2009). These policy developments aim at a shift at institutional levels. The government challenges institutions to change their view of 'fighting the water' by adopting a new view of 'living with water' (Wit et al. 2008, 1589).

An equal trend in policy changes took place on European level. The European Commission introduced in 2007 the Flood Risk Directive 2007/60 to protect member states against floods. This directive requires all member states of the European Union to reduce and manage the risks that floods cause for human health, environment, cultural heritage and economic activity. Therefore the member states have been required to carry out a preliminary assessment by 2011 to identify the river basins and coastal areas that are at risk of flooding. The goal of this assessment is that all member states establish a flood risk management plan which focuses upon prevention, protection and preparedness by 2015. All member states have to develop a flood risk policy that fits their own administrative and institutional framework but meets the requirements of the EU Directive. In coherence with Directive 2007/60 in 2009 a new Dutch water management policy was implemented, the National Waterplan (*Nationaal Waterplan*). The new policy didn't only concern the prevention of flooding but also paid particular attention to the consequences of flooding and the impact such events can have on lives, society and the economy. In addition strived this new policy to achieve more awareness of water consciousness of citizens and companies.So flood risk management policy enlarged from only working on prevention to pro-action and to aftercare.

The third layer of the multi safety approach addresses flood alerts, evacuation and response and recovery measures. The flood alert system has developed itself over the years. The opening of the Water Management Centre of Rijkswaterstaat in Lelystad in 2012 is an important step in the professionalism of flood forecasting and alerting. Flood evacuation and response to floods is subsumed under Dutch crisis management in general (Slomp 2012, 33). Part of the recovery strategy of this third layer is financial compensation. In the Netherlands this is arranged via the Calamities Compensation Act, which is explained in more detail under 2.1.3.

2.1.5. Current developments

Climate Change

At the moment the Netherlands faces a new challenge in fighting water, climate change. Climate change causes, because of global warming, sea-level to rise and an increase of peak discharges in many river basins. At the same time, patterns of development in areas of flood risk combined with changing demographics (including rapid urbanization in developing countries and ageing populations in developed countries) are increasing overall vulnerability

(Keenan 2012). Tol et al. (2003) explains that the implications of climate change may be quite severe for river deltas such as the Netherlands. The majority of general circulation models project winter precipitation to increase in the Rhine river basin. This would increase the risk of river floods. Tol et al. (2003) continues his argument by saying that earlier snowmelt in the Alps could further enhance river floods and sea level rise would slow the outflow of water. The Royal Netherlands Meteorological Institute has calculated that sea-level will rise with 15 till 35 cm within the next 40 years and 30 till 70 cm in 2100 (Klijn et al. 2007). River discharges will increase in the winter and decrease in summer. In relation to this the peak dischargers will take place more often and the discharges will increase (Klijn et al. 2007). However, in relation to peak dischargers in river basins, the Netherlands depends highly on measures neighbouring countries take. The Delta Committee has presented an advice in 2008 about the protection of the Netherlands against the effects of climate change. The advice was concentrated on more sustainable measures and an in tenfold improved safety level (Unie van de Waterschappen 2008). In addition to technical engineering measures for probability reduction, such as dikes, dams and storm surge barriers, there is an increasing awareness of the need to develop measures to reduce the potential impacts of flooding, in particular for the flood-prone areas in the west.

Socio-economic factors

The past 60 years the number of inhabitants is doubled, just as the number of houses. Most of the population growth has taken place in the cities, consequently urban areas increased and rural areas have decreased. The highest urbanisation has taken place, and will take place in the near future the western part of the Netherlands, the Randstad (Unie van de Waterschappen 2008). The Unie of the Waterschappen (2008) addresses the problem of discharge of storm water runoff because of increasing urbanisation. Besides practical problems with the discharge of water, an increase of inhabitants and houses increases the number of potential human and economic losses.

2.2. Dutch Flood Insurance

Private flood insurance is not available in the Netherlands. Aerts and Botzen (2011) open their article by saying that the Dutch should develop a more comprehensive strategy to cope with climate change, which could include improved evacuation planning, implementing damage mitigation measures, and important for this thesis, introduce financial risk-sharing arrangements. Currently, financial arrangement is arranged by the government via the WTS -Calamities and Compensation Act- (Wet tegemoetkoming Schade bij rampen en ongevallen, 1998). This act creates uncertainty about whether and how much the flood damage will be compensated. Moreover the WTS is an ad hoc arrangement for which no reserves have been made as argued by Aerts and Botzen (2011). Botzen and Van den Berg (2008) argue in relation to this that the existence of public compensation crowds out private market alternatives. Therefore, flood damage is being carried by the public sector or by households and businesses in case the public sector decides not to grant compensation. A rationale behind compensation by the government instead of private insurance is that the government is

regarded as liable for flood damage because of its responsibilities for dike maintenance. After the floods in 1953, 1993 and 1995, a public view existed that the government was partly liable for the incurred damage, due to insufficient investments in coastal protection and dikes. Furthermore, feelings of solidarity among the Dutch justify damage compensation through tax revenues.

The judgement whether compensation is provided, as well as the determination of the amount of compensation provided, lies with the government when the disaster takes place. These decisions are therefore influenced by political will and public pressure, which can be regarded as arbitrary and subjective (Botzen & Van den Bergh 2008, 416). Existence of the Calamities and Compensation Act would therefore demotivate the private sector to be active in compensating flood damage.

This was the case in the Netherlands until recently. Since September 2012 private flood insurance is available in the Netherlands (Neerlandse Verzekeringen). And lately the Dutch Association of Insurers has called the government to set an obliged insurance for flood damage (Dool 2013, Verbond van Verzekeraars 2013). The Dutch Association of Insurers (Verbond van Verzekeraars 2013) has proposed a structure in which every Dutch household is obliged to have flood insurance. In relation to this proposal the Authority of Consumer & Market has published a negative view last June. However a final say rests with the Dutch central government (Verbond van Verzekeraars 2013b).

As shown in the previous, in the past few years a heated discussion about flood insurance is taking place in the Netherlands. In the discussion mainly attention is being paid to the economic consequences in relation to recovery of flood damage. But to be able to conduct this discussion effectively, in my opinion it is necessary to broaden the scope of the discussion and include the impact of flood insurance on flood risk management, as of great essence for the Dutch society. Therefore this thesis is aiming to identify the input of the insurance industry on flood risk management based on experiences abroad.

Chapter 3 - Theoretical Framework

3.1. Risk Society and Flood Risk Management

In this thesis the answer to my research question , *'What role can insurance companies play to contribute to Duch flood risk management based on experiences abroad?* 'will be structured by looking at the current society via the theory of Risk Society (Beck 1992). The theory of Risk Society in short discusses a new global society in which control over risks is the major dividing line within society. Risks that are not under control create a residual risk society, which equals an uninsured society (Beck 1999, 53). This theory is useful for this research because flood risk management and adaptation to climate change imply a pressure on society to control flood risk.

Secondly requires this research an explanation of the basic concepts that will provide input for criteria for analysis. Concepts like the definition of flood risk management, the concept of risk and many more as will be discussed in this chapter.

3.1.1. Risk society and Natural Hazards

Ulrich Beck (1992) has called the new 'global society' of the 1990s a 'risk society', which is the result of the creation of the scientific and industrial development of the modern society. Beck argues that modern society has become a risk society in the sense that it is increasingly occupied with debating, preventing and managing risks that it itself has produced (Beck 2006, 332). With modern society Becks' focus is mainly upon the western developed countries. The underlying propositions of Beck's theory of risk society is that due to the successes of the welfare state, in reducing economic scarcity, social class and wealth accumulation, the defining parameters of social stratification are dissolving. Instead, social cleavages are increasingly coming to be defined by the distribution of technological risks.

The argument is that modern societies, due to processes of industrialization and rationalization, have learned to control natural environment and protect themselves from ravages. Modern societies have succeed in bringing under control contingencies and uncertainties for example with respect to accidents, violence and sickness. But also natural hazards appear less random than they used to. Although human intervention may not stop earthquakes or volcanic eruptions, they can be predicted with reasonable accuracy. In modern societies natural hazards are anticipated upon in terms of structural arrangements as well as of emergency planning (Beck 2006, 332). The used term 'anticipation' characterizes Beck's modern society. Beck emphasizes the distinction between risk and catastrophe. Risk doesn't mean the same as catastrophe, but risk means the anticipation to catastrophe. Therefore in a modern society innovative forms of approaches are required to deal with complicated features, chain effects an irreversibility's of contemporary crises (Beck 1992). Modern societies require a systematic method of dealing with these hazards and insecurities generated, this is the concept of risk. To pursue the concept of risk institutional changes can be needed. Risk society demands an opening up of the decision-making process, not only of the state but

private corporations and the sciences need to open up as well. It calls for institutional reform of those 'relations of definition', the hidden power-structure of risk conflicts. This could encourage environmental innovations and help to construct a better developed public sphere in which the crucial questions of value that underpin risk conflicts can be debated and judged (Beck 1999,5)

Another threat acknowledged by Beck in the Risk Society is 'human morality'. According to Ekberg (2007) human morality requires the responsibility of humans for the consequences of risk created by human innovation. In relation to flood risk management this is an interesting discussion. If an embankment or a dam breaches and the result is the flooding of land and property, one might argue that human activity has created the risk by a lack of risk management. On the other hand it is also possible to blame nature. Therefore Ekberg (2007) says it is one of Beck's major fears that there is a diffusion or denial of responsibility within the network of knowledge-producing institutions of society resulting in a collective avoidance of responsibility for risk management. According to Ekberg (2007) it is Beck's concern that our collective safety, security and survival are compromised because the anonymous and cumulative risks are characterized by organized irresponsibility, unaccountability and uninsurability. Explained by Ekberg (2007, 349), referring to Beck (1998), "Organized irresponsibility 'explains how and why the institutions of modern society must unavoidably acknowledge the reality of catastrophe while simultaneously denying its existence, covering its origins and precluding compensation or control'. This organized irresponsibility, combined with the failure of the social institutions of the first modernity to govern effectively the unfamiliar and unlimited risks emerging in the second modernity, is exemplified and amplified by a failure of insurance companies to offer insurance as protection against risk, or to offer compensation to victims of risk events. As a consequence, the risk society is a post-insurance society, or as Beck proclaims: 'the residual risk society has become an uninsured society' (Ekberg 2007, 349)."

3.1.2. Risk Society & Insurance

Beck (1995) characterizes the Risk Society as an 'uninsured' society. Ekberg (2007) explains that crossing the boundary between insurable and uninsurable is what differentiates risks from threats and according to Beck, it is the economy that reveals where this boundary is located. Where private insurance disengages and the financial risk of insurance appears too large, 'predictable risks' are transformed into 'uncontrollable threats'. Thus, if a private insurance company offers insurance cover, then a risk is a risk, but if private insurance is denied, a risk is a threat. (Ekberg 2007, 349)

Employing a technical approach to risk, the insurance industry emerged during classical modernity as a collective solution to uncertainty and risk. Ekberg (2007, 349) explains by quoting Giddens (1998) that, risk and insurance share a common origin in modernity's aspiration to control nature, control risk and control the future. Insurance is oriented towards assessing, quantifying and spreading risk. Insurance cannot prevent the occurrence of a risk event, but it can lessen the harm by spreading the cost spreading risk.

Furthermore insurance needs to develop. Ekberg (2007, 350) sees as key challenge for decision-makers in the risk society to design new forms of insurance that will replace the ineffective forms of actuarial insurance that operated in primary modernity. According to Ekberg (2007, 350), the processes of defining risk from non-risk, managing risk, assessing risk damage, assigning responsibility for preventing risk, arbitrating risk disputes and compensating casualties of risk events need to be reconstructed into a form that is appropriate for the greater intensity and the broader spatial, temporal and demographic distribution of technological risks. In the paragraphs below these concepts will be explained in detail and form criteria for assessing the role of insurance companies in flood risk management.

3.2. Key Concepts, Risks, Floods and Management Systems

3.2.1. Risk concept and risk management

Generally risk is being defined as the probability of an event multiplied by the potential impact en scope of the potential harm. With regard to natural disasters, risk is more specifically described as the probability that natural events of a given magnitude and a given loss will occur.

Beck (1999) defines risk as the modern approach to foresee and control the future consequences of human action, the various unintended consequences of radicalized modernization. Beck proceeds that risk is an institutionalized attempt, a cognitive map, to colonize the future (Beck 1999, 3-4). Risks presuppose decisions and therefore risk is intimately connected with an administrative and technical decision-making process (Beck 1999, 3-4) . This decision-making process is structured by a risk assessment process and followed by the risk management process, these two steps will be discussed further below.

Important in relation to the concept of risk is the perception of risk. The perception of risk creates the awareness of risk and the attitude towards it. This discussion referred to by Beck (2006) has two sides. Beck (2006) explains: ‘On the hand, the threat of risks is created by techniques of visualization, because without symbolic forms, without mass media etc. risks were not present and therefore not threatening. On the other hand the promise of security made by scientist, companies and governments based on risk management processes implies that the real danger lies in the policy-oriented risk assessment. The risk then involves hidden politics, ethics and morality which influences the risk management and assessment processes instead of the natural hazard itself .’ Therefore Beck (2006) states that risk is not reducible to the product of probability of occurrence multiplied with the intensity and scope of potential harm (Beck 2006, 333) . However, in practice the general definition of risk is based on the formula of the probability of risk multiplied by the potential scope of the potential harm.

3.2.2. Risk & Risk Management

As referred to before, risk means the anticipation of catastrophe. This anticipation is structured in a risk management process. More specifically dealing with spatially relevant risks like the risk for natural hazards has two components: risk assessment and risk management according to the ESPON project (Schmidt-Thomé 2006, 162) (see figure 4).

The risk assessment is the result of the assessment process of risk analysis and risk evaluation. ESPON describes the risk analysis as the result of the hazard and the vulnerability analysis. This analysis can be understood as a description of certain hazards, their elements, frequency, magnitude of occurrence (hazard component) and their impacts (risk component) (Schmidt-Thomé et al. 2006, 162) . Furthermore is risk evaluation concerned with determining the significance of the analysed risks for those who are affected. It therefore includes the element of risk perception. Risk assessment in general follows analytical procedures (Schmidt-Thomé et al. 2006, 162).

Secondly, the risk management process is defined by ESPON as adjustment policies which intensify efforts to lower the potential for loss from future extreme events (Schmidt-Thomé et al. 2006, 162). Such adjustment policies consist of a broad range of guidelines, legislation and plans that help to minimize hazards and vulnerabilities (Schmidt-Thomé et al. 2006, 162). In general these steps of risk analysis, risk evaluation and risk management are used as framework to manage natural hazards, but they can also be used to analyse policy in relation to risk management.

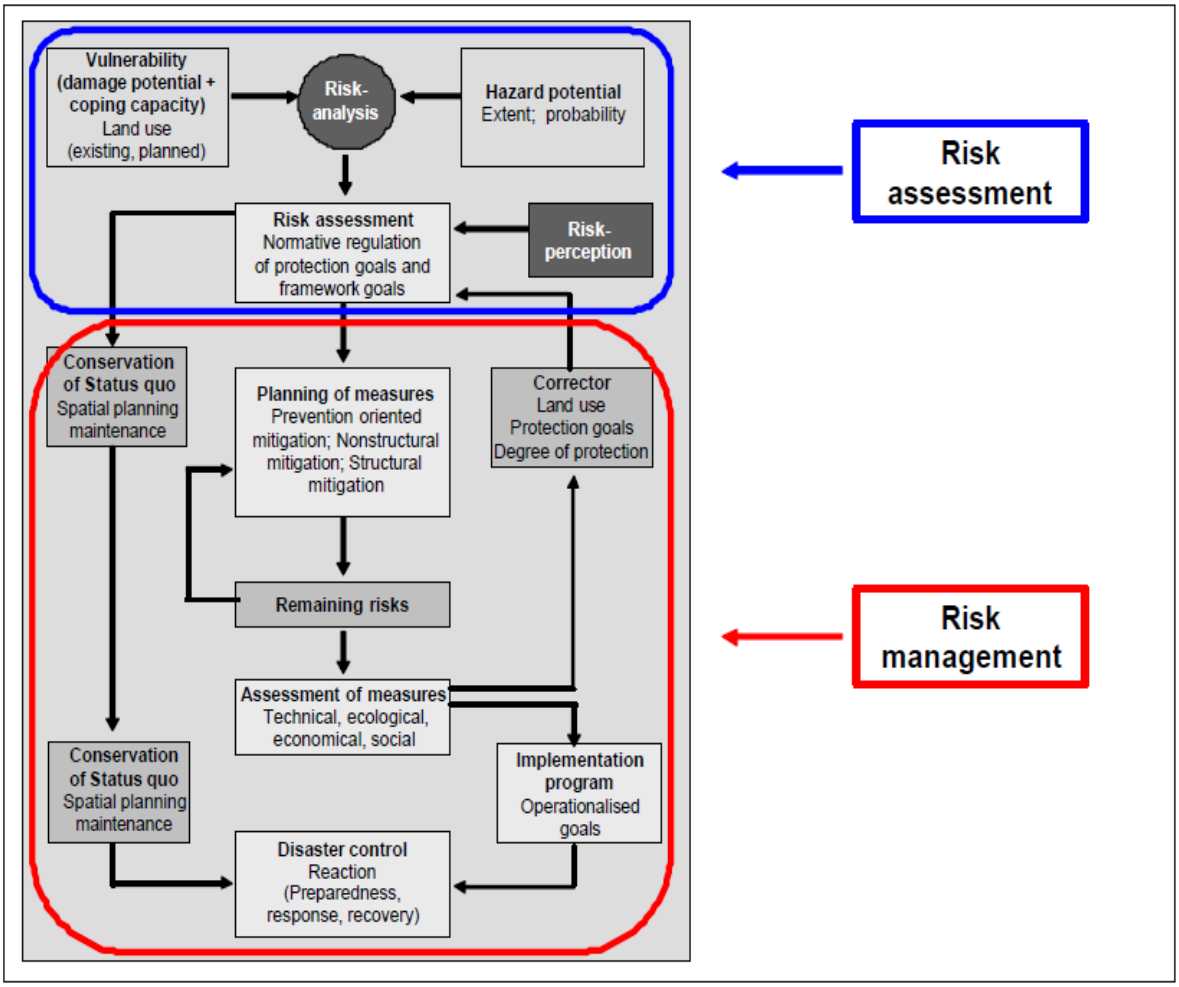

Figure 4 Overview Risk Assessment & Risk Management process (Schmidt-Thomé et al. 2006, 162)

3.2.3. Definition 'flood'

The EU Floods Directive defines the term 'flood' as "the temporary covering by water of land not normally covered by water. This includes floods from rivers, mountain torrents, Mediterranean ephemeral water courses, and floods from the sea in coastal areas, and may exclude floods from sewerage systems". FloodSITE distinguishes in relation to this definition three elements (Bruijn et al. 2009, 13):

- Time: Water permanently covering land, such as in a lake, is not a flood.
- Geography: The water must cover land, by temporary occupancy (although this may be for weeks or months).
- What is normal: Water is usually confined to a river, a lake or a sea. A flood is water that breaks free from those confines.

A flood is only not 'normal' in so far as it occurs infrequently. This does not mean that flooding is unnatural: all rivers cover areas away from their channels with their water for some of the time (on their floodplains), and low-lying coastal areas are often flooded quite naturally during storms. Floods, whether normal or extreme, may be considered to belong to the perfectly natural behaviour of rivers, lakes, estuaries and the sea. But they may potentially

cause harm to society, and that is where the term 'hazard' comes in. A hazard is a physical event or human activity with the potential to result in harm. In flood risk management, we are only interested in floods which constitute a *hazard.* A flood is a 'natural hazard' when it causes 'a temporary covering of land by water outside its normal confines'. [1]

Influence climate change on flood risk

An increase in natural hazards is a way in which climatic extremes may become manifest. The ESPON Natural Hazards project of 2006 predicts that flood probability can change if the sea level and/or the precipitation regime change, or if the characteristics of the catchment (source area) or river valley (pathway area) change from which floods originate or by which they are conveyed (Schmidt-Thomé et al. 2006, 110–115). These developments can influence the amount of discharge or the shape of the discharge wave which runs through the valley. Or as described by ESPON, because of sea levels rise sea walls or dune systems can be overtopped or breached and many other examples are to be found if precipitation and sea-level increase (Schmidt-Thomé et al. 2006, 110–115). ESPON therefore asks for adequate action since many flood risk mitigation measures take years or even decades to implement (e.g. embankments, dams, flood barriers or sophisticated flood warning systems). Especially since the implication is that one has to plan these for the flood probabilities of the future, not for what has been experienced in the past. Complex modelling may be required to determine the likely probabilities of future floods (Schmidt-Thomé et al. 2006, 110–115). It might even be, in relation to my reference to Beck (1999) earlier, that institutional changes can be needed to encourage environmental innovations, debate and judgment of risk conflicts created by climate change.

3.2.4. Flood Hazards and Risk Management

Pistrika and Tsakaris (2007) describe flood risk as the likelihood of a flood event together with the actual damage to human health and life, the environment and economic activity associated with that flood event. In this context, Pistrika and Tsakaris (2007, 6) therefore consider flood risk as the actual threat and as the real source of flood hazard to the affected areas.

Flood risk management is based upon calculated flood risk. Flood risk therefore is defined by Meijerink as the probability of a flood event multiplied by the potential impact of flooding (Meijerink & Dicke, 2008, 499). Flood risk management is an approach to dealing with flood risk based on the notion that risks cannot be taken away entirely but only partially and always at the expense of other societal goals. Therefore the aim of flood risk management is to reduce the consequences of floods in ways that balance this aim against other considerations (Bruijn et al. 2009, 9). Flood risk management aims at preventing floods and/or preventing the exposure of people and property to flooding. This includes lowering the probability of flooding as well as reducing the vulnerability of the society in flood-prone areas. Consequently, flood risk management may involve a large number of measures, for example

[1] Please see the ESPON Natural Hazards project 2006 for a definition about different types of floods (ESPON and Schmidt-Thomé 2012, 33) and FloodSITE (Bruijn et al. 2009, 15)

flood defense measures, flood control measures, but also spatial planning and measures aimed at lowering the vulnerability of people and property. Different measures are used en combined which makes flood risk management not a one-off activity. According to FloodSite it is a continuous process, characterized by repeated activities like the analysis of the flood risk, consideration of measures and policy instruments to reduce the risk, making policy decisions, implementing measures and instruments, monitoring their effects, etc (Bruijn et al. 2009, 23).

Oosterberg, citated by Meijerink and Dicke (2008) distinguish three different strategies of flood risk management: hazard reduction, vulnerability reduction and exposure reduction. Hazard reduction is the most traditional strategy of flood risk management. Hazard reduction aims to keep floods away from urban areas. By means of dams, dykes, levees, storm surge barriers etc. water managers try to fight the water. However, new policies, in relation hazard reduction aim at 'living with water' and 'work with nature'. These policies are characterized, in contrast to the more traditional policies of hazard reduction, by soft engineering or non-structural approaches, most notably the creation of more space for water (Meijerink & Dicke 2008, 500). These new flood risk management strategies have developed because of failure of dykes and dams and the increasing influence of ecologists and biologists in the flood policy domain according to Meijerink and Dicke (2008). The second strategy of flood risk management distinguished by Meijerink and Dicke (2008) aims at vulnerability reduction of floods. This strategy contains warning systems, careful planning of evacuation routes and adjustments to houses and infrastructure. By doing so urban areas should be better prepared for flooding. The third strategy, exposure reduction, relates to policies that aim at reducing the exposure to flooding. These policies focus on for example re-locating properties or by inhibiting new developments in flood prone areas (Meijerink & Dicke 2008, 501). A compensation strategy is also of importance for exposure reduction, this can be achieved by flood insurance but also for example by Disaster Funds from governments.

Besides, the three strategies, a related policy response to climate change and increasing flood risk is the development of the '*flood risk approach*'. This approach adjusts safety standards to the risk of flooding, instead to the traditional probability of flooding. This results in the fact that potential damage of a flood event is taken into account in decision making on safety standards. This has the consequence that urban areas are better protected than sparsely populated areas (Meijerink & Dicke 2008, 501). All three strategies can also be seen in the multi-layer safety approach of Dutch flood risk management as discussed earlier.

3.3. Introduction to the Insurance industry

3.3.1. The insurance industry

The insurance industry is a complex risk-sharing system. Many players are involved like insurers, reinsurers, retrocessionaires, insurance brokers, agents and regulators. Insurers, reinsurers and retrocessionaires are all risk carriers as they are the ones who put capital at risk and ultimately pay claims. Insurance agents and insurance brokers provide services to insured's and insurers, with agents representing insurers, and brokers representing insured's.

Similarly, reinsurance brokers and reinsurance underwriting agents provide services to insurers, reinsurers and retrocessionaires. The common denominator for agents and brokers in the system is that they are all intermediaries who act as channels in spreading risks. There are also other service providers (e.g. catastrophe model vendors, loss adjusters, rating agencies), but they are not directly involved in the risk-sharing process.

To increase risk sharing insurers act on the capital markets. Insurers underwrite risks for which they assess premiums that should, in theory, reflect risk experience and exposure. These premiums are pooled and become part of a fund of financial assets, which insurers invest to generate additional income to enhance, among others, their ability to meet their obligations to policyholders (i.e. insurance claims). Therefore, aside from being risk managers and risk carriers, insurers are also institutional investors (Insurance Working Group UNEP FI 2009, 21). As noticed by the UNEP FI Insurance Working group, especially over the last two decades, the insurance industry felt the need of issuing insurance linked securities (e.g. catastrophe bonds). Risk carriers have transferred peak risks in their portfolios to the capital markets by securitizing, for example, their accumulated risk exposure in a specific territory due to natural hazards such as windstorm, flood or earthquake. Because this risk-sharing system and the capital markets are of great importance for the functioning of this risk-sharing systems the issuing of catastrophe bonds is supervised by regulators (Insurance Working Group UNEP FI 2009, 21).

3.3.2. Natural Hazards/ Flood risk as (social) product and the role of insurers

In risk management, and even more in the insurance industry risk is being materialized. Risk is already defined earlier by the product of hazard potential* vulnerability or to say more simplified, the probability of an event and the impact of the event. Risk therefore could also be defined as the expected loss. The expected loss relates to the damage which could be caused based on the product of hazard potential and vulnerability. Damage in this sense applies to build structures, the environment and the economy in general as well as to human life (Schmidt-Thomé et al. 2006, 116). In relation to the materialization of risk, economic value is being granted to damage that is material but also non-material like human life.

Related to the concept of the risk society is that risk and responsibility are intrinsically connected. To whom can responsibility (and therefore) costs be attributed? Or not, if no one takes responsibility (Beck, 1998). In relation to this Mills (2005) describes that insurance is part of a broader public-private patchwork for spreading risks across time, over large geographical areas, and among diverse social and commercial communities. Not all natural hazards can be are insured. Therefore, in some cases (e.g., flood, crop) public and private agencies share the risk. That is taking responsibility of public and private agencies together. Mills is also interested in the role of insurers in relation to climate change and the increase of natural hazards. Mills (2005) is in doubt. He considers insurers may rise to the occasion and become more proactive players in improving the science and crafting responses. Or, they may retreat from oncoming risks, thereby shifting a greater burden to governments and individuals.

3.3.3.(Un)Insurability of flood risk

The UNFCCC distinguishes two conditions for the insurability of a risk (Linnerooth-bayer, Mace, and Verheyen 2003, 9). Stated is that a risk is insurable if it meets two conditions: (1) insurers must be able to identify and quantify the risk, that is, to estimate the chances of the event occurring and the extent of losses likely to be incurred, and (2) insurers must be unrestricted (unregulated) in setting premiums.

Similar to the UNFCCc, Botzen and van den Bergh (2008) determine the same two conditions that need to be met before a risk can be regarded as insurable. First of all it must be possible to estimate the probability of occurrence of the event, as well as the extent of losses that the insurance company will incur under different levels of coverage. This first condition is challenging in relation to floods. Floods occur with a low frequency and potential damage is difficult to estimate. Especially having to deal with uncertain climate change scenarios makes it more problematic to measure risk. On the other hand if a risk is precisely quantified it is also not insurable, because exactly knowing risks restricts the possibility for diversification of risks (Tol 1998, 259).

Secondly, as also distinguished by the UNFCCC, insurance companies need to be able to quantify risk and be unrestricted in setting premiums. Insurance companies have to be able to set premiums for each customer or class of customers. This can be hard to determine in relation with the difficulty of estimating the risk. Though, this condition can be met since premiums and policies can be adjusted on annual basis which makes insurance companies flexible to react to changing surroundings according to Botzen & Van den Bergh (2008, 419).

Furthermore, complementary to the above mentioned conditions is the need of insurers to be able to diversify risks. This spreading of risk is the basis of insurance. By raising premiums from diverse groups of people and risks premiums and actual compensating can be spread. This prevents insurance companies having to pay out all insured's at the same time. In respect of spreading risk, an all natural hazard insurance is advocated above a flood-only insurance.

A final criterion should be that there is a demand to insure the risk. This is related to the risk perception, and the height of the premiums in relation to the expected damage. If there is no awareness of risk people might feel safe and think they don't need the insurance. Another possibility rises if premiums are too high in relation to the perception of the damage of the risk.

3.3.4. Role Insurance companies in Risk management

Mills (2005) sees the availability and affordability of insurance as grist for economic development and the financial cohesion of society, as well as security and peace of mind. In coherence to this The United Nations Environmental Project Financial Initiative describes that insurance is more than only a risk transfer mechanism to compensate losses, but is also a risk management mechanism because insurers carry out loss prevention and loss mitigation measures in conducting their business (Insurance Working Group UNEP FI 2009, 20).

Ericson and Doyle (2003 & 2004) have shown in their books that the private insurance industry works with the state to spread the costs of risk and provide security. According to Ericson and Doyle the insurance industry also has regulatory power next to the state and mobilizes private security systems. Industry associations can regulate the insured through the contract. The insurance industry forces policyholders to implement securities intended to provide an efficient level of prevention and thereby minimize actual harm and the future cost of harm. Furthermore the insurance industry can use her assets to compensate losses for which the state might otherwise be compelled to pay for. And last but not least the insurance industry is information rich. Databases on policyholders and their assets are used for a wide range of surveillance and control functions (Ericson & Doyle, 2004, 3-4)

Acknowledged by the UNFCCC is that there has been a great deal of excitement about the potential of insurance and other forms of risk transfer for hedging the risks of extreme weather-related and other disasters facing developing countries. Governments carry a large and highly dependent portfolio of infrastructure assets, some of which are critical for restoring economic growth, and for the same reason as firms they may wish to reduce the variance of their disaster losses by diversifying with insurance and other risk-transfer instruments. According to the UNFCCC this strategy may have the added value of enhancing foreign investor confidence. A country, however, is importantly different from a firm since most governments can pass their infrastructure losses on to taxpayers. In theory, governments are thus less risk averse than firms, and risk aversion is the main justification for paying the additional costs for insurance (Linnerooth-bayer, Mace, and Verheyen 2003, 23).

The added value of insurance can be more specifically specified. Botzen and Van den Bergh (2008, 417) deem insurance capable in stimulating risk spreading, segregating risk and limiting catastrophe damage by loss-reducing incentives and monitoring. They consider insurance has specific characteristics that make it a potentially useful instrument to stimulate the adaptation of firms and households to climate change losses and therefore advocate a role for insurance companies in relation to natural disasters. In relation to Botzen and Van den Bergh Crichton (2008) distinguishes very specific actions in which insurers can be of help in reducing flood risk:

1. Assistance with identifying areas at risk.

2. Catastrophe modelling.

3. Economic incentives to discourage construction in the flood plain.

4. Collection of data on the costs of flood damage to feed into benefit cost appraisals for flood management schemes.

5. Promotion of resilient reinstatement techniques.

6. Promotion of temporary defence solutions.

An important note made by Crichton (2008) is that insurances can only help a society to a

certain extent. This depends on how flood insurance cover is arranged, how sophisticated the country's insurers are in mapping flood risks and how much the insurers are regulated by government. Crichton (2008, 117) warns for too much government involvement because the more insurers are regulated by the government the less the insurers can use market forces to manage risk.

However, Kunreuther (2001) suggest ways that the public and private sectors can work together to reduce future losses from natural disasters. Specifically three public private partnership programs are proposed by Kunreuther that can encourage cost effective risk mitigation measures (RMMs). These RMMs are considered to be also applicable on flood risk management (Kunreuther 2001).

These RMM's are:

1) Building codes

All financial institutions and insurers who are responsible for these other properties at risk would favour building codes to protect their investments. These building codes can be issued by law or by conditions for insurance or mortgages.

2) Premium reductions linked with long-term loans for mitigation

Premium or tax reductions for undertaking loss prevention methods can be an important in flood risk management. A first step in encouraging property owners to adopt these measures. The basic rule in this case is a simple one: if the premium or tax reduction is less than the savings in expected claim payments due to mitigation, it is a desirable action for the insurer or government to promote the measure.

3) Broadening protection against catastrophic losses.

Advances in information technology have led to the development of sophisticated hazard simulation models that allow insurers, re-insurers, and financial institutions to estimate the probability and losses from natural disasters. The expertise about risks therefore increased significantly.

The effect of the measures highly depends on the structure in which insurance is made possible by governments. In relation to this Crichton (2008, 119) refers to four structures of government involvement in relation to compensation of damage caused by flooding.

1. No state compensation for citizens (there might be grants for infrastructure repair) e.g. UK

Noted is by Crichton (2008) that this option can cause slow recovery if there is a lack of private initiatives, but if private insurance is available; this is encouraged.

2. Public procedures to provide compensation in hardship cases e.g. the Netherlands

In certain cases the government will provide compensation of flood damage but no private insurance is available. Crichton is not very in favour of this option because he doesn't regard

the state capable of good compensation assessments and effective administration. In this option there is generally no private insurance available.

3. *State reinsurance e.g. Belgium*

In these situations cover is based on individual private insurance policies and the state is only involved as reinsurance-provider. This option is quite solidary, because people who in live in safe areas are in effect paying for the risk reduction measures of others.

4. *National Flood Insurance Program (NFIP) in the U.S.A.*

The exceptional case of USA offers a public –private partnership in compensating flood victims. Private insurance companies provide the cover and claims handling service in almost all cases but pass the premium on to the government and recover the claims costs from the government. Crichton (2008) criticizes this option because premium is expensive and average take up is only around 50 per cent.

3.4 Conclusions

Within the view of the Risk Society anticipation to risk is of great importance. In practice this anticipation takes place via risk assessment and risk management processes. Besides the need for anticipation, it is indicated a risk becomes controllable if insurance is available. In relation to this it is stated that processes of defining risk, managing risk, assessing risk damage, assigning responsibility for preventing risk, arbitrating risk disputes and compensating casualties of risk events need to be reconstructed into a form that is appropriate (Ekberg 2007, 350). In respect of this Crichton (2008) has distinguished four types of structures (no state compensation, public compensation, state reinsurance and the NFIP) .

Within these existing structures of compensation by use of Ericson & Doyle (2003,2004) Botzen and Van den Bergh (2008), Crichton (2008) and Kunreuther (2001) different roles of insurance companies can be distinguished:

1) Spreading Risk

Risk spreading by spreading costs is the basic function of insurance and required to be able to insure risks.

2) Providing Security

The insurance industry uses her assets to compensate losses. By spreading costs house owners feel financially protected by the availability of flood insurance. Security can also be provided for example by building dikes.

3) Regulatory power

Industry associations can regulate the insured through the contract. The insurance industry forces policyholders to implement securities intended to provide an efficient level of prevention and thereby minimize actual harm and the future cost of harm. Cooperation with

the public authorities (governments) are necessary. Mentioned examples by Kunreuther (2001) are building codes or requirements for mortgage lending. Furthermore the industry can exert power as one of the stakeholders involved in flood risk management to the government.

4) Modelling and Identifying Risk

To be able to set premiums insurance companies need to model and identify the risk, therefore the insurance industry is information rich. Databases on policyholders and their assets can be used for a wide range of surveillance and control functions.

5) Providing loss-reducing incentives

In line with role 3, Regulatory power, the insurance industry can influence behaviour of people by setting loss-reducing incentives only in a more voluntary way. Homeowners can choose to lower their premiums by mitigating to risk; this can imply mover to safer grounds which will result in lower premiums or smaller adaptations like moving the washing machine upstairs.

As Crichton (2008) has indicated, the role of insurance companies depends on the involvement of the government. Therefore for this thesis it is of interest which roles of insurance companies, as distinguished, are being fulfilled in the structures in which flood insurance can be arranged to be able to identify an effective structure for the Netherlands.

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Chapter 4 - Methodology

This chapter will pay attention to the methodology which includes the applied research philosophy, conceptual model, research methods and analysis used to structure this thesis. The theoretical framework discussed in the previous chapter is important for the initial argument of the study, the framing of the conceptual model and the research methods and should therefore be interwoven with the methodology.

4.1. Research philosophy & research design

My research philosophy originates from the interpretive methodology (Saunders et al. 2009). This methodology is most appropriate for this thesis because of the social constructivist notion. This becomes very clear by the application of Beck's Risk Society. This theory shows the current 'society' being constructed as risk society. This view on reality is a social construction. In this thesis the aim is to understand the function of flood insurance in flood risk management within this constructed reality of the Risk Society.

The main research question, *'What role insurance companies can play to contribute to Dutch flood risk management'*, relates to a new question. Previous research paid attention to structures of compensation of flood damage, but doesn't or slightly pass the subject of a contribution to the flood risk management and its impact on spatial planning. Therefore this research is exploratory and descriptive at the same time. This research asks new sorts of questions in relation to the role of insurance companies besides compensating the victims of flood damage and frames it within the flood risk policy of a country. Based on the descriptive analysis a proposal for the Dutch flood risk situation has developed which is more exploratory. The exploratory part and the fact the research is rather pioneering made the research approach inductive. It also gave the research the possibility to be more open and flexible. This resulted in the fact other aspects, that were thought of at first, could be introduced into the research (Saunders et al. 2009, 93).

Based on the fact the study has exploratory and descriptive aspects, the case study strategy has been applied to this research. Saunders and Lewis (2012) explain that case studies are useful to provide the researcher with a detailed understanding of the context of the research and the activities taking place within that context. In this study my aim is to understand which roles insurance companies can play within flood risk management. Because at the moment flood insurance hardly is available in the Netherlands, it is necessary to get this understanding by looking at countries abroad where insurance companies do have a role in flood risk management.

The choice for a comparative analysis:

My thesis results in analysis of if and how the insurance industry could contribute to Dutch flood risk management policy. To be able to analyse the contribution insurance companies are able to deliver to the Dutch situation, the analyse is focused on the role of insurance

companies in other countries and the effectiveness of it. Important in doing a few-country comparative analysis is the selection of the countries according to Lor (2011). Important is that the cases are comparable in relation to the relevant theory and that there are shared and non-shared attributes (Lor 2011, 15). Therefore I have selected the following countries/regions: Belgium, England (UK) and the USA. In these countries the insurance industries play a role in their national flood risk management. Chosen is to only analyse the case of England instead of the UK is because of the decentral nature of powers.

All these three countries are just as the Netherlands confronted with a high flood risk. Also Belgium and the UK have experienced the 'Great Storm' of 1953 which also hit the Netherlands severely and created a turning point in Dutch flood risk management. A strong comparison with USA can be made in relation to their flood risk policy which is just like the Dutch policy based on the multilayer safety approach (Warner, Weijs, and Wojciechowska 2012). Which makes the USA, besides the role insurance companies have in their flood risk management, an ideal subject for comparison with the Dutch situation.

Moreover all assessed countries have to deal with high demographic pressures such as an increasing urban population. Nonetheless have the countries different histories in flood risk management due to political, cultural, economic and legislative backgrounds. Most important for this comparative analysis is that all of the assessed countries have a prominent role for insurance companies in flood risk management. Important for analysis is the fact that each of these countries is subject to a different structure of compensation as distinguished by Crichton (2008). When including the Netherlands all four structures are part of subject in this research.

Overall experiences from abroad help me interpret the role insurance companies are able to play in flood risk management and the usefulness for the Dutch situation. Furthermore the cases of Belgium, England and the USA give me the probability to analyse (policy) documents that I am able to read from a language point of view.

Qualitative research

Because my research philosophy is interpretive and a case-study strategy is chosen; qualitative research is applicable. Qualitative research fits the few-country case-study approach, because it enables you to do more in deep research, the research can be more open an gives the opportunity to check if general notions are applicable in a specific situation. Please see figure 5 how the chosen research design, strategy and metatheory connect.

Figure 4-A: Relationship of comparative methodological choices to metatheory

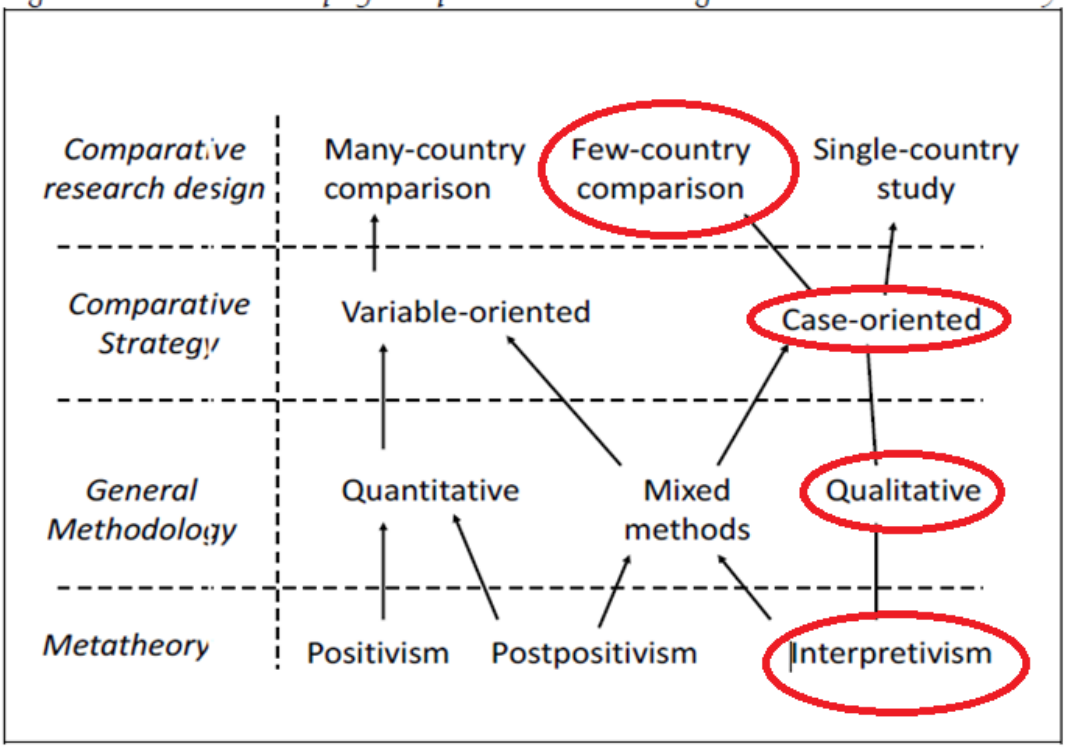

Figure 5 Overview research design (Lor 2011) (red circles added by author)

4.2. Conceptual Model

The figure below shows the most important criteria for analysis derived from chapter 2, setting the scene and chapter 3, the theoretical framework and applied to the case study's framework. This figure structured the operationalization of my research as will explained in the section below and will become clear in the following chapter.

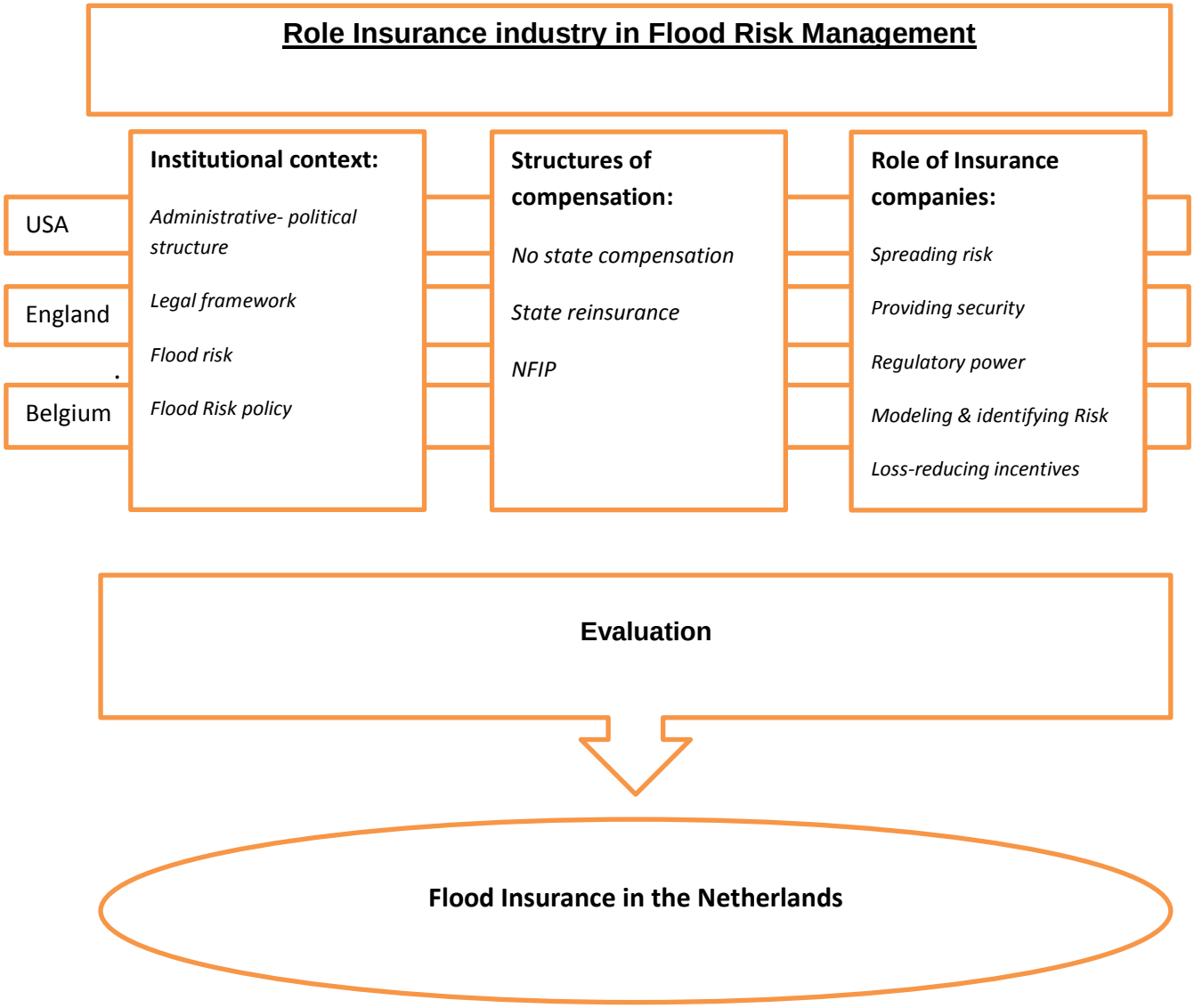

Figure 6 – Conceptual model

The conceptual model above gives a model for analysis. The concepts are derived from the theoretical framework and connected to the three countries that will form the three cases for this case study.

The institutional context as addressed in this conceptual model is of importance for data analysis because it gives a general overview of the assessed country in relation to flood risk.

Important for this general overview is the administrative-political structure in relation to flood risk management, flood risk, the legal framework and the existing flood risk policy. The set up for analysis of the institutional context is to be compared to the subjects dealt with in chapter 2 and provide grounds for comparison and consideration of the transfer of policies to the Dutch situation.

Secondly addressed in this conceptual model is the division of responsibilities between the insurance industry and the government and the structures of compensation as indicated by Crichton (2008).

Furthermore the third box, the role of insurance companies, really tries to address the role insurance companies play (in practice) in the in the theoretical framework separated tasks that can be fulfilled by insurance companies.

Subsequently derived from this conceptual model can be that the analysis will pay attention to how effective the role of insurance companies is and what are the lessons that can be learned or transferred to the Dutch situation.

4.3. Research methods

Data collection

The collection of data mainly consist of secondary data collected in Belgium, England, the USA and the Netherlands like official documents, reports, policy documents and scientific articles. The collected documents provided data to analyse the institutional context in the USA, England and Belgium. The secondary data helped analysing the flood risk policies of the three countries and also the role of insurance companies in the specific cases. Scientific articles gave insights of studies that have been done before.

Furthermore two experts of flood risk management in the Netherlands provided this research with their input. One of the experts, Robert Slomp, works for Rijkswaterstaat and is specialized in Flood Risk Management. The second expert, Ruben Jongejan, owns a consultancy firm for advising about flood risk management and has written a phd about insurance in relation to flood risk. The focus of the interview was to understand the practice of flood risk management in the Netherlands and if there is, according to the experts, place and/or demand for insurance. Therefore the input of the experts is most applicable for the input for the analysis of the flood insurance in the Netherlands as further elaborated upon in the last paragraph of part 2 (5.2.4, page 64). The interviews were semi-structured. Themes that came to my notion through document research could lead in the interview to a more in-depth discussion. Furthermore the interviews gave also space for out of the box-thinking of new themes or insights. Moreover, instead of an interview the Dutch Association of Insurers has provided input by answering a list of questions and has provided me with their proposal for flood insurance. This provided me insight in their proposal for mandatory flood insurance in the Netherlands and how they see a role of insurance companies in Dutch flood risk management. Also the input of the Dutch Association of Insurers is used majorly in this last paragraph of part 2 (page 65). An interview with the Dutch Association of Insuerers was

aimed for to be able to go more in deep and return questions on the answers given, unfortunately this was not possible.

Data Analysis

Bogdan and Biklen (1992) in Boeije (2008, 62) define data analysis as the process of systematically searching and arranging the interview transcripts, field notes and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to others. Analysis involves working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others.

The data analysis in this thesis is carried out with help of the software of ATLAS.ti. This means all collected data (consisting of scientific articles, transcripts of interviews, screenshots of websites, policy documents etc.) was uploaded to the programme which ordered all data in primary documents. The full list of primary documents can be found in Appendix 2. Once a document is identified as primary document it is possible to code the primary document. Which results in the codes providing an overview of the relevant quotes in the primary documents per theme (code family). Consequently all codes were ordered in code families that match the concepts from the conceptual framework. At first the coding was very interpretive and unstructured. Because Atlas.ti makes it possible to combine, split, rename or link codes a clear overview resulted which enabled a structured analysis based on the concepts of the conceptual framework. Please see table 2 on page 42-43 for an overview of the code families and the amount of connected quotes. For an overview of all codes per code family please see Appendix 1.

Chapter 5 - Empirical Analysis

In this chapter the output of the empirical analysis is presented. This chapter consists of three parts. The first part relates to data handling and an analysis of the primary documents. The second part discussed in narrative form a summary of the results of the data analysis. The third and last part links the data analysis to the research questions in a narrative form.

Part 1

5.1. Data handling

During my research many documents are collected relating to the subject of flood risk management, flood insurance, flood risk management in specific countries and documents relating to policy of the country. These documents come from research institutes, governments and the insurance industry.

Of importance to design the data analysis was to make a selection of the documents good enough of quality. To make sure the information gathered was not one-sided, triangulation of sources has taken place. Data input was delivered by governments, (independent) research institutes, NGO's and the insurance industry. Furthermore data was collected by in two ways; one by searching for policy documents, information on websites from different perspectives (government, insurers) and secondly by previous research and by use of semi-structured interviews.

This resulted in a total of 67 primary documents appropriate to code and analyse in the analysis program Atlas.ti. To show the output of my data selection, below an overview of the primary documents used for my analysis is shown. For a total overview of the used primary documents please see Appendix 2.

5.1.1. Background of data

To present the background of de primary documents a subdivision has been made for primary documents originating from research institutes and journals; expert interviews; policy documents and the insurance industry. The figures below show the origin of each individual primary document.

Figure 7 shows 23 of the 67 documents are related to research of research institutes and are published by the institute itself or in international journals. The analysis has shown this is the largest group, therefore the data in this thesis is influenced for a major part by previous published research on the legal and administrative framework of the countries, their flood risk management system, the role of insurance in the specific countries. Furthermore data relates to more general research about the functioning of insurance companies, comparative analysis of insurance systems and/or flood risk management.

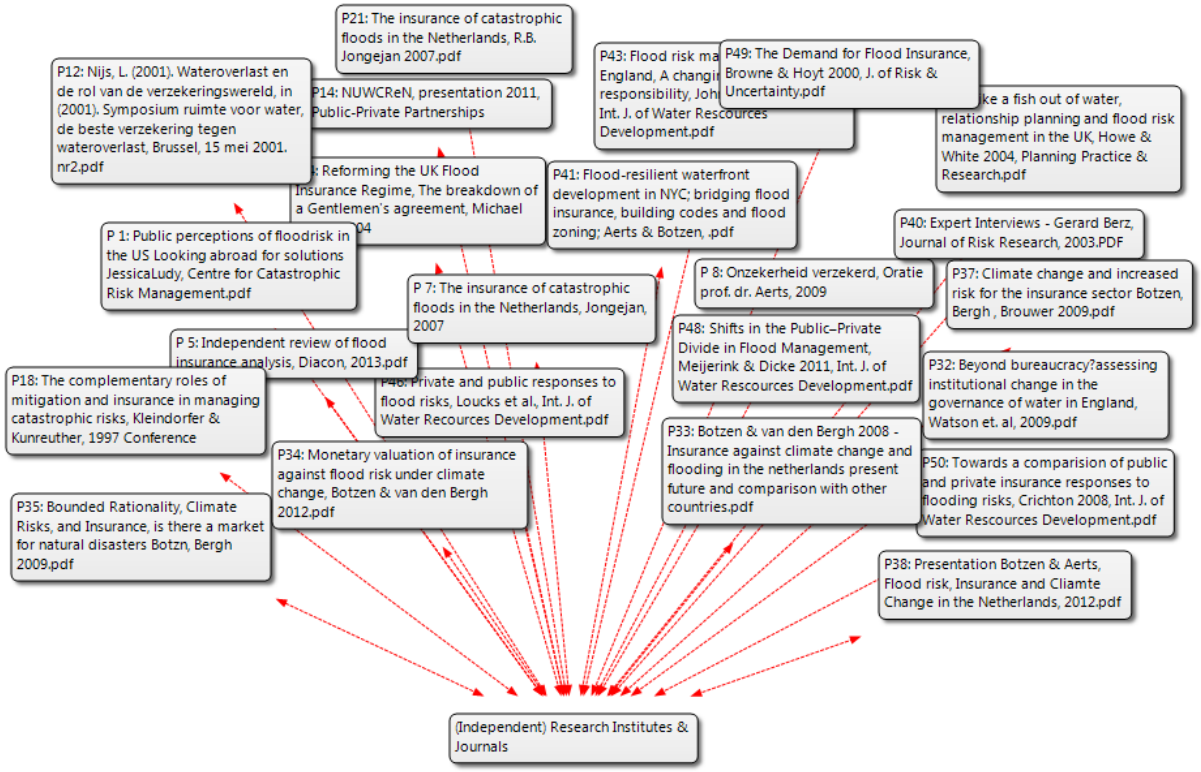

Figure 7: Overview primary documents Research institutes & journal

Furthermore two expert interviews were conducted in relation to flood risk management in The Netherlands. One of the experts works for Rijkswaterstaat and is specialized in Flood Risk Management. Ruben Jongejan owns a consultancy firm for advising about flood risk management and has written a phd about insurance in relation to flood risk.

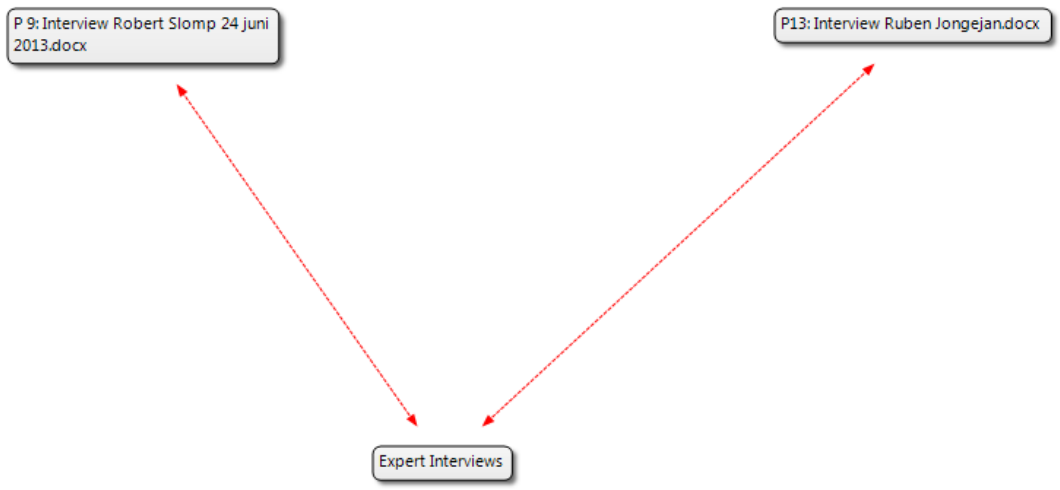

Figure 8: Overview primary documents Expert Interviews

Another source of data consists of policy documents and other kinds of government information in relation to flood risk and the administrative and political framework of the assessed countries. This subgroup of data input consists of 16 documents.

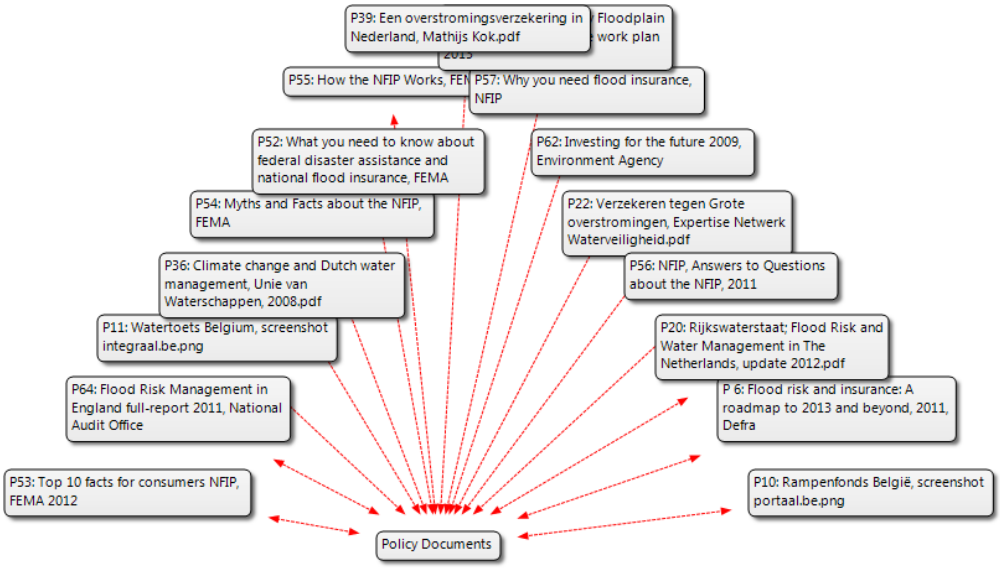

Figure 9: Overview primary documents Policy Documents

Last, but not least, data input was delivered by the insurance industry. The data consists of information found on websites, documents, reports but also by a list of questions answered by the Dutch Association of Insurers. This data results in the following overview of data (12 primary documents) delivered by the insurance industry:

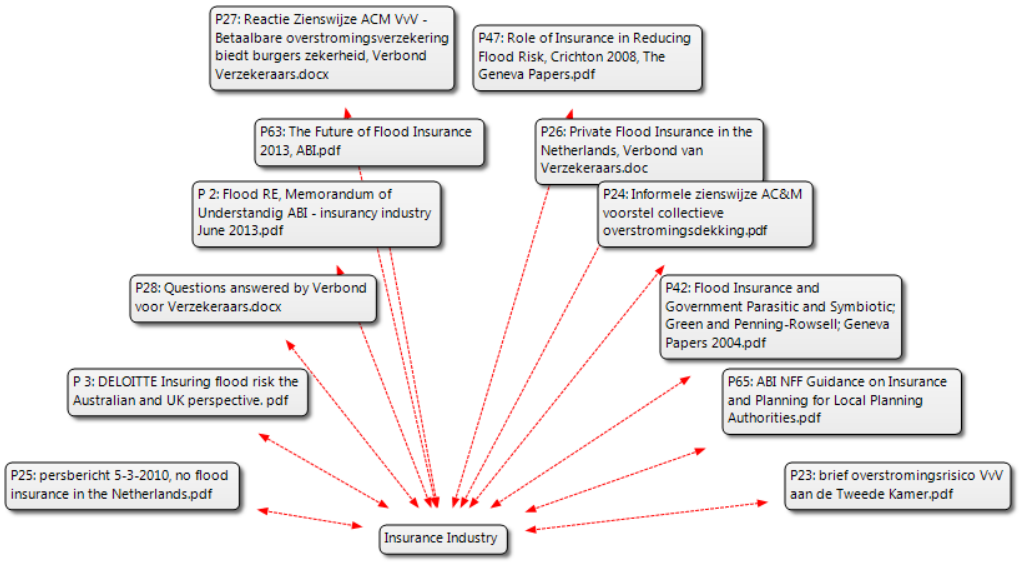

Figure 10: Overview primary documents Insurance Industry

5.1.2. Analysis of data per assessed country:

This paragraph shows the representation of data in respect of the selected cases.

Per country the following data was selected:

Country	Number of primary documents	Number of quotations following from the data
USA	15	241
Belgium	10	95
England	17	269
Netherlands	25	528
Total	67	1133

Table 1: Overview collected data per country

The major part of the data has been evaluated in relation to the Dutch situation. This can be explained as the evaluation of the Dutch situation required a more in depth analysis than the individual countries. In line with the research questions comparison needs to be made between the cases and the Netherlands, the Dutch flood insurance situation needs to be observed and the transfer of policies needs to be discussed and proposed. Furthermore the data of the Netherlands involves the expert interviews that mainly relate to the role of the insurance industry in Dutch flood risk management. This explains the larger amount of quotes and documents for the Dutch situation in comparison with the individual cases of Belgium, England and the USA for which the research is less in depth.

The assessed countries of England and the USA have about a same in-depth analysis. Clearly, Belgium is represented to a lesser extent. Especially in relation to data input from the insurance industry in Belgium. Both in England and the USA a variety of data is collected which results in a representation of the insurance industry, the government and independent research in the data analysis.

The codebook:

After selecting the documents on quality and usefulness a coding process started. In total 395 codes have resulted in 1133 selected quotations of the primary documents imported in Atlas.ti. The codes are grouped in code families which relate to the concepts distinguished in the theoretical framework and conceptual model (p.35, figure 6) and to systems of flood insurance in the assessed countries. For an overview of all codes (subdivided per code family) please see Appendix 1. In part two of this chapter in narrative form are summarized the results of the data analysis. The structure of part two relates to the main themes of the conceptual

model in figure 6. The overview below shows, besides an overview of the code families, where in part 2 the specific code families are being discussed. Furthermore does this table provide an overview of the quantity of quotations per code family and country.

Relation to conceptual model and Part 2	Code family	Belgium	England	USA	NL	Sum (row):
1. Institutional Context assessed countries	Administrative-Political Structure	8	14	3	0	25
	Flood Risk in General	4	16	16	20	56
	Flood Risk Policy in General	23	69	33	58	183
	Legal Framework	2	4	8	14	28
2. Structures of compensation of assed countries	No State Compensation/ Insurance Policy - England	8	36	7	2	53
	General information Insurance Policies	6	27	51	66	150
	State reinsurance /House insurance and disaster fund - Belgium	21	4	5	19	49
	NFIP - USA	8	12	57	21	98
3.Role Insurance Companies	Role Insurance Companies: Spreading Risk	0	1	0	9	10
	Role Insurance Companies: Providing Security	1	3	1	6	11

	Role Insurance Companies: Regulatory Power	8	64	31	30	133
	Role Insurance Companies: Modelling & identifying risk	0	2	2	0	4
	Role Insurance Companies: Loss-reducing incentives & Mitigation measures	5	12	22	46	85
4. Flood Insurance – The Dutch Case	Dutch Flood Risk Management	1	3	3	114	121
	Public Compensation/ Insurance Policy - The Netherlands	0	2	2	123	127
	Sum (column):	95	269	241	528	1133

Table 2: The codebook plus the amount of quotation incidences

Part 2

5.2. Analysis and Interpretation of Data

Based on the theoretical framework and conceptual model to which the codes link, the results of the data analysis are presented in narrative form in this second part. First output is shown in relation to the institutional context of the assessed countries (5.2.1.). This part is of essence for the comparative analysis of the countries. The second part (5.2.2) shows the structures of compensation as distinguished by Crichton (2008) in the addressed countries. Consequently does the third part (5.2.3) show the role of insurance companies within the flood risk management of the individual cases. The roles are subdivided based on the distinguished roles in the conceptual framework (figure 6, p.35). Finally, the last part (5.2.4) pays attention to an analysis of the necessity of insurance in the Netherlands.

In the paragraphs to follow references are made to the primary documents of relevance. The full list of primary documents can be found in Appendix 2.

5.2.1. Institutional context assessed countries

This section of the 'institutional context of the assessed countries' relates to the first central theme of the conceptual framework (figure 6, p. 35) and to the code families connected to 'Institutional Context assessed countries' (table 2, p. 42-43). This part provides insight in the context in which flood risk management takes place in the specific cases. Besides understanding the foreign situations it is important for comparing the institutional context of the cases in relation to the Dutch situation for possibilities of lesson drawing. In this section per individual case (country) a same structure is applied as in the Chapter 2 with themes relating to the administrative-political structure, legal framework, the flood risk and flood risk policy.

Belgium

a) Administrative-political structure

Primary document 12 describes Belgium's administrative and political structure. Belgium is described as an example of a consensual (power-sharing) democracy. Belgian society is divided along three lines of cleavages, initially religious and later socio-economic and linguistic, that structure both political parties. The country has a parliamentary polity. The linguistic cleavage, in particular, coupled with a shift in the economic dominance from Wallonia to Flanders, led to major institutional transformations that partially explain the current divergence in regional institutional water regimes. The current system based on two different kinds of federated entities: three regions (Flemish, Walloon, and Brussels-Capital) whom are in charge of economic matters and three communities (French, Flemish and German-speaking) whom deal with personified matters (culture, social matters & education). The regions and communities are formally set up in the 1970s, and since 1980 the Walloon and Flemish Regions have become autonomous, governed by their own assembly and executive. Since 1993, Belgium is a federal State. Regions and communities are added to the already existing levels of administration, and take place in the territorial hierarchy between the Federal State and the lower levels of the provinces (10 since 1993) and the communes (589). The regions are originally responsible for economic development, regional development, environmental protection and housing. Their competencies are extended in 1988 to public transportation, public works and to the financing of subordinate bodies. Regions are thus the central actors of the water management since 1980.

Belgium's water resource is distributed among five river basins. The two main ones belong to two international rivers, the Meuse and the Escaut, that take their source in France, cross both Flanders and Wallonia and flow into the sea in the Netherlands. Between those two, numerous canals form an important network for navigation. The major aquifers are located in Wallonia.

The international coordination for the river basin districts of the Scheldt, resp. Meuse is assigned to the International Scheldt Commission (ISC) and the International Meuse Commission (IMC) through the treaties of Ghent. The minister who is responsible for

integrated water policy is assisted by the Coordination Committee on Integrated Water Policy (CIW). This commission is responsible for the coordination of the integrated water policy on the level of the Flemish Region.

Flanders is divided in 11 sub-basins. In each sub-basin a common consultative and organisational structure is under preparation and will be fully operational in the near future. At the local level district water boards are operating on the level of sub-sub-basin or per cluster of sub-subbasins.

b) Legal framework

Just as in other European countries on flood risk management the Floods Directive and Water framework Directive are applicable to the Belgium legal framework. Furthermore the Act of 21 May 2003, modifying the 'Act of 25 June 1992 on the Land Insurance Agreement', and the 'Act of 12 July 1976 on the Repair of Certain Damage Caused to Private Goods by Natural Disasters', introduced flood coverage as a mandatory extension to the fire insurance policies concerning simple risks. As a result the Disaster Fund no longer needs to intervene since flood risk is insured or at least insurable. However, the Disaster Fund Act of 1976 continues to exist for those events and property not included in the Act of 2003, namely for those goods that are not insured because of the low financial capabilities of the victim, and for agricultural damage. In addition, the Act of 2003 foresees the creation of an Office of Tariffication, providing insurance to those who do not have any coverage because either no agent is willing to assume the risk or the requested premium is too high (Primary Document 31).

The institutional framework of the water policy in Flanders is described in the decree on Integrated Water Policy. The Decree constitutes the general framework for the water policy in Flanders. The Flemish Decree on Integrated Water Policy is officially approved in July 2003. This decree is the juridical implementation of the European Water Framework Directive and the Floods Directive in Flemish law.

Primary Document 31 showed that before 2005 the Disaster Fund of the Belgium government could compensate damage caused by natural hazards from tax-money. However, since 2005 homeowners are obliged within their fire-insurance to be granted an insurance for natural catastrophes. the Act of 17 September 2005 allows victims of natural catastrophes to direct themselves to their fire insurer (as long as their damage relates to the simple risks in the sense of the fire insurance) without recourse to the Disaster Fund.

Primary Document 11 explained that based upon the 'Watertest' governments decide upon granting licenses for development and a test of the watersystem is included.

c) Flood Risk

Just as the Netherlands, Belgium is located near the sea and is a river delta for several rivers. The rivers de Ijzer, de Brugse Polders, De Schelde and De Maas flow through Belgium to the

sea. Furthermore Belgium has a significant coastline. Though different from the Netherlands, Belgium is less densely populated which leaves more space for the water to flow or flood. Due to snow melting in the Alps, increased precipitation due to Climate Change and dike breaks two years ago in Belgium, a significant flood risk is to be perceived in Belgium. Also Belgium experienced a great flood in 1953. Primary Document 31 indicates five per cent of the territory of the Flemish Region could be calculated to be flood-prone.

d) Flood risk policy

In Belgium there are a lot of different water managers in both regions. Nevertheless have both regions a formal structure, VIWC (Vlaams Integraal Wateroverleg Comite - Flemish Integrated Water Management Committee) in Flanders and the PPGIE (Plate-forme Permanente pour le Gestion Intégrée de l'Eau - Permanent Platform for Integrated Water Management) in Wallonia, where all water managers are represented. Integration of water policy with other sectors (e.g. land use planning) is problematic. Although many individual sectoral targets and strategies are in place, no single integrated strategy currently exists for water management that considers the relationships between the different water bodies (surface water, groundwater, coastal waters, etc) and between the needs of all relevant sectors in Flanders and Wallonia. In Flanders there is a new Parliamentary Act on Integrated Water Policy, a good environmental policy plan (2003-2007) and a good water policy plan (2001). The proposed structures for sub river basins in Flanders should improve both types of integrations (water bodies/sectors) in the coming years. The WWF also mentioned the international cooperation is very poor. This was stated in 2003. Based upon the website from the CWI this has improved in the past 10 years.

For the organisation and planning of the integrated water management, the decree on Integrated Water Policy distinguishes 4 levels:

- the River Basin District (Scheldt and Meuse) with the river basin management plans
- the Flemish region (river basins Scheldt, Meuse, IJzer, Polders of Bruges) with the Water Policy Note
- the sub-basin with the river catchment management plans
- sub-sub-basin with the sub-river catchment management plans.

The WWF in Primary Document 51 explains the Flemish Flood-protection programme pays a lot of attention to the ecological restoration and creation of floodplains using the original concept of 'controlled inundation areas' and 'controlled reduced inundation areas'. These concepts are however not yet accepted by all local authorities. The Flemish region is paying more and more attention to prevent erosion and increase infiltration of rainwater, both in rural and urban areas. Furthermore shows WWF that in Wallonia, the draft Plan PLUIES (Integrated plan for flood prevention) will be implemented.

The WWF in Primary Document 51, states moreover that spatial planning still deals with weaknesses, especially related to construction in inundation and infiltration areas, and this again in both regions. Furthermore the main policy on flood risk management in Flanders is

based on the European Flood Directive, so preventive, protection and preparedness are their most important leading concepts. Policies similar to the Netherlands like "Room for the River" are being implemented.

England

a) Administrative-political structure

Flood protection in England is a task of the state carried out by delegating its main efforts to regional and local authorities. Political and administrative responsibilities are organised in a multi-layer structure. The Department for Environment, Food and Rural Affairs (DEFRA) is responsible for the overall policy and it provides most of the funding. Local authorities have the responsibility for the provision, design and construction of single projects and the maintenance of local flood protection. The Environment Agency has the responsibility of supervising all matters related to flood defence, but it is again not carrying out its policies as the implementation is delegated to regional and local authorities, i.e, the Regional and Local Flood Defence Committees. The Environment Agency is a non-departmental public body that operates in eight regions. Its responsibilities range from the regulation of pollution to water abstraction licensing and operating flood warning and defence systems. The Environment Agency's role is to guide, oversee and advise, and to allocate available funding according to a strict hierarchy of national need. The Environment Agency maintains regular communication with all other flood and coastal risk management organizations, including contractors and consultants. The Environment Agency's challenge is to help all of these bodies work together to achieve the Government's outcome measures. Furthermore, the Department of Transport, Local Governments and the Regions as well as the Internal Drainage Boards hold competences in flood protection.

This relatively complex system of competing and complementary competences can be expected to generate friction and difficulties in articulating and implementing a coherent policy. Exactly this fragmentation has been addressed by Huber (2004) in Primary Document 4, the failure of flood warning in 1998 was considered a symptom of systemic weaknesses.

The ambiguous structure of responsibilities is also reflected in the way resources are collected and distributed. Three sources fund flood defence: the state, the funding arrangements for operating authorities (mainly the Environmental Agency) and money invested directly by local authorities. The state funds flood defence mainly through the DEFRA / National Assembly for Wales (NAW) grants. The main addressees are local authorities carrying out works for defences, warning systems and infrastructure. The DEFRA supplementary credit approval scheme provides money for investments not covered by the DEFRA / NAW grants. Rates for drainage works that is collected and used for the purpose of flood defence constitute another source of monetary flow, which also supports the work of the Environment Agency.

Since the local regions work quite independent, critique on the system is concentrates on the fact public accountability is reduced because central government is able to deflect the blame towards the numerous other actors that are involved in policy implementation, rather than to

the state actors that are responsible for policy making. Furthermore is argued the system denies those involved in implementation the flexibility to address local circumstances and needs as policy itself continues to be set by the bureaucratic structures and processes of the Environmental Agency and central government. Third, there is a clear democratic deficit in the sense that those who are being given more responsibility for implementing river basin management and flood-risk policies have little influence over the direction or content of those same policies. In Primary Document 32, Watson (2009) argues that to develop a more responsive and collaborative system of water governance, a number of institutional reforms are required. Fundamentally, there needs to be greater recognition of the need to integrate the management of land and water at the local scale and to develop appropriate institutional arrangements for both policy making and policy implementation.

b) Legal framework

Water Framework Directive

In England, the responsibility for the implementation of the WFD rests with the Environment Agency. As the designated sole 'competent authority' for the implementation process, the Environment Agency is responsible for the development of River Basin Management Plans, which were made publicly available for all of the ten river basin districts wholly or partly in England in December 2008. Argued is the Environment Agency faced a difficult challenge in adapting to this new planning role as it has a strong water-centric (rather than river basin) organisational culture, while environmental regulation remained as its primary function within the water governance system. The requirements of the Water Framework Directive, particularly the joint consideration of land and water, the need to work collaboratively with other organisations and the demands for public participation, necessitated a different style of operation from the Environment Agency.

Floods Directive

The European Directive on the assessment and management of flood risk came into force on 26 November 2007, giving member states two years to transpose the directive into domestic This resulted in a review of the ‘Making Space for Water’-Policy.

Gentlemen’s Agreement ‘Statement of Principles’

England developed a private flood insurance scheme about half a century ago. It emerged as a reaction to flood challenges at the time. It can be described as a ‘Gentlemen’s Agreement’ between the government and the insurance industry. It is based on a division of responsibility between the state providing flood protection and the insurance companies compensating in the case of flood damage (Huber 2004). Primary Document 4 indicates the Gentlemen’s Agreement is no explicit regulatory regime but an invisible set of rules governing overall flood management. However argued in Primary Document 4 is that The Gentlemen’s Agreement shapes the interpretation and implementation of English flood management. This construction will be explained in further detail in the further analysis of the division of

responsibilities between the government and the insurance industry in England.

c) Flood risk

Many areas of the UK are, and have been, regularly exposed to flooding. Geographically this is caused because England has regions at or below mean sea level, particularly in the East Anglia region, The Fens, and Somerset on the West coast. With the UK being an Island and England accounting for the majority of this island in terms of land area, there also exists a substantial coast line which is subject to erosion and flooding. More inland the geomorphology of the country causes the water to concentrate in valleys. These areas are very vulnerable for floods because development of housing and business takes place in flood-prone areas.

The Environment Agency states in 2009 that in England one in six residential and commercial properties is at risk from river, coastal or surface water flooding. Climate change, deterioration of assets as well as the continuing pressure to build in areas at risk have contributed and will contribute to an increase in risk (Primary Document 62).

Furthermore the condition of flood defence structures in England and Wales give cause for concern. Primary Document 50 quotes the UK's National Audit Office that reported that only 61 % of the flood defence structures in England and Wales are in good condition and that an extra 150 million pound needs to be spent on just maintenance each year.

c) Flood risk policy

History Flood risk policy

The need for flood risk management in England can be compared the Dutch situation. In Primary Document 30, Samuels (2006) distinguishes three stages of development of flood risk management in the UK over the 20th century. From the 1930s till about 1970 a strong drainage coalition existed for agriculture, benefiting from the post-war need to secure food production with a policy for flood prevention. From 1970 till the early 1990s economic reasons predominated leading to a flood defence coalition to protect people and property. From the mid 1990s onwards there has been a gradual shift towards flood risk management under influence of an environmental movement. This included enhanced attention to social responsibility, community involvement and public awareness. Primary Document 4 explained furthermore flood protection in England is part of flood management and regulation and dates back to 1531 when the first legal regulations concerning protective measures against floods were issued.

Following the devastating east coast floods in 1953, the UK risk-management paradigm up to 2004 was largely based on engineered flood defences and intensive watercourse management as stated in Primary Document 66. With flood defence policy being funded nationally, determined by central government and applied by regional and local authorities and other operating authorities. Technological optimism in the ability of the state to protect people and

property against flooding, and the power of elite/expert opinion, dominated. Since the early 1990s, there has been an increased recognition of the importance of environmental values, flood warnings and awareness raising, development control and emergency management. Likewise, the role of flood insurance as complement to flood policy has become an increasingly important 'safety net' for householders and businesses; something that has been critically important in the development of the English flood risk management model because it effectively removed this aspect of flood risk management from state responsibility as stated in Primary Document 43.

Flood risk Policy and Land use policy

Until recently, explained in Primary Document 4, floods only played a minor role in land use planning. In the new integrated approach of flood risk management land use regulations are a crucial dimension. As reaction to the floods of 2000 a Planning Policy Guide has developed that emphasized the importance of flood-risks for planning processes. However, planners are faced with conflicting government aims: namely, the desire to encourage the development of housing and the need to protect society from flooding. This conflict is shown explicitly by the UK Government who stated in 2007 that 11 per cent of all new housing in England has been constructed in floodplains and against the advice of the Environmental Agency as shown in Primary Document 50. This report also stated England is the only part of the UK where flood plain development is still permitted. In relation to this Huber (2004, Primary Document 4) also argues that regulations of flood protection and land-use issues are large unconnected.

The new policies also seem an implementation in reaction to the fact that only 61 % of the flood defence structures in England and Wales are in 'good' condition and that an extra maintenance of a € 150 million is needed according to Primary Document 50.

Furthermore Primary Document 50 addresses a few points of critique on English flood risk policy:

a) Lack of involvement by the local community and key stakeholder when forming local planning policy

b) Tendency for flood risk to be assessed and mitigated on a site-by-site basis inhibiting the potential for strategic mitigation solutions;

c) Difficulties balancing socio-economic and environmental priorities against flood risk concerns

d) Local planning policy of flood risk is often generic and fails to tailor national policy with local circumstances.

According to Primary document 4 English flood risk management is a patchwork of vaguely joined areas and is bound together and coordinated by the Gentlemens Agreement as shown in the figure below.

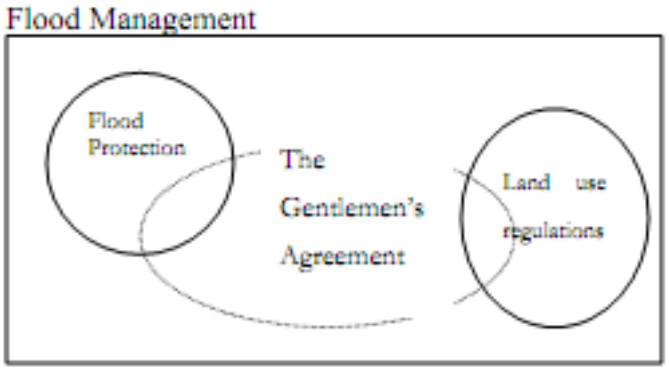

Table 1: Fragmented flood management in the UK

Figuur 11 Fragmented flood management in the UK (Primary Document 4, Huber 2004)

Current Flood risk policy

Flood risk management in England is according to Johnson and Priest (2008, Primary Document 43) undergoing a major paradigm shift as it moves from 'keeping flood water out' to one in which citizens are being asked to 'make space for water', a same development can be perceived in the Netherlands. This change in England can be attributed to a number of catalytic flood events between 1998 and 2005 and led to the recognition that you cannot defend against all floods and the limits of flood defence. Furthermore an heightened awareness was created in media and society of the potential of flood risk.

The new paradigm of English Flood Risk Management is most clearly illustrated by the government's 20-year strategy, Making Space for Water, as explained in Primary Document 43. This strategy applies a new vision for flood risk management that aims for all decisions and operations to be underpinned by sustainable development principles. Decision-making processes are to be participatory and transparent whilst recognising the significance of long-term drivers and their associated uncertainties. Risk responsibility is to be addressed through the greater embedding of flood risk management across government policy and through the greater recognition and clarification of the roles and responsibilities of the stakeholders involved. According to Primary Document 32 this new policy is moving to a more holistic and integrated risk-based approach, which seems to be in line with the implementation of the Floods Directive.

Implementing this new policy started in 2007 after the summer flood of that year. The Pitt Review in relation to these floods recommended that the Environment Agency, supported by local authorities and water companies, should urgently identify the areas that are at highest risk from surface water flooding. As part of its strategic overview role, the Environment Agency made available to Lead Local Flood Authorities (LLFAs), local planning authorities and local resilience fora, two types of maps showing surface water flood risk. Pitt Review recommendations on the mapping of reservoirs have also been completed as indicated by Defra in Primary Document 6.

The development of the policy and the accompanied policy plans are shown in the figure

below of Primary Document 64 as response to a more integrated flood risk policy:

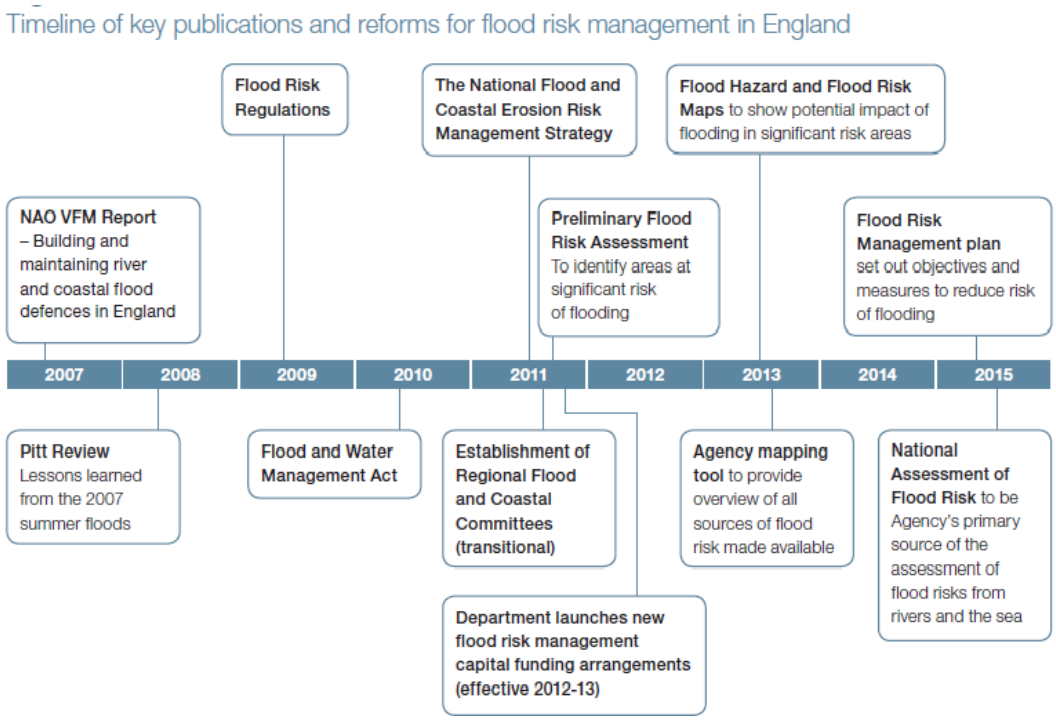

Figure 12: Timeline key publications and reforms of flood risk management England (Primary Document 64)

These new policy documents are also interconnected and the integratedness of the new flood risk policy is illustrated in the figure below:

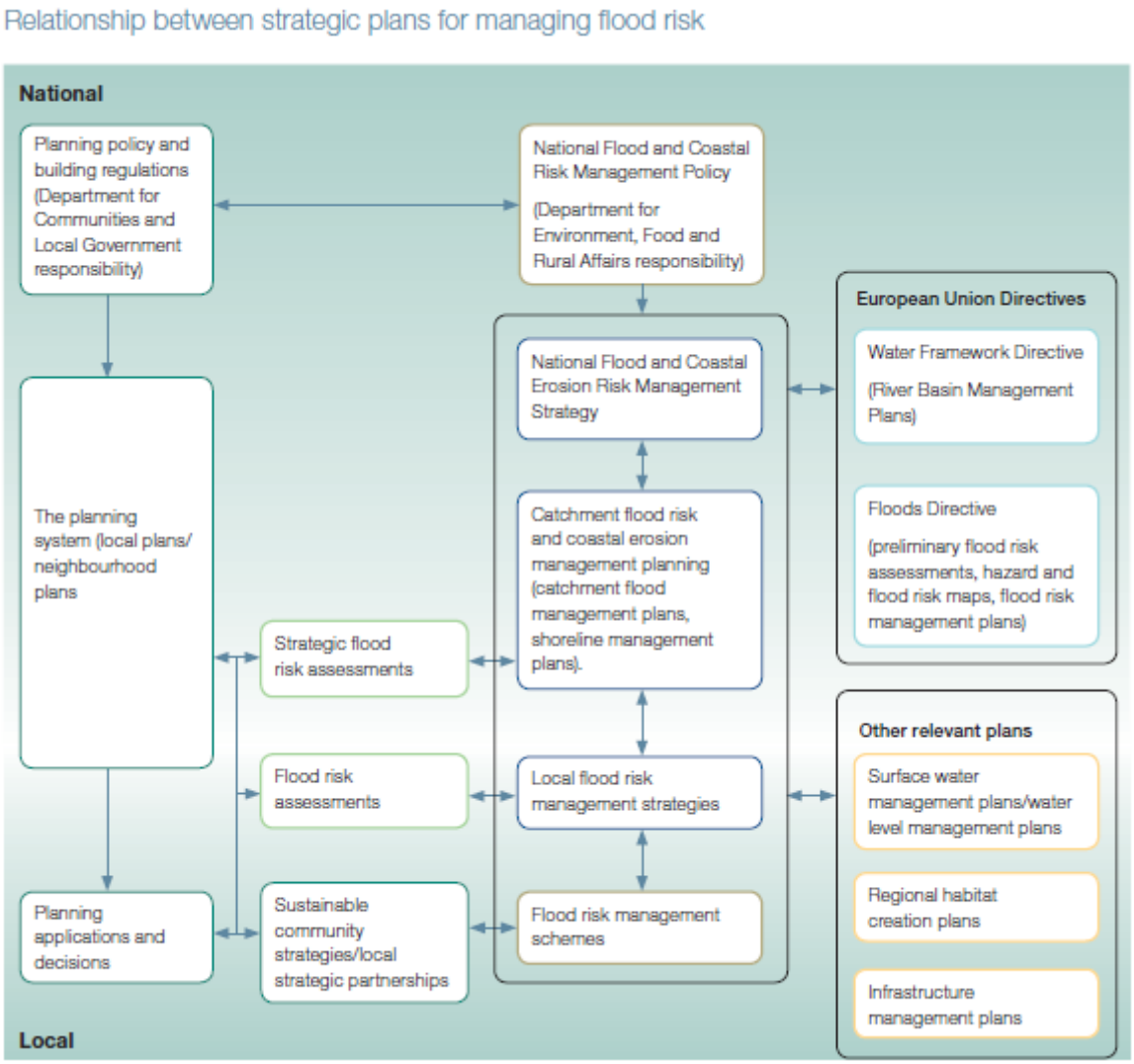

Figure 13: Relationship between strategic plans for managing flood risk (Primary Document 64)

USA

a) Administrative-political structure

Warner et al. (2012) explains in Primary Document 59 the US has focused on developing systems that can be applied across the range of threats rather than within a specific type of hazard. Most often national guidance is intended to help local regions and communities to adopt approaches to safety based on their vision of the risks, threats, and priorities. Instead local policies and practices often determine the approach any community takes to its hazards. Since the diversity of natural hazards has led to a similar level of variation in regions also the way these threats are managed vary per region. Therefore Warner et al. (2012) considers it difficult to emerge central policy. For the most part, the national government exerts influence in these activities through planning guidance, advice, and restrictions or incentives in funding

aimed at facilitating the adoption of specific types of programs the US does employ a number of specific programs that influence multi-layer flood preparedness.

At federal level flood damage reduction responsibility lays at two agencies, the US Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA). The flood damage programme of the USACE focuses primarily on reducing flood damage through implementation of various protection works. The FEMA's National Flood Insurance Program (NFIP) focus is primarily on flood insurance as means for partial recovery of losses for property owners. FEMA works closely with community officials and contractors..

b) Legal framework

Flood control act 1936

The Flood Control Acts is of national level. Based on this Act many engineered structures have been built like embankments and flood ways. Primary Document 30 estimates $18 billion of damage has been prevented due to these engineered structures, in particular during the exceptional floods in the Missippi basin in 1993. Based on this act a 1% of flood probability has become the accepted standard all over the USA .

Flood Disaster Protection Act

Important in the legal framework of the USA is the Flood Disaster Protection Act of 1973 and the National Flood Insurance Reform Act of 1994. The National Flood Insurance Act of 1968 allows FEMA to make flood insurance available only in those areas where the appropriate public body has adopted adequate floodplain management regulations for its flood-prone areas. These Flood Disaster Protection Act and National Flood Insurance Reform Act following up to this act, consequently mandate that federally regulated, supervised, or insured financial institutions and Federal Agency lenders require flood insurance for buildings located in a participating NFIP community and in an Special Flood Hazard Area (SFHA). Some financial institutions may require flood insurance for properties outside the SFHA as part of their own risk management process.

Lenders are mandated under the Flood Disaster Protection Act of 1973 and the National Flood Insurance Reform Act of 1994 to require the purchase of flood insurance by property owners who acquire loans from federally regulated, supervised, or insured financial institutions for the acquisition or improvement of land, facilities, or structures located within or to be located within an SFHA.

Following up to these Acts, in 2012, the U.S. Congress passed the Flood Insurance Reform Act which calls on the FEMA, and other agencies, to make a number of changes to the way the NFIP is run. Key provisions of the legislation will require the NFIP to raise rates to reflect true flood risk to make the program more financially stable, and change how Flood Insurance Rate Map (FIRM) updates impact policyholders. The changes will mean premium rate increases for some policyholders.

c) Flood Risk

Indicated, among others, by Primary Documents 1 and 59, is that the US experiences an incredible diversity of hazards though flooding is the number one natural hazard in the United States generating an average of 9 million US dollars of damage and 83 deaths of the past 20 years (cyclones not included).

Primary Document 60 shows the Eastern United States experiences in general more high precipitation events. Furthermore it states Western North America is susceptible to early snow melting and spring stream flow peaks. Furthermore various models predict different regional effects, but overall, global warming eventually leads to a decrease of runoff, earlier stream peak flow, and reservoir replenishment. Following the great Mississippi River flood of 1993, the United States has closely examined its floodplain management policies and procedures, conducting several regional and national assessments and has reacted to those assessments. These assessments revealed that major floods have been significant events and they will continue to occur; people and property are at risk in the floodplain. Flood risk is increasing since flood losses have increased. A report by the Allianz Group and the WWF (2006, Primary Document 60) implies this increase is due to population growth and development in high-risk areas.

d) Flood risk policy

History flood risk policy

The USA has obtained national flood standards and a floodplain management programme. Floods have been characterized as danger to national welfare since the 1930s, after massive damage from the 1927 Mississippi floods. This led to the passing of the Flood Control Act in 1936, making flood risk management a national concern. Since the 1960s, non-structural measures have been applied in addition, especially in the form of regulatory measures and insurance. For the implementation of those measures the designating of 1% flood probability zones provided the basis. This has led to a 1% flood probability having become the accepted standard all over the USA.

Current flood risk policy

Although the practice of flood risk management is growing in the United States Samuels et al. (2006) explains in Primary Document 30 the term is still not widely used, recognised or understood. Stated by Samuels et al. (2006) in the US the three central approaches guiding floodplain management today are:

- a risk-based approach used by the US Army Corps of Engineers on new studies;
- a simple standard approach for the National Flood Insurance Program (NFIP) and related land use; and
- a social goal-based approach to avoid disasters.

Although most flood risk policies in the US differ per region and are locally formed, the

FEMA employs several hazard mitigation programs. One important flood preparedness program is the NFIP. Insurance is a critical part of the program but the program also includes components that recognize, motivate and help fund investments in prevention and preparedness activities . Floodplains flooded by the 100-year flood are subject to land-use management provisions specified by FEMA and flood insurance is mandatory for properties located within this zone if communities are to remain eligible for certain disaster relief programmes. This approach permits reasonable and efficient administration of the flood insurance programme and clearly defines where communities must implement development controls. It defines a clear zone within which local agencies are held accountable for land use decisions and floodplain management activities as stated in Primary Document 46. In relation to this Loucks (2008) addresses in Primary Document 46 that it would appear the US has the management of flood risks well in hand, an increase in flood losses implies the other.

5.2.2. Structures of compensation of assessed countries

This section relates to the second central theme of the conceptual framework (figure 6, p. 35) and to code families connected to 'Structures of compensation of assessed countries' (table 2, p. 42-43). This part describes the structures of compensation in the specific cases. Of importance is to see how flood insurance can be structured in different ways to fit in the flood risk management of the relevant country .

Belgium - State reinsurance: Mandatory private Insurance & State Disaster Fund

Since 2005 every fire insurance policy (most of the time element of the home insurance) is equipped with an included premium against the most common natural hazards. Only in exceptional cases the Disaster Fund will come into action, but only if the hazard is recognized as disaster. In general solidarity is aimed for in this construction since fire insurance is compulsory in Belgium since 2010. This results in a high market-penetration of the flood insurance.

Primary Document 31 explains government or bodies of government define risk-areas in Belgium. Based on the risk-areas the insurers estimate the size of the risk and a premium is related to the risk. In addition the creation of an Office of Tariffication provides insurance to those who do not have any coverage because no agent is willing to assume the risk or the requested premium is too high. At the same time the insurance company may decide the height of the guaranteed compensation. If this limit is exceeded the Disaster Fund is available for cover, but only if the event is recognized as a disaster by the government. Also the total amount of compensation by the government is limited to 325 million US dollars. This amount is unlikely to cover extreme damage. Primary Document 44 states the deductibles of Belgium flood insurance are lower than the NFIP amount and high compared to other systems. However, the premiums for flood insurance in Belgium are with an additional premium of 12 per cent of the fire insurance contract, in line with those of France.

Except for partly risk-based regional premiums no incentives for mitigation are included in the premiums or conditions for the Disaster Fund as shown in Primary Document 44. On the

other hand, people are excluded from flood insurance in case development is discouraged by the government.

Primary Document 31 tells us Belgium flood insurance is only paid out under certain conditions. The principle is that property is mandatorily insured against storms that have a wind speed of no less than 100 kilometres per hour. Furthermore, the Royal Decree foresees a minimum level of coverage and authorises the exclusion of those goods that are highly vulnerable to the storm risk (such as light or easily movable constructions, open buildings and bell towers).

Critique

Also in Primary Document 31 it was said introduction of the compulsory insurance was difficult since people feared that people that are not exposed to the risk of natural disaster would also have to contribute, so no solidarity was wished for. In Primary Document 12 Nijs finds it remarkable Belgium has chosen to keep the Disaster Fund available besides the insurance system.

England - Private Insurance

In the UK insurance plays an important role in flood risk management. The Government has a gentlemen's agreement with the insurance industry (the Association of British Insurers, ABI) since 1961, called the 'Statement of Principles', that commits insurers to offer insurance for providing insurance for flood risk as part of the standard home insurance policies and where the government is responsible for providing flood protection. However this agreement is not compulsory the market penetration for UK flood insurance is between 75 en 85 per cent. This can be explained, according to Paudel,(2012) in Primary Document 44, by the requirement of flood insurance for receiving mortgages. The current agreement is due to end in 2013 and Defra is committed to ensure that flood insurance remains widely available in England after this point.

Several Primary Documents but in particular number 2 and 8 indicate the flooding's of 2007 have created discussion about the sustainability of this agreement because the insurance industry requires more investments by the government in flood protection. Primary Document 44 also says premiums have increased significantly and in some cases insurance is refused. In reaction to these developments the insurance industry has proposed Flood RE as set out in Primary Document 2. Flood RE will be an independent special insurance policy for flood risk policies that are assessed of entailing a risk too large. Flood RE will be run and financed by insurers as a not-for-profit fund which will cover the cost of flood claims from high risk homes. Premium for the flood risk will be calculated on council tax banding up to a maximum limit. Flood RE will charge member firms an annual charge of 180 million pounds, which is equal to 10,50 pounds on annual household premiums and is meant as cross-subsidy that already exists between lower and higher flood risk premiums. Flood RE will cover losses up to the losses expected 1 one 200 years with the government taking primary responsibility. This proposal has great impact on the private individualistic, market-based approach to flood

insurance existing in England. On the other hand is argued solidarity is being impaired since the high risk cases are set aside. According to the Association of British Insurers (Primary Document 63) if Flood RE is agreed the Statement of the Principles will be rolled over until Flood RE is delivered.

Currently, there is also little state involvement in providing financial assistance; the State provides financial help via the Social Fund for people with limited resources that are affected by flooding.

USA – NFIP

Since 1968 the insurance industry is an important partner of the US government in realizing flood risk management all over the country. The National Flood Insurance Program (NFIP), part of the FEMA, was designed as partnership between the federal government and local communities. In exchange for mitigation measures homeowners and businesses were able to purchase flood insurance. The federal government organizes a flood insurance programme which is implemented by the private insurance industry and the government decides on the safety standards. This programme is administered by the FEMA, which works closely with nearly 90 private insurance companies to offer flood insurance to property owners and renters. In order to qualify for flood insurance, a community must join the NFIP and agree to enforce sound floodplain management standards. The NFIP, a federal program, offers flood insurance, which can be purchased through property and casualty insurance agents. Rates are set and do not differ from company to company or agent to agent. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding.

Currently, almost 20,000 communities participate in the program; as of August 2008, there were over 5.5 million policies-in-force nationwide. The majority of these flood policies are written by private insurance companies that keep a portion of the premium to cover their operating and administrative expenses, but the risk is borne entirely by the federal government (Primary Document 61).

So in fact NFIP is a public-private partnership, it is a government fund which is partly funded by premiums of the participants, but the programme is carried out by the insurance industry. The programme as addressed by Allianz and the WWF (2006, Primary Document 60) is well intended but has resulted in insurance of homes and businesses in high-risk flood zones to whom a private insurer would not provide insurance or would charge markedly more than NFIP does. The NFIP premiums cover only 60% of the program's expenditures. Argued is by NFIP is distorting the market. The Flood Insurance reform and Modernization Act of 2012 would phase in more actual premium rates.

There is no requirement for any community to join the programme, but if they do not, areas at flood risk are not eligible for financial assistance. Also are mortgages often rejected in case of flood risk. Though over the past century, the US federal government has offered support to the victims of natural disasters. According to Jongejan (2007, Primary Document 7) this

tendency might have raised expectations and created a severe moral hazard problem.

5.2.3. Role of insurance companies

In this section the third important theme of the conceptual model, the role of insurance companies is being discussed in the light of data output. This section is of great importance since it shows the roles of insurance companies in the today existing compensation structures and provides the main arguments for the role insurance companies could play in the Dutch flood risk management. This section is structured differently than the sections before. The in the theoretical framework distinguished roles are discussed separately in relation to the results of the data analysis.

Spreading Risk

In the case of the US spreading risk of financial damage takes place by the insurance industry because a large area is being covered. Though the fact market penetration is low the adverse is accomplished and premiums are high and keep rising if flood events increase. Kunreuther and Kousky (2009, Primary Document 61) think a government program might be successful since it could pool risks more broadly, have funds to jump start the program, subsidize homeowners currently residing in hazard-prone areas, and tie insurance to land use regulations and building codes that would lower risks.

The Gentlemen's Agreement between the English government and the ABI optimises according to Huber (2004, Primary Document 4) risk spreading. All property owners share risk and therefore solidarity in such a way a sound economic basis developed of insurance activities without burdening the state. This risk spreading might be endangered following the proposal of Flood RE.

In the Belgium case a relatively high market penetration is achieved since a mandatory flood insurance is collected and therefore risk spreading is created.

Botzen et al. (2009) also strive in Primary Document 37 for a further harmonization of the European financial service market to foster robustness of the insurance sector to climate change by creating a large geographically spread market. Also natural hazards insurances are advocated for. As bundled natural hazard including floods are packaged to one mandatory insurance policy risk spreading would be optimized.

Providing Security

The economic consequences of flooding events or other natural disasters for individual businesses and households can be catastrophic. Insurance can spread the costs and provides security. Providing security is linked to the factor of spreading risk. If risk is spread and therefore costs can be spread, security can be provided. Of importance for this concept is the maximum amount of compensation offered by flood insurance, if this is relatively low then flood insurance does not provide security. A reinsurance strategy via government increases faith and secures the provision of security. Therefore the situation in Belgium is twofold. The maximum compensation is relatively low at 25.000 euros, on the other hand is provided that if

a disaster takes place the government Disaster Fund will entry into force. However, also in case the Disaster Fund will entry into force a maximum amount of compensation will be set. Furthermore is insecurity created because it is unsure whether a flood will be judged as disaster or not.

Primary Document 4 argues the availability of the Gentlemens' Agreement in England and therefore the availability of flood insurance in England takes care of a sound economic basis without burdening the state and provides security. This same argument is also applicable to the NFIP only the government is being burdened since the premiums are financially complemented via public treasury. This however increases faith compensation will be provided in case necessary and therefore provides security. In case of a pure private insurance, there always is the chance the insurance industry is not able to pay out because of bankruptcy.

As indicated by Primary Document 7 in the USA there can be too much faith in compensation by the government in case of disasters; and therefore moral hazard is being created. In case charities and governments offer compensation in case of disaster, even an insurance at a fair premium under the NFIP is not necessary for the perception of security. Over the past century, the US federal government has increasingly offered support to the victims of natural disasters. Jongejan (2007), in Primary Document 7, sees this as possible explanation for the low coverage of the NFIP.

Providing security also exists in having faith in flood defences. In England as appointed earlier the government is failing in flood protection. Having flood insurance soothes this lack of security. In relation to the Netherlands and the discussion about cost-benefit analysis in Primary Document 8 is argued that for the Netherlands the heightening of dikes as hazard reduction is cheaper than vulnerability reduction. An insurance arrangement will cover the rest risk, in case a dike does not hold. Both measures are considered to be complementary and provide security.

Modelling and identifying Risk

As insurance companies need to set premiums based on risk they invest in and have a lot of knowledge about modelling and identifying risk. How this can contribute to flood risk management is shown in this paragraph.

Primary Document 50 shows British insurers have invested heavily in hazard maps and GIS data that enable them to charge differential prices down to individual household level to improve their service and be more competitive. Also in relation to the Flood RE proposal insurers need to be able to model and identify risks so judgments can be made in relation to the risk citizens are exposed to. Defra (Primary Document 6) says in relation to this individual insurers will often take distinct approaches to flood risk. Their underwriting decisions may be influenced by their strategic approach and risk appetite or by the need to minimize accumulated exposures to large weather event. Furthermore Defra (Primary Document 6) states the Environmental Agency is responsible for assessing, mapping and planning to reduce flood risk and suggest this could, among other things, be improved by insurers providing

information to the Environment Agency.

Also the NFIP encouraged the development of skills of modelling and identifying risk of insurers and offers a programme of flood hazard identification and mapping. The NFIP programme adopted a 100-year event as floodplain threat market. Flood insurance is mandatory for properties located within this zone. Primary Document 46 states this requires the NFIP to be able to define zones. The NFIP (Primary Document 52) also indicates that these maps are available for property owners so transparency is an additional advantage. Though in the US determination of flood hazard for an area is performed by an engineering study (Flood Insurance Study, FIS) conducted by the FEMA.

Regulatory Power

Regulatory Power can be exerted by the insurance company to contribute to flood risk management in two ways. In both ways the government is needed to set regulations and/or demand compliance. The insurance industry can control their insured's via the insurance contract as imposed by the government, but it is also possible the government takes over regulations or policy from the insurance industry and implements policy on demand of the insurance industry. Both ways of regulatory power are to be perceived.

In England for example a strong influence of the insurance industry can be observed on English policy making. Huber (2004) states in Primary Document 4 the Gentlemen's Agreement forms the insubstantial core of English flood management. According to him the main characteristic is the absence of formal regulation, despite it exerts remarkable regulatory power by shaping the flood management. This is explicitly illustrated by the insurance industry wanting to exit the Gentlemen's Agreement if the state would not provide better flood protection.

The proposed Flood RE insurance program by the insurance industry shows the influence the English flood insurance industry has on flood risk management. Flood RE enforces investments on behalf of the government in flood protection. This Flood RE proposal also obliges the Environment Agency to provide the insurance industry with flood maps of England. In return the ABI will provide the government with a national database of individual property-level flood claims.

The behaviour of the insurance firms, the state as well as the insured in England can be characterised by withdrawal, negligence and irresponsibility. Therefore Primary Document 4 shows the Gentlemen's Agreement establishes a set of rules and interpretation guidelines to institutionalise lax and irresponsible behaviour. Huber (2004, Primary Document 4) explains the rational behaviour of the state to get only minimally involved into flood management as the Gentleman's agreement has no in built signalling mechanisms that signals the insufficiency of investments. The Flood RE proposal tries to exert pressure from the insurance industry upon the government to provide flood protection. The request from ABI for more investments of the government in flood protection also led to a reformed Gentlemen's Agreement in 2002. Therefore the insurance industry is able to exert power on the

government in England.

Besides providing a monitoring role, the insurance industry in the UK helps developing flood risk policy because most risk information and risk assessment are carried out and provided by the insurance industry. Therefore the industry is an important partner in developing policy. Primary Document 50 indicates this also includes premium mechanisms that persuade people to move to safer areas and prevents the granting of mortgages in flood risk areas. Primary Document 50 also warns this has the consequence social housing, hospitals and senior citizen accommodations and other publicly owned buildings are built in floodplains and without flood protection. Recently, the UK government created the Planning Policy Statement in collaboration with insurers, which sets out the Government's national policies on different aspects of land-use planning and flood damage reduction. These policies were one of the main conditions put forward by UK insurers for continuing to provide flood cover (Primary Document 44).

A final but important aspect of the regulatory power of the insurance industry in England is ABI's guidance on insurance and planning in flood risk areas for local planning authorities in England (Primary Document 65). This guidance provides guidance for local governments when producing Local Plans or dealing with planning applications in flood risk areas. It is designed to be considered in the context of the National Planning Policy Framework.

In the USA the NFIP develops in cooperation with the NFIP flood risk policy and is able to enforce policies and programmes via the NFIP, therefore the regulatory power of the NFIP in the USA is relatively big. However, the insurance industry itself lacks power since NFIP is a government funded programme. The sale of flood insurance is subject to FEMA rules and regulations. And private insurance companies participating in the program must be licensed and regulated by states in which they wish to sell the flood insurance (Primary Document 52).Along with the insurance, participants and the communities the participants live in are obliged to enforce ordinances of the NFIP. If communities do not adopt the measures instructed to they can be placed on probation or be suspended from the program. The FEMA will offer help if necessary.

Loss-reducing incentives & Mitigation Measures

In this paragraph is outlined how the insurance industry in the assessed countries influence behaviour of people by setting loss-reducing incentive.

In the NFIP programme different sorts of deductibles are available which pursue mitigation and vulnerability reduction. The NFIP offers five main mitigation grant programmes that provide funding to local communities for investments in flood damage mitigation measures but also funding for recovery from a flood.

First of all to join the NFIP, communities have to go through two separate phases:

Phase 1- communities are required to present an appropriate risk mitigation plan for their community, and need to meet general flood risk management requirements set by FEMA;

Phase 2 - flood risk maps are created by FEMA that depict the 1/100-year floodplain within which it is compulsory for homeowners with federally backed mortgages to purchase flood insurance.

Furthermore, communities can enrol in the "Regular Programme" that enables them to acquire full NFIP membership. The NFIP requires participating communities to adopt certain flood damage mitigation. These premium reductions can be obtained by participating in the community projects. In addition to the community discount, individual policyholders can also receive discount on their premiums through elevating buildings above a certain water level. Primary Document 44 describes the operation of NFIP deductibles. NFIP deductibles are mainly offered in relation to community action as a whole. If communities join the NFIP's Community Rating System (CRS), their policyholders may receive a discount on flood insurance premiums. The CRS recognizes communities for their additional efforts to reduce flood damage to insurable property; strengthen and support the insurance aspects of the NFIP; and encourage a comprehensive approach to floodplain management. The discount on their annual flood insurance premiums can range from 5% to as much as 45%, based on the community's CRS Class. Properties located outside the Special Flood Hazard Area receive smaller discounts.

Primary Document 44 indicates that in general, the NFIP has been quite successful in reducing vulnerability of new buildings to flooding, but the programme has been less effective in reducing the vulnerability of existing buildings and limiting development in areas prone to flooding.

An increase in flood risk in England (due to climate change, cut flood defence spending and flood plain development) has made British insurers invest in hazard maps and GIS data to enable them to charge differential prices which made household flood insurance no longer a commodity with a standard price for all. This model did not hold any more because competition in safe areas forced insurance industry to diversify their premiums. This makes it more interesting to live in safer areas.

In Belgium damage mitigation measures are being conducted through local flood mitigation plans. The objective of these plans is to map flood risk zones and to prescribe flood prevention and mitigation measures. These plans are designed based on a 1 in 100 year flood zone and try to stimulate investments in both risk-reducing measures by individual homeowners and discourage new development in flood-prone areas. Deductibles on premiums are set to encourage communities and households to undertake individual risk-reducing measures. The deductibles and premiums are a fixed percentage of the underlying insurance contract and do not allow differentiation according to risk. As Paudel (2012, Primary Document 44) says no premium discounts are provided to policyholders who invest in mitigation. Except for partly risk-based regional premiums, there are no incentives for mitigation. The most important provision that gives an incentive to limit future damage is the delineation of flood zones on the flood maps upon which the risk premiums are based. In flood-prone areas with an extremely high flood potential, the Belgian government advises that new construction or settlements should not be built, and people may be excluded from flood

insurance if they neglect this advice. Except for partly risk-based regional premiums no incentives for mitigation are included in the premiums or conditions for the Disaster Fund.

Primary Documents 13 and 33 do not believe in flood protection at object level, e.g. home level. These types of measurements only have effect if the flood does happen and makes the return rate of these measurements extremely low. This is illustrated by the following in Primary Document 7: "It probably makes good sense to avoid carpet on ground floor levels in the flood plains where the probability of 'wet feet' is relatively high, it makes little sense to avoid a wet carpet when a flood causes the house to be washed away". A positive note by Jongejan (2007) in Primary Document 7 is that loss-reducing premiums make people 'feel' the costs of living in a flood prone area and may stimulate them to consider whether it is worth taking the risk. It should however be kept in mind that insurance premiums and deductibles by themselves do not create incentives to mitigate risks. Insurance contracts contain deductibles to maintain incentives (reducing moral hazard). And insurance premiums only provide an incentive to move to low risk areas when people would otherwise be compensated for their losses by charities or governments. Without the prospect of disaster relief, rational individuals would try .

5.2.4. Flood insurance – The Dutch case

In this section, according to the fourth main theme of the conceptual model (figure 6, p.36) attention is paid, based on data analysis, to the opportunities, threats, advantages and disadvantages of flood insurance for the Netherlands. The subsections relate to subjects the data output related to as result of the inductive character of this study.

Flood insurance in the Netherlands

The Dutch Association of Insurers has made a proposal to introduce flood insurance as mandatory element of home insurance (Primary Documents 23 and 27). This proposal is rejected by the Authority of Consumers in June 2013 because it would include an inappropriate increase in costs for homeowners. Besides the Authority of Consumers also Jongejan (2013), Primary Document 13, is against this proposal. According to him a mandatory flood insurance is the same as raising tax via another canal. The major point of critique is this form of tax levy is being withdrawn from democratic checks and balances. Important in this discussion is the question what would be achieved with introducing a mandatory flood insurance in the Netherlands? And secondly is there a demand for flood insurance in the Netherlands? Jongejan thinks these are the two major questions that need to be answered, besides the underlying the question why is there no flood insurance yet?

Another point of critique from Jongejan (2013, Primary Document 13) regarding mandatory flood insurance is that it seems a market is being activated, while by obliging people if you the market is artificially created. In respect of this the Dutch Association of Insurers doesn't see the possibilities for a pure private insurance program in the Netherlands.

In line with the Dutch Association of Insurers Aerts (2009, Primary Document 8) considers a mandatory insurance necessary. According to him mandatory insurance suits the solidarity of

our welfare. A large scale flood would harm the economy nationally which requires solidarity from the low-risk parts of the Netherlands.

Slomp (2013, Primary Document 9) sees as positive side of introducing flood insurance, the Netherlands would be able to reinsure the costs for a natural disaster. This would improve risk spreading by spreading national costs internationally. In respect of risk spreading the possibility of a bundled cover seems hard to realise in the Netherlands whereas flood is the only natural hazard threatening the Netherlands. A European bundled cover would offer possibilities.

Demand for flood insurance

Floor risk perception in the Netherlands is low. Aerts (2009, Primary Document 8) has investigated 57 % of the Dutch population considers flood risk to be lower than the chance to be carjacked. Aerts research also showed people are not aware of flood risk and think they are safe and even think they are safer than other parts of the Netherlands. However 63% of the surveyed group is interested in obtaining flood insurance if there is no compensation offered by the government, even 53% would be interested in flood insurance if the Calamities and Compensation Acts stays into force.

Price Dutch flood insurance

Expected by Jongejan (2007 and 2013, Primary Document 13 and 7) Dutch flood insurance will result in high premium costs. Therefore the Dutch Association for Insurers wants to implement a mandatory insurance and government reinsurance. Aerts (2009, Primary Document 8) has calculated premiums would differ per dike ring. High risk areas could reach premiums of 250 euros annually, but per household an average of 20-30 euros a year should be paid for flood insurance. Aerts has shown in previous research Dutch households are willing to pay 120-130 euros for flood insurance a year.

Moral Hazard

As underinvestment can be observed in England. Jongejan (2007, Primary Document 7) stresses if flood damage is financed by insurers moral hazard would be created at the side of the government, because it would lose an important incentive to look after the flood defences; like in England.

Role insurance industry

Jongejan (2013,Primary Document 13) emphasises in the expertinterview that the Dutch situation stands out. The responsibility for flood defences lies with the government for decades and is essential to the wealth known in the Netherlands. Therefore Jongejan wants to make an explicit distinction between the situation of living within the dike rings and outside regarding flood insurance. Within the dike rings the government is responsible for flood safety which justifies water tax to the water boards. Outside the dike rings the government has no responsibility and no reason to provide security. Therefore Jongejan (2013, Primary Document 13)thinks for people living outside dike rings there insurance companies could fulfil roles of flood risk management. In these cases there is need for individual flood protection, financial compensation and encouragement of risk averse behaviour. Taking

individual flood protection measures inside dike rings which could be encouraged by flood insurance, Jongejan considers as idiocy and sees is it as an inefficient tool of damage reduction. According to Jongejan, this realization has already taken place in the 18th century when water boards developed to arrange flood risk protection locally and not individually. Aerts (2009, Primary Document 8) disagrees and has calculated risk reducing measures like tile floors and placing washing machines and boilers upstairs would reduce damage costs enormously, which would encourage Dutch flood insurance.

In relation to a role of insurance companies in flood risk management, the Dutch Association of Insurers does not envisage a larger role than providing compensation and risk dependent premiums (Primary Document 28). Argued is investments in prevention have to be taken care of by the clients themselves, premiums could potential be adjusted accordingly. This is solely potential because The Dutch Association of Insurers states it is to the individual insurer to set their own policy of premium differentiation. However, the Dutch Association of Insurers does aim to discourage living in flood plains if mandatory flood insurance will be introduced. In relation to this Jongejan (2007, Primary Document 7) questions the effectiveness of discouragement and wonders if an insurance contract would be able to stimulate moving to low risk areas. Currently the Calamities and Compensation Act and the actual diversification in water taxes do not achieve this as millions of people live in the low lying western part of the Netherlands and in floodplains.

Part 3

5.3 Results Data analysis in relation to research Questions

In this third part of the Empirical Analysis the results of the data analysis are connected to the research questions. To answer the main question: *"What role can insurance companies play to contribute to the Dutch flood risk management based on experiences abroad?"* The following sub questions will be discussed and answered:

Sub questions:

1. *How are the assed countries in relation to their institutional framework and flood risk policy to be compared to the Dutch situation?*

Clearly observed is the European Floods Directive of great influence on flood risk policy in The Netherlands, Belgium and England. For example 'Room for the River' –policies are implemented in all European countries.

Belgium is clearly less (centrally) organised in relation to flood risk management than the Netherlands, therefore the administrative framework differs greatly from the Dutch flood risk policy which is very centrally organised. Flood risk on the other hand can be compared to the Dutch situation. Compensation was arranged similar to the Dutch situation via the Disaster Fund. Interesting about the Belgium case is, that only recently they decided to transfer from

only government compensation to mandatory insurance. It is not a country in which the culture already was very private orientated, just like the Netherlands. Motivation, beside the argument of solidarity, is lacking. This might be caused by the minimal amount of data in relation to the Belgium case.

Flood risk in England is comparable to the Netherlands, and is high. Different than in the Netherland , where due to a high flood risk a coherent and collective flood risk management has developed, in England institutions work quite independent and have competing and complementary competences. Fragmentation in policy therefore takes place. Remarkable is funding is arranged at central level; which could indicate influence on the allocation to it in relation to policy implementation, this however did data not show. Even because of the fragmentation public accountability is reduced. In the Netherlands there is also fragmentation because of the functional, central and decentral layers that create and implement flood risk policy. However this takes place more organised and aligned and public accountability is evident. Furthermore of great difference is that in England development in floodplains takes place a lot more; low public accountability at the side of the government is part of this problem. Current policies in relation to 'making space for water' and integrated flood risk management align with Dutch developments. An important difference in the institutional framework of English flood risk management is the role of flood insurance which is of great importance in relation to policy creation and compensation.

In relation to the US a similar approach of multi layered safety is applied. However, the system via which implementation takes place is totally different. Flood risk policy is implemented via an insurance programme, instead of government channels as in the Netherlands. Communities are triggered to arrange flood protection by the incentive of joining the NFIP. The Legal Framework clearly shows that apart from engineering measures of flood defence, all other measures are being implemented via the NFIP.

2. *What contributions do insurance companies in England, Belgium and the USA deliver to flood risk management?*

Overall it can be said all distinguished roles of insurance companies (e.g. spreading risk, providing security, regulatory power, modelling and identifying risk, loss-reducing incentives) can be retrieved in one or more models of compensation. Regulatory power, modelling and identifying risk are roles especially fulfilled by the insurance industry in England. In the US the NFIP excels especially in implementing loss-reducing incentives. Spreading risk is also addressed in all three cases, especially as flood insurance is being attached to mortgage lending.

3. *What is the result of the taken measures in Belgium, the England and the USA**?***

The Belgian case is difficult to analyse, only recently flood insurance is introduced and the insurance companies have to find their role in flood risk management. At the moment the insurance industry in Belgium spreads risk via a mandatory flood insurance under the fire insurance of households; which gives the insurance industry a constant flow of incomes. At

the moment there are no incentives for mitigation.

In England, a region where flood insurance is available already for a long time. Developments because of climate change and an increase in demographics ask for an increase in flood protection which requires more government involvement, more investments in flood protection and a reinsurance from the government for the most vulnerable households. This shows a pure private model as effective in England, is not without problems. Furthermore of importance in the English model is the reduced public accountability of the government. Interesting in this respect is the regulatory power the insurance industry has adopted. Because of failing of the government, the insurance industry has informally created policy for development in floodplains, just as the proposed reform of flood insurance in Flood RE. At last of importance is the knowledge the English insurance industry has in respect of modelling and identifying risk. The input of the insurance industry is even used for risk assessments performed by the Defra.

In the USA you see the NFIP is an interesting system in which community action is encouraged. However, in this system the government is not financially relieved since it complements premiums to a level in case compensation is needed the insurance industry is always able to pay out. Even though, premiums for the NFIP are still high compared to other countries. Nevertheless, different from the Dutch situation is premium differentiation which causes households that experience higher flood risk to contribute relatively more than households with lower flood risk. Furthermore deductibles can be granted which encourages individual and community action (with or without help from FEMA) with respect to flood protection. Individual or community action in the Netherlands is always channelled and funded by the government. Apart from the good intentions of the programme, in practice moral hazard exists because the National government pays out via Disaster Funds which reduces the demand for flood insurance; this moral hazard problem needs to be taken into account as pitfall when introducing flood insurance. Finally, a great advantage of the situation of the USA is the expanse of the country; this enables the USA to spread risks without having mandatory flood insurance (except for Special Hazard Areas).

4. *& 5. Could these measures be useful and effective for Dutch policy on flood risk management? And if so, what would be an effective structure?*

In relation to the roles the insurance industry takes up in the three cases the following lessons can be learnt for the Dutch case.

Of great interest for the Netherlands is it to spread risk. Especially since a flood disaster would cause such high costs this would be hard to carry for the small country it is. From the empirical analysis it can be learnt that spreading risk can be achieved via mandatory insurance, flood insurance connected to mortgage lending or by spreading risk over a larger geographical area.

Secondly provided the role of providing security interesting insights for the Dutch situation. In the Netherlands security is provided via flood defences and the Compensation and

Calamities Act. This last measure is questionable because of its incertitude. Flood insurance could improve this. Especially for home owners outside the dike rings that are not entitled to compensation based on the Compensation and Calamities Act. When introducing flood insurance it is advisable not to keep the Compensation and Calamities Act in action to prevent moral hazard and people await compensation from the government instead of purchasing flood insurance.

The regulatory power exerted by the ABI in England is a remarkable role. It indicates the insurance industry can play a monitoring role, is able to provide checks and balances for responsibilities of the government and is able to influence policy. On the other hand, the proactive role of the insurance is caused by the problem of the low public accountability of the government. Subsequent, public accountability is very low because flood damage is compensated by the insurance industry and not by the government itself. Therefore appointed in the expert interviews is that in the Netherlands, because flood damage will be paid for by the government; a monitoring role of the market, the insurance industry, is not necessary as is in England. Furthermore in the Netherlands flood protection is of such importance other actors, besides the insurance industry, will indicate and trigger the government if flood defence is lacking.

In respect of the contribution insurance companies could deliver to risk identifying it is can be concluded enormous expertise is present at Rijkswaterstaat at the moment. If flood insurance is introduced the insurance industry would need the expertise of Rijkswaterstaat to help them identifying and model risk, as contrary to the situation in England. This role for the insurance industry would not be applicable to the Dutch situation in the short term.

In relation the encouragement of individual and community action by loss-reducing incentives in the USA is interesting. More individual action could be encouraged in the Netherlands. Currently community action takes place on behalf of the waterboards. Though the Dutch itself could be made more aware of flood risk and also of the responsibility for protection. Individual triggers via flood insurance could improve this and in relation to this could stimulate action. Especially in cases of communities outside dikerings, community action could help in lowering flood risk and consequently flood damage.

Main Recommendation

Based on the roles the insurance industry is able to play and its advantages and disadvantages it is a fact in the Netherlands flood risk management is well arranged, though providing security by compensation of damage and spreading risk flood insurance could be very useful and effective. Especially, as addressed in the expert interviews in particular, for people living outside dike rings in the Netherlands. This group receives no protection and receives no security from flood defences. For this group (voluntary) flood insurance definitely would be helpful and demanded, and could encourage by use of loss-reducing incentives (individual and community) flood protection.

Mandatory flood insurance in the Netherlands would be like levying taxes which is already

being carried out via the water boards and general taxes and would not be paired with the benefits of investments in flood protection apart from damage compensation. Therefore it would never be considered as replacement of the taxes for flood protection but would increase the costs for households. To lower the costs for flood insurance and to achieve risk spreading mandatory flood insurance would be advocated for and it would fit in the solidary culture of the Dutch. Also research by Aerts (2009) has shown people are willing to obtain flood insurance, which is over 50% which could make mandatory flood insurance available for consideration. Questionable would be, why introduce flood insurance if the benefits of marketfunctioning are lost because of its mandatory character. Alternatively a government fund could be set up for which all Dutch people pay premiums.

For the Dutch situation at the moment the role of insurance companies can exert of spreading risk of flood damage is of great interest. A large flood disaster would imply enormous damage that needs to be carried by the Dutch government. To be able to spread risk over a larger geographical area as in the US it would be advocated for to introduce an European flood insurance. To spread risk even optimal an European all-natural hazards insurance would be a solution.

An European all-natural hazard insurance would reduce the need for the unpopular mandatory flood insurance to spread risk. Because an optimized risk spreading is achieved, premiums will stay affordable and for the people willing to feel more secure. Just as for people living outside dikerings an European all-natural hazards insurance would provide security, with the remark the insurance industry can also reject customers if they consider risk too high. Furthermore, by preventing a mandatory insurance to be introduced the insurance market can really function as market and is able to compete, diversify risks, set premiums unrestricted and create economies of scale. This is in the interest of customers, they are not obliged to anything and if they have demand for insurance they have the possibilities to purchase it. Finally, big European players have certain advantages of scale. They are able to invest in knowledge to evaluate and assess flood risk on an European level without taking into account national interests as representation by national governments will imply. Which could be helpful for making policy on national and international level.

To conclude, a market for only Dutch flood insurance is too small to be able to spread risks and provide security without mandatory flood insurance, especially in relation to the high flood risk the Netherlands is facing. However, Dutch flood risk management could be improved by financial security for home owners, spreading costs of flood damage and improving cross-border cooperation. In my opinion an European all natural hazards insurance could contribute to this, however the structure in which this will be exerted can differ. Thought of can be an EU compensation system for natural disasters or an initiative comparable to the USA's NFIP. Further research for the most effective way to arrange security and risk spreading in an EU setting is necessary.

Chapter 6 – Conclusions and Reflections

Conclusions

This thesis has indicated the different roles the insurance industry is able to exert in flood risk management. However, the roles the insurance industry plays depend highly on the framework and the responsibility taken by the government in the particular country. Also of importance is the culture in relation to solidarity and individual responsibility. Therefore every country is a different case and a different role for insurance is reserved.

The Netherlands is a very specific case, a country where solidarity is highly valued and flood risk management is well organised. However, climate change is an unavoidable development that will increase flood risk at the present moment and in the near future. The Netherlands, which is a densely populated and urbanized country needs to adjust to these developments in which spatial planning plays an important role. These developments relate to higher costs in case of floods. In relation to this the concepts of providing security and spreading risks are important for the Dutch situation in these developments. Floods and flood risk can only be reduced effectively if, in addition to these technical measures, spatial planning regulates land use in areas endangered by floods. In addition land use decisions are decisive for the future impact of flood events. Therefore in relation to spatial planning introducing flood insurance could imply discouragement of development in flood-prone areas, for example pairing insurance to mortgage lending. On the other hand, development could be encouraged if flood insurance is available because relied can be on compensation if flooding takes place. Furthermore, as seen in the USA, loss-reducing incentives can encourage communities and individuals to undertake action. This could also influence Dutch spatial planning e.g. if flood insurance deductibles are offered if communities and or individuals develop their houses and communities according to safer requirements.

Beck indicated as key challenge for decision-makers in the risk society is to design new forms of insurance that will replace the ineffective forms that exist today. The existing roles as indicated in the conceptual framework might be ineffective in the sense they rely heavily on the role of the government. Shifts in effectiveness might be perceived in England where the insurance industry is taking up responsibility, driven by the market, by introducing a new pool for households experiencing high flood risk. Just as introducing a guidance for local planning authorities. Unfortunately the Dutch Association of Insurers has not expressed any initiative deviating from the traditional and existing roles. Therefore it seems the Dutch insurance industry will not be leading a new generation of insurances as asked for by Beck. To construct the risk society as proposed by Beck an European system of compensation is advocated for as Beck sees that processes of compensating casualties of risk events need to be reconstructed into a form that is appropriate for the greater intensity and the broader spatial, temporal and demographic distribution of technological risks. However, initiatives as advocated for from an European Market perspective, resulting in an insurance industry with more volume; skills and experience could lead to this new generation of insurance. For example in relation to Room of the River policies, cooperation among countries and river basins could be arranged and

coordinated via the European industry that is able to collect data its own data beyond borders, provide and identify and coordinate risks complementary to the policy making of national and international governments.

Interesting for further research would be to further investigate the possibilities for an European insurance market in flood risk management in which different sorts of public- and private involvement is possible. Furthermore in relation to the roles of insurance companies other cases or more in depth case-studies could lead to more answers and give an elaborated view on the role of insurance companies in flood risk management.

Reflections

As this was my first research of certain level, the process was hard at times. I have been been struggling with finding the right structure and format. Also in relation to collecting data the insurance industry itself was not willing to participate in forms of interviews which I regret. The interviews held on the other hand were very clarifying, and the interviewees were very enthusiastic about the topic. Although the process was relatively long and difficult, the topic was always interesting to me and I have learned a lot about the process of writing, structuring and doing research.

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Appendix 1 – Overview codes

The codes are depicted per code family. Please see table 2, page 44 for an overview of the code families. The numbers behind the codes e.g. {2-1} indicate respectively the amount of quotations attached to the code and the amount of relations with other codes.

Code Familie : Administrative-Political Structure

Codes (9):
Administrative-political structure in General {2-0}
administrative-political structure of Belgium {3-2}
development in floodplains England {2-1}
Environmental Agency {1-1}
institutional context England {8-3}
local government USA {1-0}
Main rivers in Belgium {1-1}
privatisation watermanagement England {1-1}
Rampenfonds Belgium {4-1}

Code Familie : Flood Risk in general

Codes (21):
climate change more floods {3-0}
condition flood defences England {1-0}
development in floodplains England {2-1}
Figure Societal risk {1-0}
flood damage England {1-0}
flood risk Belgium {2-0}
flood risk England {7-0}
flood risk UK {5-0}
flood risk USA {8-0}
Flooding is the number one nat.. {1-0}
Individual risk {2-0}
lessons learned in England summer floods 2007 {1-0}
low probability flood risk {4-0}
Main rivers in Belgium {1-1}
Overview of flood prone parts of the Netherlands {1-0}
Recent report found 55% of the.. {1-0}
restrisk {1-0}
risk analysis {3-0}
Risk perception {1-0}
Societal risk {3-0}
Storm of 1953 {2-0}

Code Families : Flood Risk Policy in general

Codes (67):
Belgium flood risk policy {1-0}
Belgium mandatory insurance {5-0}
condition flood defences England {1-0}
conditions of effect Gentlemens greement {1-0}
conflict flood risk and development {1-0}
conflict flood risk management and need for houses England {2-0}
cost-benefit analysis {11-0}
costs flood risk policy England {3-0}
costs NFIP policy {1-0}
Crisis management and disaster relief {3-0}
cross-subsidiy Flood RE {1-0}
damage recovery after summer floods in England {1-0}
development in floodplains England {2-1}
Dutch safety levels {2-0}
English Flood management {1-0}
Environmental Agency {1-1}
exit Gentlemen's agreement {1-0}
FEMA {3-0}
FEMA hazard mitigation grang program {2-0}
figure a multi-layerd insurance program {1-0}
Figure Cost-benefit Analysis {1-0}
Figure Economically efficient flood probabilities for dike ring sections {1-0}
Figure Population Density the Netherlands {1-0}
Finance Dutch water management {10-0}
Flood 1993 1995 {4-2}
Flood damage in the Netherlands per {1-0}
flood hazard management England {1-0}
Flood RE {4-0}
Flood Risk in the Netherlands {9-0}
flood risk management Belgium {2-0}
flood risk mangement England {3-0}
Flood risk policy {21-0}
Flood risk policy England {14-0}
Flood risk policy in short {1-0}
flood risk policy USA {5-0}
Fragmented flood management in UK {1-0}
future Flood Re {1-0}
Gentlemen's agreement {2-0}
hazard reduction {9-0}
history England flood riks policy {6-0}
Importance of investment in prevention measures {1-0}
Improvement flood defenses in short {1-0}
increase in financial burden because of Dutch flood insurance {1-0}
Increasing flood risk the Netherlands {1-0}
jobs {3-0}
land use planning {1-0}
local government USA {1-0}

New agreement UK {6-0}
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