Chapter 1 Introduction

1.1   Quick tour

The concept of sustainable development was launched in the report "Our Common Future", published in 1987 by the World Commission on Environment and Development. The commission was set up by the United Nations in 1983 to re-examine the environmental and development problems on the planet and to formulate realistic proposals to solve them. The concept promises a solution for two of the most profound problems of human society at this moment in history. No wonder, almost instantly, the concept became popular among governments and businesses, in rich as well as poor countries. It is fifteen years later now, and where has the debate on sustainability taken us?

To provide some answers to this question, the dissertation investigates how water companies deal with the concept of sustainability. They have an interest in sustainable development because it contributes to a cleaner resource. Therefore, they are expected to have a positive attitude towards 'sustainability'. In the period the research was carried out, a hot debate about liberalization of water companies was going on in the Netherlands. This made the results extra interesting, because it raises the question of how the market economy influences the sustainability debate.

The water companies are approached from an unusual angle. Instead of developing an instrument to measure their 'sustainability performance' from the researchers perspective, this thesis examines what sustainability means from the water companies' perspective. A mix of ethnographic, grounded theory and case study methods was used to find out how this 'tribe' of water company people looks at sustainability, why these people see it that way, and how these views guide their practices. Based on these findings, conclusions are drawn on the social construction of sustainability.

1.2   How to find a focused research topic

1.2.1   Initiators, hosts and goals

This study was initiated by the Science Shop of Tilburg University. Next to providing advice to non-profit clients in short term projects, the Science Shop hosts longer term dissertation research on recurring themes. In 1994, it published a dissertation about legal protection of brook systems. To add to the knowledge on problems with water systems, the Science Shop initiated two follow-up projects on sustainable groundwater management. One project started in the Law Department, the other, this study, started in the Economics Department of Tilburg University.

A research question had to be formulated, based on the keywords groundwater, sustainability, and economy. A first proposal was written by the staff of the Economics Department, focusing on what strategy is developed by industries with a high water use to deal with groundwater scarcity. I was hired in 1998 to develop a more elaborate research proposal that would be both scientifically and societally relevant.

After one and a half years, the environmental management group to which I belonged moved from the Economics Department of Tilburg University to the Social Sciences Department of

Erasmus University Rotterdam. This meant that the formal involvement of the Science Shop in this project ended; contacts continued on an informal basis.

1.2.2 Field study leading to a focus on water companies

With the keywords groundwater, sustainability, and economy in mind, an exploratory field study was done. Its goal was to get an overview of all relevant actors, issues and positions, problems and solutions in one region, the Province of Noord-Brabant. This involved literature as well as interviews (for a list of interviews see annex 3).

The field study made it clear that groundwater problems are quite serious. The quality of groundwater is being threatened by pesticides and nutrients from agriculture, and to a lesser extent by pollutants from industry and traffic. Nitrate is found at 10 metres below grassroots level, and in many places even at 20 to 30 metres. It is proceeding towards the deeper groundwater layers. Water companies and industries usually extract groundwater between 60 and 150 meters, but eventually the pollution will arrive in those aquifers as well. This is an irreversible process; it can at most be slowed down using less manure and fertilizer.

The quantity problems are generally described as 'desiccation' in Dutch water policy. Natural groundwater levels fluctuate between summer and winter, and can also differ in exceptionally wet or dry years. In the higher areas of the Netherlands, the average groundwater table went down from 0,1 metres to 0,4 metres below soil surface (RIVM, 1999, Milieubalans 1999). This causes damage in water-dependent nature, because its vegetation relies on natural groundwater levels. Also farmland increasingly suffers from droughts in summer, which is solved by irrigation with groundwater, aggravating the desiccation in nature parks. Desiccation has a number of causes (RIVM, 1995):

- Water boards and farmers drain farmland during winter, to make the land accessible for agricultural vehicles early in the season. This drainage inhibits groundwater replenishment (estimated as 60% of the cause).
- Water companies and industries extract deep groundwater in high areas, which reduces welling of groundwater in low areas (20% of the cause).
- Infrastructure and urbanization in low areas require continuous pumping (20% of the cause).

Quality and quantity problems are interrelated. After the water boards have pumped away the surplus rain in winter, there usually is a water shortage in summer. This is solved by transporting surface water from large rivers (mostly the Rhine) to farmland. Surface water is more polluted than rainwater, resulting in pollution of nature reserves. Pollution by exogenous surface water is included in the Dutch definition of 'desiccation'.

In general, water is not scarce in the Netherlands. Only the clean resources are under pressure (see Table 1.1). 69,000 million m^3 water enters through the river Rhine every year. The nett replenishment of groundwater from rain surplus is only 2,615 million m^3 a year. This is why surface water is often seen as the most sustainable resource in the Netherlands (Baan and Savornin Lohman, 1992). The extractable amount of groundwater is estimated at 1,900 million m^3 a year (Dufour, 1998 p110). This estimate is based on technical and economic criteria. About 1,553 million m^3 a year was extracted in 1990, and the amount has stabilized since then.

Table 1.1: Dutch hydrological cycle (NHV, 1998 p23; Dufour, 1998, pp.17, 28)

	million m³ water a year
Precipitation (in)	29,100
Rhine (in)	69,000
Meuse (in)	8,400
Other river inflows (in)	3,000
Total in	**109,500**
Replenishment of groundwater aquifers	2,615
Evapotranspiration (out)	21,400
Use of groundwater and surface water (out)	2,100
River outflow to sea (out)	86,000
Total out	**109,500**

Many social actors influence the groundwater situation, all with different interests and views. Under the national policy of 'Integrated Water Management', coordination is increasingly sought. Governments, public and private companies, and NGOs form a network of organizations involved in groundwater management. Their interactions drive the decision making process (Morgan, 1997).

Such a complex field creates an abundance of uncertainties and unanswered questions, not in the least for the participants themselves. It is impossible to provide all answers in one PhD project, so I chose to focus on one actor. Among the possibilities were provincial governments and water boards, but the governmental viewpoint was already covered in the Law Department project. In the private and semi-private sector the actors are water companies, farmers and industries. The choice fell on the water companies because they are the largest users of groundwater resources, according to the available data (see Table 1.2).

Dutch water companies are public utilities with local and regional governments as shareholders. Customers pay a charge per cubic metre to the water companies, based on cost price. The companies have a lot of autonomy in deciding how to invest their income, though they have to consult the shareholders about large investments. Traditionally, water companies are not involved in sewerage and wastewater treatment in the Netherlands; this is the responsibility of municipalities and water boards, respectively.

Table 1.2: Total groundwater extractions, licenses, goals and estimates in the Province of Noord-Brabant in million cubic metres a year (Studiecommissie "Water op Maat", 1997):

	Extractions 1991	**Extractions 1996**	**Extraction licenses 1995**	**Goal 2000 (Prov. water management plan I)**	**Estimated demand 2000**
Water companies	236	229	264	246	325
Industry	62	49	65	46	
Irrigation / Agriculture *)	92	76		39	
Other	45	49		27	
Total	**435**	**399**		**358**	

*)   There are about fifty thousand farmers in the Netherlands; in a dry summer, they are estimated to extract the same amount of groundwater as water companies. Their separate extractions are not large enough to need an extraction license; therefore, reliable figures are not available.

Water companies need clean water resources, so they are expected to welcome a concept like 'sustainability'. They operate on a stable market in the rather wealthy economy of the Netherlands, so they must be able to invest in technology, if necessary. They function under Dutch legislation and policy, and the Netherlands are generally seen as one of the most successful nations in environmental policy performance (Dryzek, 1997, p. 137). These circumstances enable water companies to operationalize sustainability more elaborately.

Because of the liberalization trend in Europe, water companies are urged to operate more according to market principles. Dutch drinking water regulations are being revised, so in this period of uncertainty "anything can happen", and water companies started to experiment with new strategies. This divergence makes it extra interesting to investigate these companies.

1.3   Meanings of sustainability

To research the sustainability of water sector strategies, we have to know what the concept of sustainability means.In section 1.3.1 we explore the origins of the concept, finishing of with the definitions published by the Brundtland commission in 1987. Discussions about the meanings of sustainability in the scientific literature are explored in sections 1.3.2 and 1.3.3. In section 1.3.4 some operationalizations to the water domain are explored. In section 1.3.5 the consequences for this study will be assessed.

1.3.1   Origin of the concept: from 'Club of Rome' to Brundtland

The term sustainable development was developed in a United Nations context. The word 'sustainable' was first used in a debate about renewable resources such as forestry and fisheries (Dryzek, 1997; Bebbington, 2001). The phrase 'sustainable yield' meant 'an output that would keep the output-generating capacity of a local or regional system of renewable resources intact'. Based on this concept, a 'maximum sustainable yield' can be calculated for every natural resource. This yield is perpetual as long as the system boundaries are respected.

The terminology entered the 'Limits to Growth' debate which had started since the publication of the 'Club of Rome' report in 1972. This debate questioned whether continuing economic growth would lead to environmental destruction (Pezzey, 1992). In the 1970s, the debate was polarized, because of claims that capitalism destroyed the earth, and that a whole new societal design would be necessary to save it. In 1980, a coalition of moderate NGOs and UN organizations was formed (Hajer, 1995, p. 97). They published the 'World Conservation Strategy' (IUCN 1980) which explicitly argued for 'sustainable development': conservation of nature, efficient resource utilization and considerate environmental planning. These goals were presented as being possible within existing societal institutions as democracy and a free market. This less confrontational approach caused a shift in the environmental debate, and led to a stronger involvement of supra-national organizations such as the UN. It also meant that the concept of sustainability was reframed as compatible with capitalism.

The next influential event is an OECD conference on Environment and Economics in 1984 (Hajer, 1995, p.97). The OECD was the first to frame pollution problems as inefficiency: 'pollution prevention pays'. This not only emphasizes compatibility of environment and economy, it even frames sustainability as serving the self-interest of commercial companies. This second change in the meaning of sustainability made it possible for the ministers of the European Community to agree on a statement about 'sustainable development' at the end of the conference (Hajer, 1995, p.29).

In 1987, the World Commission on Environment and Development (or Brundtlandt Commission) publishes the report "Our common future". The commission was set up by the United Nations in 1983 to re-examine the environmental and development problems on the planet and to formulate realistic proposals to solve them ("…the downward spiral of linked ecological and economic decline in which many of the poorest nations are trapped."; p.xii). In the report, the concept of sustainable development has a prominent role. The Brundtland

commission defines it as follows: "Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs" (WCED, 1987, p.43). This definition has become widely known, especially the phrase 'future generations'.

The WECD states that the needs of the poor are to be accommodated by economic growth. The adverse effects of economic growth on natural resources should be limited by technological innovations, which reduce the amounts of material and energy needed for the same functions. The commision thinks economic development can be sustainable, if it takes its dependence on the natural environment into account ("What is needed now is an era of economic growth – growth that is forceful and at the same time socially and environmentally sustainable", p.xii).

Table 1.3: Most urgent domains for sustainability (WCED, 1987)

Chapters	Basic ideas
Population and human resources	The population problem is not about numbers, but about how those numbers relate to available resources. Should be dealt with by: - Eliminating mass poverty; - Education to improve management of resources; - Providing people, especially women, with facilities and education that allow them to choose the size of their families; - Tribal and indigenous peoples must have a decisive voice in how to develop their areas.
Food security: sustaining the potential	Global agriculture has the potential to grow enough food, but often it's not available where it is needed. Solutions: - Incentive systems for small farmers in developing countries to grow food crops; - Industrialized countries must cut surpluses and reduce unfair competition; - Promotion of ecologically sound farming practices; - Land reform and other efforts to improve purchasing power of small farmers and the landless.
Species and ecosystems: resources for development	Species are disappearing at a higher rate than before. They are necessary for the biosphere to function as a whole. Solutions: - To stem destruction of tropical forests and other reservoirs of biodiversity while developing them economically; - To bring large areas under some degree of protection; - To design a 'species convention'.
Energy: choices for environment and development	Bringing developing countries to a level comparable to industrial countries would mean that present energy use multiplies by a factor of five, while threats of global warming and acidification rule out even a doubling of energy use. Solutions: - Energy efficiency policies and a redesign of appliances; - Research and development on environmentally sound energy alternatives; - Improving safety of nuclear energy; - Producing more wood and plant fuels in developing countries; - Governmental pricing policies to encourage energy saving.
Industry: producing more with less	Raising the consumption in developing countries to the industrialized level would require a five to tenfold increase of manufacturing output, with corresponding emissions of toxics and waste as a negative side effect. Solutions: - Anti-pollution technology; - Increased material efficiency in production and products; - Tighter control on export and dumping of hazardous waste.
The urban challenge	More and more people migrate to urban centres, but few city councils in developing countries have the power and resources to provide them with the facilities needed for an adequate human life: clean water, sanitation, schools and transport. Solutions: - Building smaller towns and cities to take pressure off the largest urban centres; - Decentralization of funds, power and personnel; - Cooperation with the majority of urban poor.

In the Brundtland report the meaning of the concept is expanded for the third time. The term now applies to a global level, because of the relationship between rich and poor nations; and to renewable as well as non-renewable resources. The principle of sustainability promises an answer to all societal problems: those of the poor, those of the rich and those of nature. Table 1.3 shows the most urgent problem domains according to the Brundtland report. Water is not one of them yet.

The Brundtland report contains a second definition that is used less often:

"Sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations." (p.46)

This emphasizes that sustainable development is not a steady state or utopia: it is a *process of change* towards meeting human needs. On the one hand this definition is strict, because it prescribes everyone to join in and cooperate in harmony; on the other hand, it is lenient, because it does not say how fast this process should be.

1.3.2 Rio Summit and after: views on sustainability

Use of the term sustainability was further enhanced by the Summit in Rio de Janeiro in 1992. At this event, the concept was embraced by the 171 national government delegations (Dryzek, 1997, p.127), but equally there was a lot of debate about its content. According to Hajer, the Summit was meant to be the culmination of a new ecological consensus, but in reality it proved how many conceptual holes and political ambivalences were still there (Hajer, 1995, p.1). Hildyard (1995, cited in Bebbington, 2001) states that the Earth Summit failed, because it did not discuss key structural features of unsustainability: there were "materials for a convention on biodiversity, but not on free trade; on forests but not on agribusiness; on climate but not on automobiles (...) on enabling the poor to achieve sustainable livelihoods, but none on enabling the rich to do so; a section on women but none on men."

In a 1992 World Bank document John Pezzey sums up 33 different definitions of sustainability. Brooks (1992) found at least forty working definitions. More important than how many definitions are produced is what the differences in opinion are about. In this section a series of views on sustainability in the scientific literature will be described. Sometimes the views are contrasting, sometimes they are complementary, and in general, there is little consensus.

According to Pezzey (1992) consensus exists about the core ethic of sustainability: future generations are entitled to at least as good a quality of life as we have now (intergenerational equity). In his paper, he tries to model global sustainability with neoclassical economic methods. He finds fundamental differences in opinion that economics cannot solve (see Table 1.4).

Table 1.4 shows that a term designed for local renewable resources is hard to apply at a global level for all types of resources. The question how to deal with non-renewable resources is unanswered, and the global ecosystem is much too complex for estimating a 'sustainable yield' of anything.

Table 1.4: Some opposing views on sustainable development (based on Pezzey, 1992)

Continuous economic growth can be sustainable.	To achieve sustainable development economic growth should stop.
The aggregate of global resources should not decline.	Every single resource must be conserved: soil and soil quality, ground and surface water and their quality, land biomass, water biomass, and the waste assimilation capacity of receiving environments, at a global and a local scale.
Perceived needs are culturally and socially determined.	A basic subsistence level can be defined, universally applicable for humanity.
Natural resources can be substituted by man-made capital such as technology, in order to make overall development sustainable.	Substitution of natural resources is morally inexcusable and/or physically impossible.
Non-renewable resources can be used as long as resource depletion is compensated by technological research into substitutes.	Only renewable resources should be used.
The goal of sustainability is survival of humanity on the long term; extinction of species is allowed, as long as it does not destabilize the global ecosystem.	Other species have an inherent right to a sustained existence, independent of their instrumental value to man. They have an intrinsic value.
Some countries can rise and others fall, as long as the total sum of welfare is constant (or grows).	High living standards which would be physically impossible for everyone to have, are not allowed.

A representative of the no-economic-growth approach is the 'ecological footprint' of Wackernagel and Rees from the University of British Columbia. They define sustainability as 'securing satisfying lives for all, and staying within the means of natural capital' (Redefining Progress, 2003). Wackernagel and others claim that the human economy was absorbing 120% of the earth's productive capacity by 1999 (Wackernagel, 2002). Their method is based on assumptions about acres of biologically productive space (land and sea) and world average productivity of renewable resources such as crops, fish, and timber. Economist Julian Morris states on BBC News that this conclusion of 20% overdraws is fiction, based on inappropriate assumptions and poor data (BBC, 2002). In essence, the 'Footprint' is a top-down approach, because they calculate a global carrying capacity for human society, and divide this by the number of people on earth.

Contrasting with this, the Global Reporting Initiative (GRI) is a bottom-up approach. GRI is meant as a global effort to operationalize 'corporate social responsibility', a concept related to sustainability, but more oriented towards commercial companies. GRI is founded by Ceres, a federation of US based environmental groups and agencies. GRI actively organizes debates with stakeholders from all over the world. Though the US and Europe are likely to be dominant, everyone across the globe is invited to contribute through the internet (www.globalreporting.org). The goal is to develop agreement on a set of core indicators. split Sustainability is split up iinto environmental, social, and economic performance (Krut, 1999). These aspects can again be split up into criteria and indicators until all aspects of human activities are covered.

Measuring economic performance is the most mature field, though it is still evolving (Ranganathan, 1999). For example, there is a discussion if economic performance is completely equated by financial performance. There have been many initiatives to measure environmental performance, which led to a 'sea of confusing, contradictory, incomplete and incomparable results' (Ranganathan, 1999). Still, standardization of environmental performance is believed to be possible in the course of time. On the social performance indicators much less work has been done. There is scepticism if standardization is possible at all, since 'social performance depends on values, which differ from country to country, and even from person to person' (Ranganathan, 1999). Finally, how information on these performances is to be integrated, is entirely unexplored (GRI, 1999).

A number of authors has developed more holistic guidelines to help businesses make the drastic changes necessary for sustainable development (Gladwin *et al*, 1995; Elkington,

1997; Roome, 1998; Lovins *et al*, 1999; Nattrass, 2000). Of these authors, Roome and Gladwin have a more process oriented view on sustainable development. Roome argues that the concept of sustainable development is contested and that norms change over time. This makes sustainable development a continuous process of learning and action, first in organizational cultures through double loop learning processes and as a consequence also in the entire human society. Gladwin *et al* (1995) argue that two worldviews called techno-centrism and eco-centrism do not match with sustainable development, and that the paradigm must change towards sustain-centrism. This requires shifting from quantity to quality thinking, thinking in systems, and taking responsibility.

Elkington, Nattrass and Lovins *et al* use more law-like sets of principles that should guide businesses towards change. The overview in Table 1.5 shows that businesses have many different criteria to choose from. Again, the question arises if non-renewable resources can be used or not.

Table 1.5: Principles for sustainability (based on Elkington, 1997; Nattrass, 2000; Lovins et al, 1999)

John Elkington: Seven revolutions for the triple bottom line	Brian Nattrass: The natural step for business	Amory Lovins, Hunter Lovins and Paul Hawken: A road map for natural capitalism
1. Develop a triple bottom line strategy to cope with accelerated competition. 2. Incorporate human and societal values. 3. Become transparent. 4. Manage life cycles of technologies and products from cradle to grave. 5. Form partnerships with other businesses, governments and 'strange alliances' with former critics from NGOs 6. Think across decades instead of 'just-in-time'. 7. Become a sustainable corporation in 39 steps.	1. Leave metals and fossil fuels in the earth's crust. 2. Do not produce persistent, human made substances. 3. No over-harvesting or other forms of ecosystem manipulation. 4. Use resources fairly and efficiently to meet basic human needs.	1. Dramatically increase the productivity of natural resources (material and energy efficiency). 2. Shift to biologically inspired production models (closed loop systems). 3. Move to a solutions-based model (services, not products). 4. Reinvest in natural capital (restoration of ecosystems).

Whereas the above mentioned authors think that sustainable development requires drastic change, there are also authors who assume that sustainable development does not require a fundamental change in the present economic system. Just as the welfare state proved to be compatible with capitalistic structures, caring for natural resources can be integrated without much difficulty (Van den Daele, 1998). Björn Lomborg is an extreme representative of this view. In his book "The sceptical environmentalist" he states that the world gets better all the time, thanks to the existing societal structures (Lomborg, 2001).

Besides differing opinions about economic growth and the different pathways towards operationalization, there are also different opinions on which problems are the most urgent ones. For some authors alleviating Third World poverty is an absolute priority. Prahalad and Hart encourage multinationals to develop innovative products and services for the poorest 4 billion people on earth in the name of sustainable development (Prahalad, 1999).

Other authors prioritize biodiversity. For example the Sierra Club, a California based NGO concerned with nature reserves and nature conservation, holds the opinion that "the

'population explosion' (...) caused an increasing scarcity of wilderness and wildlife and has impaired the beauty of whole regions, as well as reducing the standards and the quality of living" (Sierra Club, 2003). Therefore, the human population needs to be controlled by governments in the US and across the globe.

1.3.3 Sustainability as a contested concept

Most of the literature mentioned in the previous section is normative, change-oriented research[1]. Many authors who generate new definitions are assuming that global carrying capacity can be objectively calculated. This will be very difficult, or may even prove to be impossible (WRR, 1994). The consequence is that sustainability criteria can only be guided by normative views. From this point of view, sustainable development is a subjective exercise. So next to the range of objectivist views on sustainability we now also have subjectivist views. A leading author in this area is Maarten Hajer.

According to Hajer, the concept sustainable development helped in arriving at an ecological modernization consensus: "One of the main achievements of the Brundtland report is to have presented the environmental case in such a way that it could bring round big institutions like the World Bank and the IMF" (1995, p.12). The initially radical environmental movement of the 1970s is reformed into what he calls 'ecological modernization'. The ecological modernists think that environmental problems can be solved within existing institutional arrangements: democracy, market economy, and a traditional relation between science, technology and politics.

In Hajers view, sustainable development presents the environmental problem as a positive-sum game, instead of criticizing economic growth (p.65). Thus it is attractive to large groups of producers, consumers, and politicians. It does not please everyone though: radical critics fear this will end the debate about fundamental causes of the environmental crisis (p.12). Hajer states that the concept of sustainable development facilitated the first global discourse coalition in environmental politics, but "the paradox is that this coalition (...) can only be kept together by virtue of its rather vague story-lines at the same time as it asks for radical social change" (p.14).

Sustainable development is nothing else but a discourse, says John Dryzek, since sustainable societies hardly exist, "save in small scale hunter-gatherer and agrarian societies" (1997, p.123)[2]. He defines sustainable development as follows: "It refers to the ensemble of life-support systems, and seeks perpetual growth in the sum of human needs that might be satisfied (...) through intelligent operation of natural systems and human systems in combination". Because it has become the dominant discourse, actors try to influence the meaning of sustainability to their advantage: environmentalists try to build in intrinsic values of nature, Third World advocates stress the need for global redistribution, and businesses equate 'development' with 'growth'. It is an important concept, comparable to a term like 'democracy' and so its essence is contested in a political debate.

By the year 2000, it has become clear for most researchers that the concept of sustainable development means different things to different people in different contexts (Bebbington, 2001). In the debate a 'weak versus strong' pattern can be discerned (Springett, 2003; Bebbington, 2001), or 'anthropocentric versus ecocentric' sustainability. Table 1.6 shows some assumptions on which 'strong' and 'weak' sustainability are based.

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[1] Roome has an intermediate position because he is change-oriented but also process-oriented, without using any fixed norms on what to achieve.
[2] This is opposite to what Prahalad and Hart think.

Table 1.6: Basic assumptions underlying 'weak' and 'strong' sustainability (adapted from Bebbington 2001)

Aspect	'Weak' sustainability	'Strong' sustainability
Focus of sustainable development	Prevention of environmental catastrophe that would threaten human society	Fundamental examination of human-environment relationship
Nature-human interaction	Nature is a resource mastered by humanity and should be handled with more care	Humans and nature are two separate things, harmony is sought
What to sustain	Human society	All species, including humanity
Gap between present and sustainable future	Present situation is nearly sustainable, incremental change over the next 30-50 years will do	Present situation is a long way from sustainability, may take 150-200 years to solve
Required process	Legal arrangements, market forces and technological development	Participatory process aiming at behavioural change, technical solutions have limited value
Relevance of ecojustice	Environmental and economic issues prevail, social goals will automatically be reached later	Intra-generational equity and third world conditions are an essential part of sustainability
Relevance of economic growth	Economic development is essential for the pursuit of sustainability	Economic growth must be abandoned or refined

There are many parallels between Table 1.6 and the differences identified by Pezzey (see Table 1.4). Pezzey frames the debate as a scientific one: if these questions are answered, we know what to do. Although this may be partly true, the debate is also caused by ideological differences and differences in interests, especially concerning equity and biodiversity. The main debate seems to be about whether our present economic system can deliver sustainability or not (Bebbington, 2001).

Springett also sees the concept as essentially contested (2003). Her critical view is that the sustainability discourse has been captured by capitalists, in order to neutralize its potentially revolutionary content. Commercial businesses have redefined it as 'green business as usual'. If the environment is discussed, this is done in economic terms: natural resources, natural capital. Themes like exploitation, repression and unfairness are pushed off the agenda. Especially the 'triple bottom line' translation by John Elkington helps to tame the concept, she argues, because it can be used as an excuse for continued economic growth.

I think, however, that it is doubtful whether the 'capitalists', or commercial businesses, even recognize a potentially revolutionary content in the concept. Business managers think their enterprise is beneficial for society, providing people with products, profits and jobs. Confronted with the concept of sustainability, they mainly think of internalizing environmental externalities, not of neutralizing revolutionaries. They are truly surprised and disappointed, when their 'Total Quality' efforts are not appreciated by environmentalists (Tukker, 1999).

Does the concept of sustainability have a revolutionary content? Does the finiteness of natural resources force the wealthy to share their possessions with the poor, and does it require a whole new societal design to force everyone to stay within the earth's limits, an ecocracy? Hans Achterhuis has an interesting view that explains the relation between economic growth and finite natural resources, inherent in the concept of sustainable development. According to Achterhuis, there are three basic human instincts that potentially lead to continuous war of all against all (Achterhuis, 1988):

- innovativity, which continously generates new objects that people wish to own;
- greed: the tendency to want what our neighbour has, even though we did not need it before we knew it was there;
- the tendency to be violent towards other human beings.

In the Middle Ages, these instincts were controlled by tradition and Christianity. It was a God-ordained order to follow in your father's footsteps, and to stay poor if he was poor. If a person

had no income, he could not marry, and if a person was not married, he could have no children. Since the 'Enlightenment' of the 17th century, the belief slowly spread in Europe that humans were all equal, and that everyone had a right to use his inventiveness to strive for happiness. This unleashed the basic human instincts again, leading to the threat of a war of all against all, so the concept of economic growth was constructed to pacify humanity. The message of this concept is, "Wait, there is no need to attack your rich neighbour, your time will come, the economy is still growing".

In 1972, the message of the Club of Rome was that the earth's resources are finite. This threatened to destroy the 'economic growth' paradigm. Therefore, the environmental debate did have a potentially revolutionary content in the nineteen seventies. The debate was appropriated by business interests during the eighties and nineties, which turned the issue into ecological modernization (Hajer, 1995). The concept of 'sustainable development' can be seen as the ultimate outcome of this process. The Brundtland commission did not have revolution in mind. It tried to generate a concept that would unify, pacify, and focus on 'our common future'. It explicitly chose for economic growth, in other words, to stay within the dominant market paradigm.

The concept of sustainability encompasses three goals, economic growth, social equity, and the conservation of nature and the environment. These goals are only contradictory for those who assume that we are close to the planet's limits (Springett, 2003 p82, 84), in other words, for those who adhere to the 'strong' version of sustainability. By taking an anthropocentric view, like Björn Lomborg does, the moment that we actually run into the earth's limits can be postponed for several centuries, or even millennia.

The main difference between the weak and strong views is not so much that only human welfare is valued in weak sustainability, and only nature is valued in strong sustainability. The main difference lies in how these views deal with the wealthy. In weak sustainability, the rich can keep what they have, and nature is exploited further by the poor to achieve the same wealth. Strong sustainability implies a redistribution to give a bit more to the poor, and much less to the rich, to restore the balance between humanity and other species. This difficult redistribution issue is avoided with the weak version of sustainability. Which of these views is chosen depends on one's estimate of the earth's condition. The earth's resources are limited, but maybe we are not even near these limits (Lomborg, 2001). Then it would be silly to go through the upheaval of a global restructuring of human society. As long as the questions about the state of the global ecosystem are not answered, the debate on sustainability will continue.

In my view, the 'weak' versus 'strong' debate is also an 'economists versus ecologists' debate. Economists work with the central paradigm of economic growth. In economic science, it is possible that the global Gross Domestic Product, or the total amount of money on earth, grows every year. It can be a trillion dollars this century and a zillion in the next. And of course, when the stock exchange crashes, millions of dollars can evaporate in minutes. John Pezzey states that capital is measurable (1992, p.2), which is true, because money is the best-recorded data in the world. At the same time, hard cash is virtual, because it is a human institution, based on human agreements and a belief in money. Constant recording is necessary to keep money as such in existence and to constantly renew the agreements between people about monetary values of all their assets.

Ecologists have a different view of the global system. They see the biosphere as a fragile layer of finite materials, which are used by a large variety of living beings in intricate, connected cycles. The finiteness of materials leads to competition, which in turn leads to natural selection and evolution of species. Creativity is built into genetic material, leading to an ongoing growth in variety and complexity. This is the kind of growth valued by ecologists.

They do not believe that perpetual growth of human wealth is possible without a decrease in the wealth of other species.

In the sustainability debate, economists and ecologists have tried to find common ground. They found it in long-term thinking, intergenerational justice, and taking environmental damage seriously. However, they have different views on all the issues mentioned in Table 1.4. They probably also fundamentally misunderstand each other. The economists cannot deal with the finiteness and irreplaceability of natural systems. They describe the environment as being dependent on economic growth, instead of the other way round (Springett 2003, p.81). The ecologists cannot deal with human freedom and innovativity and, therefore, they are unable to develop an attractive alternative society.

1.3.4 Meanings of sustainability in the water sector

The Brundtland report pays surprisingly little attention to water issues. Because of pressure from governments and NGOs it does appear in the Agenda 21 in 1992 (Donkers, 2000). In 1997 the first World Water Forum is organized in Marrakech and in 1998 the World Commission on Water is initiated. The second World Water Forum takes place in 2000 and the Third in 2003. In the preliminary forum statement from the Third World Water Forum, sustainability has a prominent role: *"Fresh water is a precious and finite resource central to sustainable development, economic growth, social stability and poverty alleviation."* (http://www.world.water-forum3.com). The most urgent concern of the forum is "*global water security*" or the lack of good drinking water and sanitation for poor people around the world. It should be provided with the help of private capital and preferably within environmental limits.

In an article preceding the Third World Water Forum, Donkers lists criteria for sustainable water management (Table 1.7). He also signals that the World Water Forum committees have not succeeded in working this out in more concrete terms, and that sustainable water management may be far off.

Table 1.7: Criteria for sustainable water management (After Donkers, 2000)

Ecological sustainability	- Annual extraction is at or below annual recharge rate - No negative consequences such as salinization, desiccation or reduction of biodiversity - No water pollution - Problems are not passed on to downstream areas or future generations
Social sustainability	- Less water related disease - Access to water for all - Participation of stakeholders in planning and policy making
Economic sustainability	- Users pay the cost price for water supply and sanitation - Water is used in sectors with the highest economic return - Water is used efficiently
Technical sustainability	- Water supply systems are durable and require little maintenance - Water systems are maintained to stay in a good condition - Water systems bring about efficient use
Political sustainability	- Water policies are integrated - There is enough institutional capacity for preparation, implementation and evaluation of water policies - Institutions, users and stakeholder groups cooperate - Planning processes are open and democratic - Decisions are made at the lowest possible level

Some authors tried to apply sustainability specifically to groundwater resources (for example: Das Gupta and Onta, 1997, Villarroya and Aldwell, 1998). Das Gupta and Onta define sustainable water resources as resources that provide water in sufficient quantity and quality to meet human needs, now and in the future, for an acceptable price, and without environmental deterioration. The authors recognize that groundwater extraction leads to

significant economic and social benefits, but it should not be used above its recharge rate. Not only to conserve the resource for long term use, but also because overexploitation leads to several other environmental problems such as land subsidence and intrusion of saline water.

Other authors such as Custodio are of the opinion that exceeding the limits of a renewable resource is not necessarily overexploitation, because the social and economic benefits can be greater than the environmental damage (Villaroya and Aldwell, 1998). The damage may also take place while better technologies develop.

The main debate is if groundwater should be considered as non-renewable or as renewable. If people would assume it is a renewable, it is still unclear if it can be used above its recharge rate, because there is no scientific agreement how overexploitation of groundwater should be weighed against social and economic benefits. And if they would agree not to use it above its recharge rate, the 'sustainable yield' of the larger Dutch groundwater systems would be unknown.

Even though the scientific debate on sustainable water use is unresolved, many societal actors are trying to translate the concept to their own activities. In the EU Water Framework Directive the term is used casually, as if its meaning were obvious (European Communities, 2000). For example, on the first page of the directive, in the 'whereas' section under 3: "... called for a programme of actions ... aiming at sustainable management and protection of fresh water resources". The term sustainability is not found in the list of 41 definitions (Article 2). Therefore, we'll try to infer the meaning of sustainability in this directive from the textual uses of the term and from the main aims of the directive.

Firstly, important aspects of the directive are the environmental quality goals. Surface water and groundwater have to achieve a 'good' status in 2015, and 'good' is defined in chemical and biological terms in the annexes of the directive (Article 4). Secondly, the directive asks Member States to analyze the status of river basin districts and to produce river basin management plans (Articles 5 and 13). This will enhance a more integrated approach to water systems as well as promoting cooperation between member states sharing a river basin. Thirdly, the 'polluter pays' principle is applied, which means that households, industry and agriculture must pay the full costs of water services (Article 9). This is also supposed to enhance efficient water use.

The impression is that the quality aspects are much better worked out in the directive than the quantity aspects. For water quality chemical and biological indicators are listed, defining when water quality is 'good'. The directive prescribes *progressive reduction of pollution,* suggesting the status quo of 2000 is not acceptable. As far as quantity is concerned, the *prevention of further deterioration of ecosystems* poses quantitative limits on future water use. This formulation suggests the status quo of 2000 is acceptable. Furthermore, floods and droughts are mentioned and people are urged to use resources sustainable, a behaviour to be enhanced by adequate pricing mechanisms. There are no guidelines for 'good' water quantities. Possibly this is because of a lack of information which is likely to improve when river basin analyses and plans are produced by Member States.

With some precaution we conclude that in this directive sustainability means: clean water resources, efficient use, and enabling ecosystems to decline no further than they had in the year 2000.

At the Dutch State level, the Ministry of Traffic and Water Management issued the Fourth Whitepaper on Water Management in 1998. Sustainability is not specifically defined in this document, though it is used extensively throughout the text (sustainable water systems, sustainable economic growth, and sustainable protection against flooding). It is also used in

the formulation of the document's main goal: "Having and keeping a safe and inhabitable country and keeping and strengthening healthy and resilient water systems, which guarantee a sustainable use." Important principles in the document are an integrated approach of quality and quantity problems, to work in accordance with natural processes in water systems instead against them, and to think in larger water systems such as catchment's areas. The document both emphasizes that human uses must be safeguarded for the long term, and that natural ecosystems must become healthy.

A first outline for a new Drinking Water Law is given in the Policy Plan on Supply of Drinking and Industry Water of 1996. In this document the first goal is defined as follows: "The policy regarding supply of drinking and industry water aims at sustainable safeguarding of public water supply, serving health, well-being and welfare of society. (...) Sustainable safeguarding demands on one hand a stringent protection of ground and surface water against pollution and on the other it means that supply of drinking and industry water should not impair the carrying capacity of the environment, necessary for sustainable development." (Ministry of Housing, Spatial Planning and Environment, 1996, p.4) So at this stage, sustainability is a central concern for the ministry.

In the follow-up document of march 1998 this goal is repeated on page 6, but in the accompanying letter the Minister states that "the protection of captured customers and the societal function of water companies" are the central issues in the Drinking water law revision (Tweede Kamer, 1998). This means that the liberalization debate has become central. Sustainability is an element of the 'societal function' of water companies, because it refers to "promotion of efficient water use, for example by water saving and supply of secondary water qualities. Protection of resources, for example by stimulating nature- and environment-friendly land use around water extraction sites, also belongs to their tasks." In the debate triggered by this document, sustainability is used as an argument against privatization: on a free market, the societal functions mentioned above will not be achieved. In April 1998, the Dutch Parliament accepts a vote stating that "the market mechanism in public water supply may have a negative effect on tariffs for captive customers and for sustainable resources management" (Feenstra, 1998). Therefore, sustainability is not the central argument anymore, but still a powerful one.

Another important document is the Vewin Environmental Plan, produced by the Dutch water sector in 1991. It is a reaction to the Dutch Environmental Policy Plan of 1989, in which water companies see a chance to express that water pollution has to stop. "Others pollute water, which forces us to build expensive technology to clean it up, which is not according to sustainability principles", Vewin says. The document sums up the actions necessary to prevent further deterioration of water resources, and to give this more strength the water companies also work out environmental improvement actions for their own processes.

In the Netherlands provincial governments are responsible for regional integrated water management plans. Three examples will be shown.

Firstly the Province of Noord-Holland, that issued a Water Management Plan in 1998. According to this document, "sustainability and livability" are vital goals to safeguard "economic development, while at the same time nature and landscape are protected and developed". The Provincial government explains sustainability and livability further with the following principles:

- Protection against flooding and health risks;
- Retention of clean water within the region;
- Dependence of human functions on the possibilities of the water system;
- Protection of historical values in the landscape;

- Limitation of water costs.

In this translation human interests are important, while the vulnerability of the water system in this area is also recognized.

The Province of Overijssel seems to have avoided the term 'sustainability' as much as possible in its Water Management Plan of 2000. The only reference to the concept is a phrase in Section 1.1: "We want to secure the quality of the living environment, for the present population but also for the next generations". The main principles in this plan are "social quality and well-being". The main goals are leaving room for economic development while at the same time protecting and strengthening important nature areas in the province. Translated into water this means:

- Restoring of the resilience of water systems (desiccation versus safety);
- Enhancing the recreation value of water;
- Enhancing the quality of drinking water;
- Providing a resource for agriculture, transport, industry, and energy production.

It is an approach that emphasizes human water uses and supports economic development in the Province of Overijssel.

In the Water Management Plan of the Province of Zeeland from 2001, "sustainable water systems" are the main goal. The provincial government writes that the limits of technical water management have come in sight. The solution is water management which is more in accordance with natural systems. This means:

- Creating space for fresh water retention;
- Making natural water systems a starting point for spatial planning, instead of adapting the water system to whichever function;
- Restoring some of the estuarine dynamics in the coastal areas.

This interpretation of sustainability is about shifting the balance from purely human needs and fighting nature, to working more in accordance with nature.

The first conclusion regarding the practitioner's documents is that they usually do not problematize the meaning of sustainability, contrary to scientific literature. Governments use it matter-of-factly, as an ordinary adjective, as if there were consensus about it. At the same time it is clear that actors interpret it differently. For example, the three provincial governments show quite different views on sustainable water management.

1.3.5 How to study a contested concept?

Sustainability turns out to be a controversial concept. The debate is not on fringes or a few details, but on its most fundamental meanings. This is why it is so difficult for the practitioners to operationalize. Because there is no scientific or political consensus on goals and indicators of sustainable water management, there is no obvious framework to judge the activities of water companies in this research project.

We need a research approach that is applicable to this contested concept of sustainable water management. A method especially tailored for researching an unclear area is the social construction theory. This theory assumes that the reality we know is socially constructed. Meanings are negotiated in an ongoing cultural process, and the relation between meanings and the 'real' reality will always be uncertain. The main reason for

uncertainty is that cognitive capacities of humans are considered being too limited to grasp reality's complexity.

From this perspective it is an advantage that we are able to witness the learning process of how society should deal with sustainability. The fact that there is no agreement on the essence of sustainable development can be "A help rather than a hindrance, for no avenues are ruled out by stipulation, and so all kinds of new possibilities might be unearthed. (...) The discourse itself (...) provides the only conceivable glue to hold these various efforts together." (Dryzek, 1997, p.134)

Social construction has been applied recently in environmental management literature. We already saw some authors in section 1.3.2 like Hajer and Dryzek. Others are Hannigan (1995), Eder (1996), and Van den Daele (1998). In the next section, general social construction theory will be described.

1.4   Social construction theory

1.4.1   The social constructionist world view

The oldest source of the phrase 'social construction' is Berger and Luckmann's "The social construction of reality" (1966), though the basic ideas have been floating around for a long time (Sismondo, 1993). Berger and Luckmann start with two claims: 'reality' is socially constructed, and the focus of social studies of science should be the process through which knowledge produced by scientists becomes 'reality' for the general public. Berger and Luckmann differentiate between reality and 'reality': the first is objective, the second subjective. In their view a sociologist cannot differentiate between valid and invalid assertions about the world, and therefore, she only deals with 'reality'. During the last 20 years, social constructionism has acquired a substantial influence in sociology, particularly for social problems, science studies, and feminist studies (Sarbin and Kitsuse, 1994, p.3).

In social constructionism the idea of one unchangeable truth is abandoned. Instead, a whole range of views on reality is presupposed, depending on culture and personal interests of the viewer. These views are ever-changing because of social interactions and learning processes. Shotter writes: "We must cease thinking of the 'reality' within which we live as homogeneous, as everywhere the same for everyone... We can begin to think of social reality at large as a turbulent flow of continuous social activity, containing within it two basic kinds of activity:

i. A set of relatively stable centres of well ordered, self-reproducing activity,
ii. With these diverse regions or moments of institutionalized order being separated from each other by zones of much more disorderly, unaccountable, chaotic activity.

"It is in these unaccountable, marginal regions - on the edge of chaos, away from the orderly centres of social life - that the events of interest to us occur." (Shotter, 1993, p.18)

In the stable areas of a culture meanings are considered to be 'facts', whereas in unstable areas hypotheses about reality are discussed. In this discussion a paradigm shift can take place: a dominant discourse A is replaced with discourse B (Gergen, 1994, p.11-12). Discourse is not the possession of a single individual, but a product of social inter-dependence: the joint creation of meaningful discourse. Three main stages can be discerned in a paradigm shift:

1. The critical phase: confidence in the dominant discourse A is undermined. Discussants expose factors or processes excluded by the dominant discourse, demonstrate its shortcomings, decry its oppressive effects, condemn its underlying motives, etcetera (also called the *heretical* phase).
2. The transformational phase: fragments from a new type of discourse B are employed; another world becomes palpable (also: the *plausible* phase).
3. Discourse B is accepted as a new truth, sometimes coexisting with discourse A, sometimes replacing it. Discourse B has become coherent (= non-contradictory) and self-contained (=there are no other worlds) (also: the *certain* phase).

Anthony Giddens argues in his causal theory of social change that decision making can not be rational, because of bounded rationality. The strategy-design of actors is influenced by a partial understanding of their environment, and without intending it they will produce effects that they would never have been able to account for (see Figure 1.1). Because actors have ideas about the circumstances of their own actions, their decision is *rationalized* in hindsight (either as a strategic success or as a strategic mistake). Because of this process, the causal conditions of human social conduct are inherently unstable (in Wind, 1996, p.35-39).
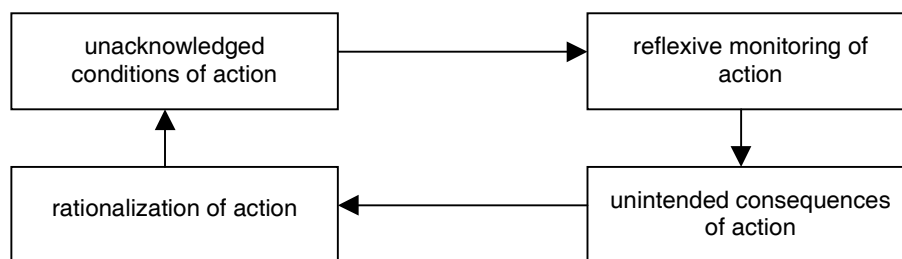

Figure 1.1: Anthony Giddens' causal theory of social change.

Social constructionism is not free from internal debate either (Sismondo, 1993). The controversy concentrates on the question whether reality exists or not. At one extreme of this debate are the 'strict relativists', who believe that reality may not exist at all. The mainstream social constructionist view is that reality does exist, but cognitive capacities of humans are too limited to grasp its complexity. At the other extreme are the 'realists' who assume that it is possible to define an accurate view of reality. The only problem is that scientists are human and therefore, scientific work is sometimes 'contaminated' by social-cultural influences.

In this project, I use the mainstream view on social construction. My assumption is that a physical reality existed long before humans started to investigate it, or were even there. Our lack of understanding and our learning processes to overcome these deficits are interesting areas for research.

1.4.2   The social constructionist approach to research

From a social constructionist viewpoint, scientists are not searchers for the truth, but producers of *meaning* in today's society (Shotter, 1993, p.24). While generating new knowledge, scientists use a few explicit, and many implicit assumptions about the nature of the world. Social constructionism reveals the strategies of scientists to convince others of the accuracy of their findings. In the process of constructing scientific facts they not only use 'objective' methodology and 'hard' technology, but also rhetorics and negotiations. In their famous study "Laboratory life", Latour and Woolgar study the scientific construction of facts in detail (1979). They show how scientists engage in a dialogue within their social network until a controversy is put to rest by an inversion process (Latour, 1994, p.177):

- A statement begins to stabilize, consensus emerges among scientists;
- The statement becomes a split entity: a statement (a string of words) + a real object (a thing out there);
- An inversion takes place: the object becomes the reason why the statement was formulated.

Latour and Woolgar claim that objects do not exist before they are defined by scientists and that such objects can only be found by other scientists, if they become part of the socio-technical network that invented the object. With this explanation of the process, they are close to the relativist extreme: even 'scientific facts' are social constructions.

For a social constructionist, the task of science is not to unravel 'the truth' from the messy tangle of everyday experience by using logical and systematic methods. Instead, she studies the efforts of people dealing with reality's complexity, with the intention to show that many different solutions are possible.

Because social construction theory denies the existence of certainties, it is not immediately clear what valuable insights social constructionist research can deliver. It is like the cosmology reported by Geertz (1973): "For an informant, the world rests on the back of an elephant, which in turn stands on the back of a turtle. When the informant was asked what the turtle stands on, the answer was: 'Ah, Sahib, after that, it is turtles all the way down'. This is not exactly a comforting answer if one wants to believe there is some stable bedrock somewhere. But (as with the elephant and its turtles) in stories, it is narrative all the way down". In a research project, however, we do not need to discuss the whole cosmology all at once. As Latour suggests, the way to do social construction research is to *ignore* the fact that all knowledge is uncertain (1979, p.35), and to focus on a small area of uncertainty.

Sustainability provides a unique opportunity to use the social constructionist approach. By studying the regional level of groundwater resources, some important questions about sustainability will surface, such as what the carrying capacity is and how resources should be distributed. By using the social constructionist approach, the study can contribute to more general discussions about sustainability.

1.5   Conceptual framework and research questions

As explained above, this study looks at sustainability from a social constructionist viewpoint. A paradigm such as sustainability is constructed in a discourse of social actors. Examples of such actors are the United Nations, represented by the Brundtland Commission; governments, such as the European Union, national and provincial governments; industries and public utilities; research organizations and environmental NGOs. Although these actors may have different and even conflicting views and interests, they also function within a larger societal network. They engage in a discourse about meanings and goals, until a shared view of reality, or paradigm, is agreed upon. This means that the network of actors and the discourse they engage in must be studied. Our main research question is:

How is the concept 'sustainable development' translated into business practices?

The research is based on the conceptual model in Figure 1.2. It uses the idea of Bruno Latour (1979) that concepts travel through society through contact between societal actors. Therefore, we look at the network of actors around the company, to see who inspires them. It also includes the theory from Carl Weick (1979) that managers' perceptions of their environment are of more importance to their strategy, than the 'real' characteristics of their

environment. We assume a feedback loop between the strategies and the network, because companies will probably make deliberate choices about their contacts.
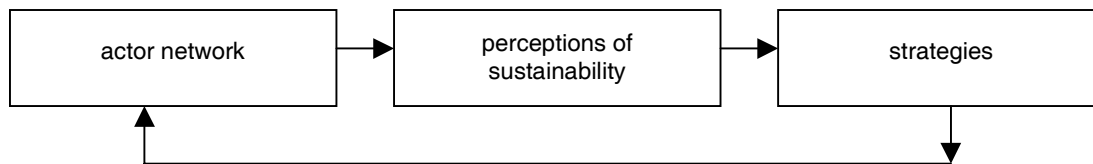

Figure 1.2: Conceptual model of data collection.

The sub-questions following from this model are:

What perceptions do people at Dutch water companies have of the concept sustainability?

Which societal actors are involved in the process in which these perceptions are constructed?

How do these perceptions influence company strategies and operations?

With perceptions the storylines and activities are meant that people connect to the term sustainability. Because of the methods used, the perceptions usually take a textual form, but otherwise it is very open: anything they see as connected to the term sustainability must be captured by the method.

Dutch water companies are the focal points of the study. Organizations are seen as groups of people and not as abstract entities. Respondents were mainly sought among the higher management, because of their insight in strategic choices. They are not the only people who influence perceptions, but they are a good starting point because they are chosen to represent the organization and to make important decisions (Noorderhaven, 1995). They also do a lot of networking outside their own organization. To check if the managers 'reality' matched with that of the operational level, a member of the Workers Council was involved in each company.

According to the theory of action learning networks, organizational learning is made possible by a limited number of 'network champions' within the organization (Roome, 1998). These are individuals who have a large network outside the organization and who facilitate the diffusion of new ideas through the organization. The research is therefore widened to the network of organizations that water company managers have direct contacts with. Direct contacts are defined as people from other organizations that top managers from the water companies talk and listen to. These contacts are assumed to have an influence on the perceptions of water company managers.

Because there is little consensus about sustainability, it can be interpreted in many ways. Therefore, the integration of sustainability into business practices of water companies will lead to a variety of strategies. For environmental management it is interesting to know what factors influence the development of these different strategies.

In the past, strategy was considered to be what a company rationally decided to do after a thorough analysis of its own functioning and environment (Douma, 1998). In more recent theory, it is acknowledged that strategy is a fuzzy concept. It can also 'emerge' out of random trial and error behaviour of an organization (Mintzberg, 1989). In the model above, a broad definition of strategy is used, similar to the 'theory-in-use' concept of Argyris and Schön

(1996) It consists both of 'what they say' and 'what they do' (though the latter will be restricted to 'what they say they do').

In this research, we are after the set of beliefs and rules used in the domain of sustainability in the drinking water sector: ideas, values, physical realities, and social mechanisms. The ideas, values, and social realities represent reality as experienced and created by the respondents. During the interviews they selected themes, and they indicated many relations between those themes. These beliefs are considered to be important motives in the process of constructing sustainable realities.

In the cross case analysis patterns and rules for social construction will be sought by comparing cases. The resulting causal model is a product of the researchers own sense-making process. The model is a hypothesis and does not pretend to control or predict future phenomena. It is an effort to lift this study to a higher, more generalizable level so that it can be connected to other scientific work. Even though the chosen approach will not lead to direct answers on what we should do next to solve environmental and societal problems, it leads to a reflection on how we humans handle such a complicated concept.

1.6   Outline of the dissertation

After this introduction, the methods used are described in Chapter 2. A combination was made of methods from anthropology, case study research and the grounded theory approach. In Chapter 3, the Dutch drinking water sector is introduced in an historical overview. Exploration of the problematic issues they dealt with, and the structures they developed in the course of 150 years, gives insight in how they deal with sustainability today, and why. In Chapters 4, 5, 6 and 7, four water companies are analyzed in detail: PWN, WMO, Nuon and Delta. For each company the meaning of sustainability, the strategy, the operationalization of sustainability, and the influence of the network are analyzed. The data were collected in 2000 and since then, Nuon and WMO merged into a new company called Vitens, together with a third company. PWN and Delta also underwent changes, so the companies described must be seen as companies of the (recent) past. In Chapter 8 a cross case analysis is presented. Finally in Chapter 9, we return from the detailed level of specific companies, to the general level of how sustainability is socially constructed. What can we learn from the ways in which water companies deal with sustainability?