Countering threats to drinking water quality

Strategy formulation for enhanced protection of drinking water interests regarding organic micropollutants in the course of European Union decision-making

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Master of Science Thesis in Systems Engineering, Policy Analysis and Management
Master of Science Thesis in Civil Engineering

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"Industry executives and analysts often mistakenly talk about strategy as if it were some kind of chess match. But in chess, you have just two opponents, each with identical resources, and with luck playing a minimal role. The real world is much more like a poker game, with multiple players trying to make the best of whatever hand fortune has dealt them."

~ David Moschella

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This thesis is the final result of the graduation research project that has been conducted in the period February – October in 2008. It serves as final requirement for completing two Master of Sciences degrees from Delft University of Technology: one in Systems Engineering, Policy Analysis and Management, another in Civil Engineering. At first hand, this may seem like a rather strange combination to you. Hopefully, this thesis can prove otherwise. There are many integrative possibilities, which are also visible within the selected topic: learning from European Union decision-making processes concerning Priority Substances to protect drinking water interests.

As initial research foundation, an extensive literature research has been carried out at the association for Dutch water companies (Vewin) in Rijswijk. In addition, numerous interviews have been conducted throughout Belgium, Germany and the Netherlands – an international project indeed! Besides the large amount of relevant information gathered, these interviews were really exciting: I have had the pleasant opportunity to meet very interesting and smart people who are – in one way or another – influencing the course of water policy at a high level. Moreover, they seemed genuinely interested in this research, the approach and my findings. Therefore, in return for their time and information, I hope that this thesis may provide new insights to them as well.

The research topic has been really interesting, not only because it had a challenging complexity where I could really dive in, but also because of the *setting*: prior to the research, I was really motivated to acquire a decent understanding of the European Union and its influential mechanisms since it was one gigantic *black box* to me at the time. With this project, I think I succeeded in obtaining insight in the EU decision-making processes but also in the lobby mechanisms – much more than I can report here. But, besides what I know now, there is still so much more to it!

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Perry van Overveld
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Executive Summary

Organic micropollutants, like pesticides and pharmaceuticals, are frequently detected in surface water as a result of emissions from sources like agriculture, industry and households. Surface water is an important drinking water source. Due to their specific physical and chemical properties, micropollutants cannot be completely removed in drinking water treatment plants and are therefore occasionally detected in drinking water. Although they only occur in very low concentrations in surface and drinking water (ng/l up to µg/l), adverse effects on ecology (surface water) and public health (drinking water) cannot be ruled out due to many gaps in knowledge. To reduce the risk of organic micropollutants, legislation has been developed via decision-making processes at the level of the European Union (EU) to restrict their emissions. Initiated by the Water Framework Directive in 2000, over the last decennium Priority Substances (PS) have been identified – including several pesticides – which are bound to maximum acceptable surface water concentrations (Environmental Quality Standards, EQS). To protect their interests, many stakeholders – like the association of Dutch water companies, Vewin – attempt to influence EU decision-making. The research question answered is this thesis is: *"Which recommendations can be formulated for Vewin to counter drinking water quality threats from organic micropollutants, based on a decision-making reconstruction regarding Priority Substances and given the European multi-stakeholder setting?"*

Pesticide emissions to surface water have been identified for decennia, while pharmaceuticals are an emerging problem for drinking water production. Nevertheless, their potential risk to or via the aquatic environment is regulated via the same legislative context as pesticides: the Water Framework Directive, specifically the identification of PS (1997 – 2001) and derivation of EQS (2002 – 2008). By reconstructing the decision-making processes regarding PS and EQS, factors that have a significant impact on the decision-making outcome can be identified and not only be used to counter the threat from pesticides, but the emerging threat of pharmaceuticals – and other micropollutants – as well.

A theoretical model has been selected to assist in structuring the technical-substantive and social-strategic complexity. After careful consideration, the Advocacy Coalition Framework – initially developed by Paul Sabatier in 1988 – has been chosen because of its focus on stakeholder perceptions and the role of technical information within arguments. Advocacy coalitions are formed by stakeholders with a comparable belief system, and they have a lobby strategy to influence the decision-makers using their resources. To collect the data, document analysis has been undertaken and thirty interviews were conducted with representatives from coalitions and formal decision-makers.

In total, three advocacy coalitions have been identified. The water coalition protects water and environmental interests by favoring stricter European Union environmental legislation. Their arguments are based on the precautionary principle since there are many gaps in knowledge about the adverse effects of these pollutants. On the other hand, the agribusiness- and pharmaceutical coalitions oppose stricter EU legislation to protect the production and application of their products and their economic growth. According to their risk-benefit approach, the advantages of these products for food production and patient treatment outweigh the limited adverse effects that are currently known.

These coalitions attempt to influence EU decision-making processes by lobbying the formal decision-makers: the European Commission, the European Parliament and the Council of the European Union. Each of the two consecutive rounds (PS and EQS) consists of two phases. First, in the informal pre-decision making phase a scientific methodology is developed and applied, resulting in recommendations. This phase was led by the Commission and Fraunhofer Institute in consultation with Member States and stakeholders. Second, in the formal decision-making phase the Commission submits a Proposal for new legislation based on the recommendations, and via the codecision procedure the Parliament and Council adopt the new legislation together. The first phase is strongly focused on science whereas the second phase is of a strong political nature. The Commission can be

approached with scientific-oriented arguments, whereas the Parliament can be lobbied with political-oriented arguments. The Council is caught in the middle: they are open to both types of arguments.

Analysis of these two decision-making rounds has revealed that the water coalition has mainly focused on the second, political-oriented phase and successfully targeted the Parliament. On the other hand, the agribusiness coalition has been actively involved in both phases and consequently also used arguments of both a political and a scientific nature, thereby successfully lobbying especially the Council but also the Commission. Thus, due to the precautionary messages of the water coalition to the Parliament and the risk-taking messages of the agribusiness coalition to the Council, the initial positions of these decision-makers are pulled into the directions of the respective coalitions. One of the hypothesis of this thesis is that due to the lobbying activities the distance between the Parliament and Council becomes larger, resulting in a longer and more difficult formal decision-making process. It must be noted that the pharmaceutical coalition has only entered the analyzed context during the second phase of the second round (EQS, 2006-2008). This coalition had to anticipate the proposal from the Parliament – initiated by the water coalition – to list several pharmaceuticals as PS. Nevertheless, the pharmaceutical coalition can be expected to be actively present from now on.

Given the research scope, the scientific debate has been reconstructed until 2005 and the political debate until 2008. Based on this reconstruction, the decision-making is strongly impacted by the following factors: timing, technical information, organizational empowerment and public opinion.

Early involvement is imperative to the final decision-making outcome. Since the Commission Proposal for both PS and EQS has been based on the recommendations which followed from application of the according methodology, and the Commission Proposal in both PS and EQS nearly equaled the final decision-making outcome, it is essential to exert early influence during the informal pre-decision making phase: the methodologies are the key. However, the drinking water sector has missed several opportunities in this phase. In 2001, glyphosate would have been listed as a Priority Substance if one more stakeholder would have delivered monitoring information between 1997 and 2000. Furthermore, the EQS for atrazine (2.0 µg/l) could have been below 0.2 µg/l if a representative of the water coalition would have insisted on the provisions in the EQS methodology for expert judgment regarding the removal efficiency of atrazine by simple treatment between 2002 and 2005.

A prerequisite for early involvement is technical information: in this first phase stakeholders are discussing scientific issues with Member States and the Commission based on state-of-the-art-knowledge. Comparing the water coalition with the agribusiness coalition, the latter has an advantage since they have this technical information in-house, whereas relevant information in the water coalition is largely distributed over many stakeholders, including research institutes and universities. Nevertheless, the water coalition could for instance enter the scientific debate with Quantitative structure-activity relationship (QSAR) models, which predict the removal efficiency in water treatment.

Furthermore, a coalition must have a strong organization. This thesis has introduced organizational empowerment: the level of professionalism and structure with which a coalition exploits the combination of available coalition resources. Monitoring data must be collected, technical knowledge coordinated and stakeholders must communicate the same message in lobby activities.

Public opinion and media can be used for agenda-setting prior to or during the decision-making, shifting the debate in the direction of the precautionary principle. Together with the other factors, media coverage can have a large impact on the development and application of the methodologies, and ultimately the legislative decision-making outcomes.

Following the analysis and main conclusions of this thesis, recommendations for Vewin include:

- Further empower the organization of lobby activities within the water coalition: manage measurement data, determine drinking water EQS, coordinate knowledge and arguments;
- Strengthen the argumentation structure with QSARs: QSARs scientifically support the argument of limited removal efficiency in treatment and will have a large impact on several methodologies.

Glossary

This list provides a concise description of frequently used and specialized terms. In addition, the list gives the full version of the abbreviations used in this thesis.

17α-ethinylestradiol	synthetic hormone present for its contraceptive property in the majority of birth-control pills; however, several adverse effects like fish feminization have been observed already at very low concentrations in surface water
AA-EQS	annual arithmetic mean concentration in the aquatic environment (surface water) based on long-term intake
ACF	Advocacy Coalition Framework; the main theory, originally developed by Paul Sabatier in 1988, that is used in this thesis
Advanced treatment	drinking water treatment using advanced techniques in addition to simple treatment techniques, for instance membrane filtration; some suggest that GAC should be regarded as an advanced treatment step too
Advocacy coalition	a cluster of stakeholders who share a common deep normative core, for instance the protection of surface water quality
Carbamazepine	a mood stabilizing drug used in the treatment of epilepsy, invented by Novartis but no longer patented; it is frequently detected in low concentrations in many river basins throughout the European Union and difficult to remove in drinking water treatment
Carcinogenic substances	substances that promote cancer as an adverse effect
Coalition	see advocacy coalition
Codecision procedure	the main legislative procedure by which new Acts are adopted within the European Union, requiring the Parliament and the Council to agree on an identical text
Commission	European Commission
COMMPS	Combined monitoring-based and modelling-based priority setting; this methodology is used in the European Union for the identification of Priority Substances
Council	Council of the European Union
EAF	Expert Advisory Forum
ENVI-Committee	European Parliament's Committee on the Environment, Public Health and Food Safety
EU	European Union
EQS	Environmental Quality Standard; the operational parameter that accompanies a Priority Substance and which reflects the maximum surface water concentration for this PS; in this thesis, the EQS always refers to MAC-EQS
EQS methodology	scientifically agreed methodology for the derivation of the operational parameters (EQS) for Priority Substances
GAC (GAC filtration)	filtration with Granular Activated Carbon; a drinking water treatment technique that is often applied to a surface water source to remove hydrophobic (micro)pollutants

Genotoxic substances	known to be potentially mutagenic: changes in genetic information which potentially results in cancer
Glyphosate	a non-selective herbicide especially used to kill weeds, invented by Monsanto but no longer patented; difficult to remove in drinking water treatment, even with GAC, due to its low hydrophobicity
Hydrophobicity	expressed in $\log K_{ow}$, which represents the logarithm of the octanol-water partitioning coefficient, thereby providing an indication for the removal efficiency with GAC; a pollutant with a high $\log K_{ow}$ (hydrophibic opposed to hydrophilic) is relatively easy to remove because it attaches to the carbon
MAC-EQS	maximum acceptable concentration in the aquatic environment (surface water) based on acute toxic effects
MEP	Member of the European Parliament
NGO	non-governmental organization
NOAEL	No Observed Adverse Effect Level; the maximum concentration of a substance that is administered to species while no adverse effects can be observed
Organic micropollutant	see synthetic organic micropollutant
Parliament	European Parliament
Policy subsystem	that part of the world that is regarded in a specific study, categorized both by topic and level of territory; here, this in the topic of Priority Substances within water quality at the level of the EU
Pollutant	any chemical found in surface water that is threatening an undisputable drinking water quality (f.i. adverse effects regarding public health, aesthetics or consumer confidence)
Precautionary principle	in case of scientific uncertainty or absence of scientific consensus, potential risks to the environment or public health must be minimized (i.e. prevent the emission of micropollutants to the aquatic environment)
Priority Substance	a substance that is regarded as a threat to or via the aquatic environment for which Member States must take measures with a priority and comply with the EQS
PS	Priority Substance (see Priority Substance for description)
QSAR	Quantitative Structure Activity Relationship; can be used to predict activity based on a well-studied structure; for instance, the removal efficiency in drinking water treatment based on the chemical structure of a pollutant
Removal efficiency	the degree to which a molecule can be removed, retained or rejected in a drinking water treatment plant; depends among others on the treatment techniques applied, operational conditions and molecule properties
Resource	an asset of a coalition which enables them to undertake lobby activities and protect their belief system
Simple treatment	drinking water treatment using basic techniques only, like rapid sand filtration; some suggest that GAC should be regarded as part of simple treatment too nowadays
Sources for drinking water	surface water and groundwater; only surface water is regarded in this thesis

Sovereign	a formal decision-maker with legal power; in this thesis, this includes the European Commission, the European Parliament and the Council of the European Union
Substance	see pollutant
Subsystem	see policy subsystem
Synthetic organic micropollutant	a human-made chemical which is present in low concentrations in surface and/or drinking water, containing carbon and difficult to remove in treatment due to its physical and chemical properties
Toxicity	the degree to which a chemical is able to damage an exposed organism
Trialogues	informal negotiations between key representatives of the Parliament and the Council facilitated by the Commission with as goal to reach an agreement before the plenary voting in the Parliament
Vewin	Association of Dutch water companies / Vereniging van waterbedrijven in Nederland
WFD	Water Framework Directive

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1. Research problem

In contrast with many developing countries, the European Union (EU) can generally enjoy an abundance of water that can be used for navigation, agriculture, recreation, industry and consumption. Water is an essential necessity to life, but it has to be 'clean' to allow safe consumption. The two main *sources* of drinking water are groundwater and surface water. However, their water quality is threatened by all kinds of pollutants, which consequently also threaten life in general. There are two ways to counter these threats: drinking water treatment plants can be enhanced to remove more pollutants, and the quality of the drinking water sources themselves can also be improved. The first – more technical – path is undertaken by research institutes and universities for instance, whereas the second – more strategic – path is primarily achieved via decision-making processes that take place at the level of the European Union. The decision-making outcome is EU legislation, which has to be implemented at lower levels of aggregations: the Member States have to comply with this legislation. The EU decision-making processes can be influenced by various stakeholders, like the association of Dutch drinking water companies *Vewin* (Vereniging van Waterbedrijven in Nederland), who is the primary problem owner and client of this research project.

Vewin feels that *measures at the source* must be taken instead of *end-of-pipeline solutions*. This implies that, although technical solutions to produce drinking water are useful, the water quality of the source must be good to start with. In addition, there is a tendency of decreasing national and increasing EU importance regarding legislation[1]. Therefore, better insight in the *European Union decision-making* should assist Vewin in improving its strategies to reach its primary goal: the delivery of drinking water of undisputed quality. Thus, how can European Union decision-making be better influenced so that pollution threats are countered more effectively?

This chapter first gives an introduction to the problem context of this thesis (§1.1). Then, the problem context will be regarded from a technical drinking water perspective (§1.2). In §1.3, Vewin's perspective will be presented, which will illustrate that there are additional factors of importance besides the ones identified from a technical perspective. Afterwards, the research will be demarcated regarding scope and pollutants (§1.4). Then, the research objective will be stated, resulting in the formulation of the main research question and subquestions (§1.5). This chapter is finalized by the thesis structure, presented in §1.6.

1.1 Problem introduction

1.1.1 How various substances cause water pollution

Surface water, like rivers and lakes, is a large source for the production of drinking water. For instance, almost 40% of the total drinking water supply in the Netherlands originates from surface water (van Dijk, de Moel et al., 2005, p. 96). This collection of water found *on* the ground is replenished by precipitation – meltwater and rainwater – but its quality is diminished by various kinds of pollutants, which not only makes the production of undisputable drinking water more difficult but often also have adverse effects on ecology. Besides surface water, micropollutants can also enter the other drinking water source: groundwater. However, since – currently – this problem appears to be less acute, groundwater will not be regarded here.

Figure 1.1 presents an overview of the relevant water flows and the way in which pollutants can impact the surface water and drinking water quality. Surface water can be polluted by many *direct* discharges, for example rubber and oil from traffic, heavy metals from traffic accidents and building materials, pathogens from animal feces, toxic substances from illegal industrial waste dumping and run-off of pesticides from agriculture. However, there are also *indirect* discharges:

[1] Appendix A gives an overview of Vewin's objectives.

human urine and feces which contain biological pathogens, ammonia, hormones and other material, are first transported via the sewer systems to waste water treatment plants. There, the various treatment steps usually transform the waste water into cleaner water which is then discharged to surface water (e.g. a river). However, not every kind of pollution can be removed in the waste water plants, and thus a range of substances finds its way to the surface water. Finally, in drinking water treatment plants, drinking water is produced from surface water. This drinking water is used for all kinds of activities, including consumption, showers, toilets and gardening. After usage, a large part of this waste water is released to the sewerage system, which completes the urban water cycle.

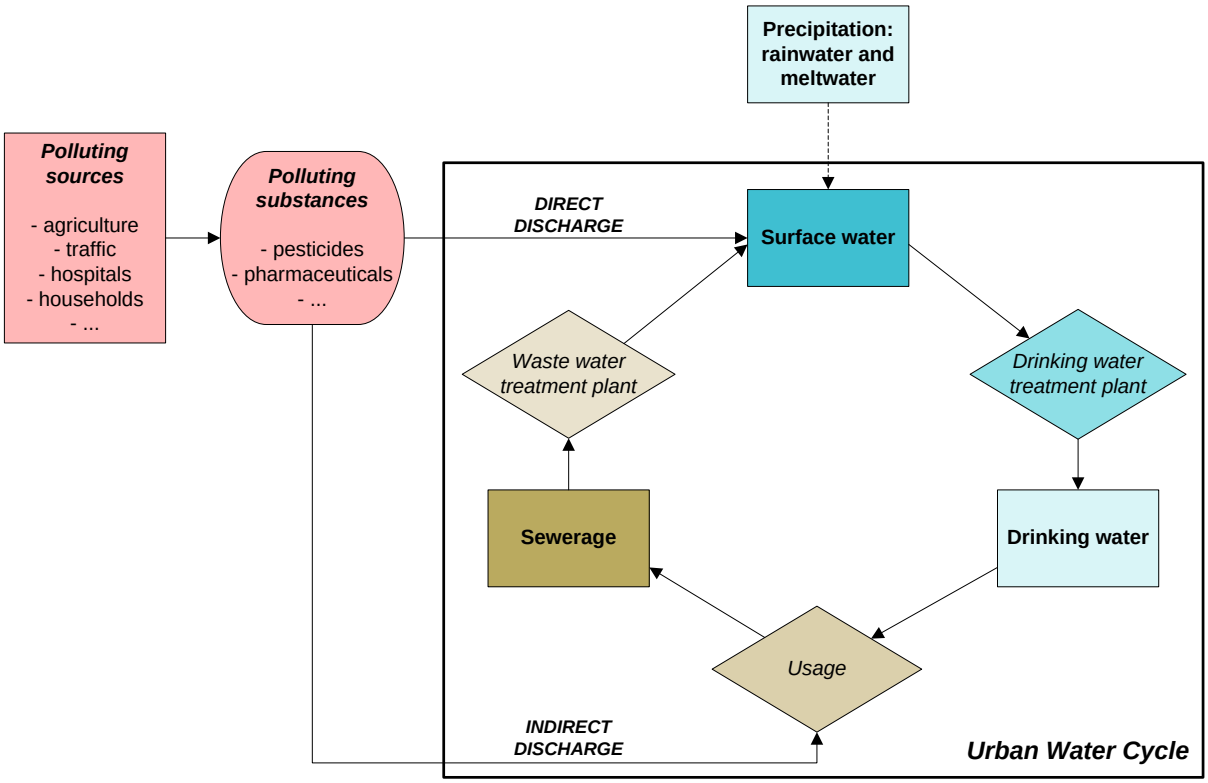


Figure 1.1: Overview of the water flows in the urban water cycle and the impact of pollutants.

1.1.2 The problem with synthetic organic micropollutants

For drinking water purposes, a large amount of pollutants present in surface water can be removed relatively easy in a drinking water treatment plant. However, there are also specific pollutants that are not so easily removed. Among these are the *synthetic organic micropollutants,* which diminish the surface water quality and consequently threaten the drinking water quality. They are called *synthetic* (human-made) because they are not naturally occurring in the surface water. The term *micro* reflects the relative low concentrations in which they occur in surface water but can have adverse effects nevertheless: nanograms/liter up to micrograms/liter (*ng/l – µg/l*). Undesirable chemical and physical properties (see technical overview in §1.2) makes removal of these pollutants in drinking water treatment plants more difficult. Even the most sophisticated treatment steps, like Reverse Osmosis, cannot remove all of these pollutants (van der Bruggen and Vandecasteele, 2003; Verliefde, Heijman et al., 2007). Two groups of *organic micropollutants* (further on: *micropollutants*) that receive an ever increasing amount of attention are pesticides and pharmaceuticals.

Environmental problems caused by pesticides have already been acknowledged for a long time. Rachel Carson's book 'Silent spring', focusing on the insecticide DDT and its adverse effects on birds, facilitated the ban of DDT in the United States (Carson, 1962). Moreover, the book served as breakthrough for widespread international concern regarding the hidden danger of pesticides. DDT's

effects are not specific against birds, but they are harmful to other animals as well. Hence, if people eat fruits or vegetables that have been treated with a certain pesticide without proper washing, they may also suffer from adverse effects. There is scientific evidence of acute and chronic health effects, including increased cancer risk as a result of the carcinogenic properties of pesticides (Ejaz, Akram et al., 2004).

However, that is not the only path the threat can take: for instance, pesticides distributed on the fields are washed into the surface water by rainfall, potentially compromising public health via drinking water. Because of large uncertainties regarding *toxicity*, the *precautionary principle* has been used to establish a general applicable drinking water standard of 0.1 µg/l for all pesticides (Council of the European Union, 1998). Nowadays, *glyphosate* is an example that is frequently the topic of debates: its concentration in surface water seems to rise (see figure 1.2), while the *removal efficiency* in drinking water treatment plants is limited (Kiwa Water Research, 1996). Consequently, drinking water concentrations sometimes exceed the legal standard of 0.1 µg/l.

Hence, there is much experience with and information regarding pesticides, which also resulted in legislation at the national and European level.

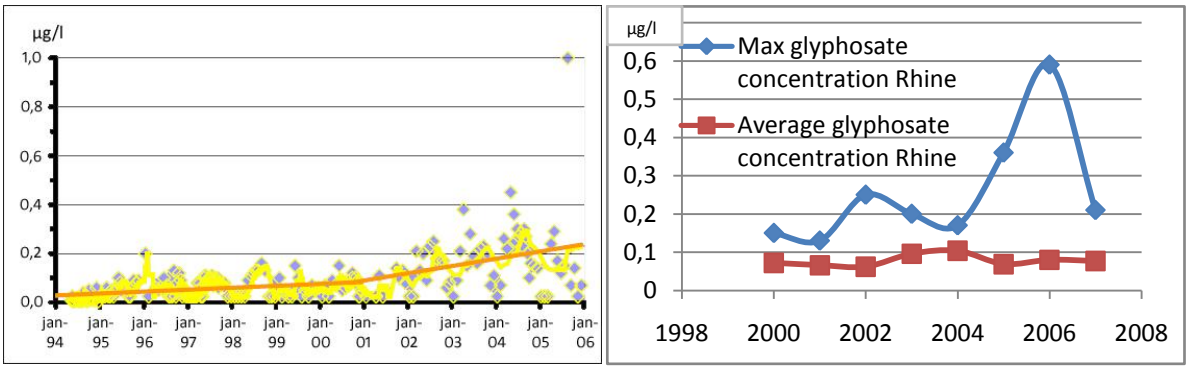


Figure 1.2: Measured concentrations of glyphosate in the Meuse and resulting trend line (RIWA-Maas, 2007) on the left, and average measured concentrations in the Rhine on the right (based on RIWA-Rhine data).

Pharmaceuticals, on the other hand, represent a new – or *emerging* – threat to surface and drinking water quality, and the potential ecological and public health problems have only been identified over the last decennium. Probably the first finding in ecology was the feminization effect on fishes of the synthetic estrogen *17α-ethinylestradiol*, the active agent present in almost all contraceptive pills. Already at surface water concentrations of 4 ng/l, specific male fishes – the fathead minnow – fail to become sexually mature, whereas the population crashes at 5 ng/l (Länge, Hutchinson et al., 2001). On the other hand, threats of pharmaceuticals to public health are also identified. Examples are the reduced functioning of the testis and sperm quality of men, and an increased cancer rate (World Health Organization, 2002; Birnbaum and Fenton, 2003).

Although there is a large degree of uncertainty regarding the concentrations required for effects on ecology and public health of many pharmaceuticals, it is evident that adverse effects are already present. Antibiotics, anti-epileptics, x-ray contrast compounds, hormones and analgesics are frequently detected in surface water. And given the development of new products to cure more and more diseases (technological breakthroughs), a growing population (more consumption) and an aging population (the older people get, the more pharmaceuticals are prescribed), pharmaceutical concentrations may be expected to rise in the future (CBS, 2005).

However, organic micropollutants do not only have adverse effects: they also improve food production (pesticides) and public health (pharmaceuticals). Hence, a clash of interests is unavoidable. For instance, certain stakeholders would like to see a reduction of such pollutants in the aquatic environment, whereas other stakeholders need these substances to achieve economic growth of their business. The European Union is primarily responsible for Community environmental affairs and

resulting legislation. The Member States are then responsible for transposing this European Union legislation into their national legislation, and for meeting the legislative aims by implementing measures.

1.2 Sanitary engineering: technical drinking water perspective

Delft University of Technology, the Netherlands, is host to – among others – the department of sanitary engineering. Extensive research, including fundamental research in laboratories, is pursued regarding the *urban water cycle* (figure 1.1). Their main concern is guaranteeing a drinking water quality that does not threaten public health. This paragraph will present their perspective on the threat of organic micropollutants, by providing an overview of three technical elements that are of importance for guaranteeing public health via drinking water consumption. For micropollutants, these three elements are the pollutant concentrations in surface water (§1.2.1), toxicology (§1.2.2) and removal efficiency in drinking water treatment plants (§1.2.3). An upcoming tool in drinking water research is shortly introduced in §1.2.4. A technical synthesis will conclude this paragraph (§1.2.5). Besides documents analysis, this paragraph is drawing on information from interviews with the sanitary engineering department, with employees from the Dutch river water works (RIWA) and with the Dutch institution for public health and the environment (RIVM).

1.2.1 Concentrations in surface water and their measurements

Many organic micropollutants are rather persistent in the aquatic environment. Consequently, the biological degradation of many organic micropollutants takes very long, and the surface water that is taken in for the production of drinking water may contain micropollutants. Roughly until 1970, concentrations of organic micropollutants in surface water were not measured since the potential dangers to public health – and ecology – were unknown at that time. But as time passed, the awareness of adverse effects was – and still is – increased as a result of new knowledge, including the publication of *Silent Spring* and resulting research.

However, awareness alone does not make it possible to measure concentrations in surface water: *analytical techniques* are required, but were lacking. These were then developed, and this development is going on ever since (Sacher, Lange et al., 2001). Although it is now possible to measure numerous pesticides and pharmaceuticals, and even though the *detection limit* has decreased to the range of ng/l and even below, many of the thousands organic micropollutants still cannot be measured: each pollutant(group) requires a specific analysis technique. Therefore, the focus of research is on micropollutants that are known to be present or increasing in concentration, and for which measuring techniques are readily available. Besides, monitoring (i.e. measuring) all pollutants is financially not affordable[2]. Furthermore, a measurement is always based on one specific moment in time (grab sample), although peak concentrations are the cause of problems for the drinking water production: the specific measurement from a grab sample, and the peak concentration of the pollutant in the surface water, are not likely to coincide. Nevertheless, technological progress over the last decades delivered developments which allow insight in threats to public health stemming from micropollutants in surface water.

Moreover, even if all surface water concentrations would be known, certain substances are causing problems that are not related to high peak concentrations in surface water alone. For instance, over the last years it has been found that the – complex, mutagenic, suspected carcinogenic and very toxic – substance NDMA[3] is in fact formed as a by-product of disinfection processes using ozone or chlorine[4] *in* the drinking water treatment plant (Kiwa Water Research, 2004; Andrzejewski,

[2] The analysis of one grab sample of surface water costs approximately €250 per analytical group.
[3] N-Nitrosodimethylamine.
[4] Disinfection processes are frequently used in drinking water production from surface water, with the objective to kill all microorganisms like bacteria, viruses and protozoa.

Kasprzyk-Hordam et al., 2005; Netherlands Ministry of housing spatial planning and the environment, 2007a). This gap in technical knowledge was unforeseen, and is now studied throughout the world. NDMA is known to be very toxic already at very low concentrations. Apparently, not only concentrations matter. This introduces the second technical aspect: toxicology.

1.2.2 Toxicology

Toxicology can be defined as the study of the relationship between the dose of any pollutant and the adverse effects on living systems (Klaassen, 2001). Adverse effects can range from minor skin irritations to death, and living systems include humans, animals, plants and microorganisms. Obviously, for public health the effects on humans are central here (human toxicology as opposed to eco-toxicology). Dangerous, toxic substances that are stored have to be labeled with the symbol displayed in figure 1.3 (European Council, 1967).



Figure 1.3: EU toxic symbol.

Toxicological data is used to derive standards for drinking water quality: the maximum allowable concentration of a specific pollutant in drinking water without endangering public health. However, the adverse effects of certain pollutants on humans cannot be tested directly: animals are often used to study the relation between dose and effects. An *example* of a procedure for substances that can be applied is presented below, to a large extent based on the procedure described by the WHO and handbooks (van Dijk, de Moel et al., 2005; World Health Organization, 2006).

From animal tests with three different species, a *No Observable Adverse Effect Level* (NOAEL; in mg pollutant per kg body weight) is derived from the most susceptible species, via administration of increasing masses of a pollutant until adverse effects are occurring. However, the NOAEL is adjusted by specific safety factors which cover for both imprecision, incompleteness and inconsistency of the data, and differences in sensitivity between the examined species and humans (Nielsen and Øvrebø, 2008). This adjusted NOAEL for humans is then converted into a *Tolerable Daily Intake* (TDI) – which can be taken in via drinking water, food and air – by using an average human body weight of 60 kilograms. Finally, the relative contribution of drinking water to the total human intake for the specific pollutant is set to 10% of the TDI, and considering an average daily intake of 2 liters of drinking water per day the *maximum concentration of the pollutant in drinking water that does not endanger public health* is derived.

This *deterministic* procedure can only be used for toxic substances whose adverse effects have a clear threshold at which adverse effects occur. However, substances that promote or result in cancer – genotoxic carcinogens – do not have such a threshold: even the smallest possible concentration may result in an adverse effect. One molecule already may alter a cell or DNA, thereby initiating cancer. Since a zero-concentration of a genotoxic carcinogen cannot be guaranteed, the level of acceptable risk must be established[5]. Using animal tests and extrapolation tools with mathematical models, and an additional safety factor, the maximum concentration of the genotoxic carcinogen is derived based on this risk level.

Obviously, toxicology cannot be expressed in one simple parameter. Moreover, derived drinking water standards are only an approximation and can vary to a large extent as a result of the methods and safety factors used – there is much technical uncertainty indeed. Consequently, different organizations come to different conclusions (Nielsen and Øvrebø, 2008). For more information, Casarett & Doull's handbook on toxicology provides an extensive scientific overview (Klaassen, 2001).

In addition to uncertainties that are included in the conversions, many additional issues are not taken into account in determining toxicologically 'safe' standards. For instance, each pollutant is

[5] For instance: a chance of one in a million that a person will develop cancer during his/her life due to intake from a specific genotoxic carcinogen.

separately reviewed from a toxicological point of view. But what about *combinations of pollutants*, which separately are below safe limits but together may have a toxic impact nevertheless? Moreover, what about potential *synergetic effects*, in which pollutants with similar 'mode of action' strengthen each other (Reemtsma and Jekel, 2006)? Furthermore, a different type of knowledge gap is found in the long-term consequences: what effect does continuous intake of low concentrations over a period of 70 years have? Also, in deriving a 'maximum allowable concentration in drinking water' using toxicological calculations, an average body weight of 60 kg is used. But what about weaker target groups, including the fetus – known for its increased sensitivity to dangerous substances – and the elderly? In addition to the previously mentioned uncertainties, these issues show that knowledge with regard to toxicology is currently limited and cannot be taken into account yet. Nevertheless, using toxicology, insight to some degree is obtained in whether a specific pollutant is toxic at relative low concentrations, or only at much higher concentrations: therefore, the concentrations in the water alone do not determine the level of threat to public health.

Ultimately, even if pollutants are occurring in high surface water concentrations, and if pollutants are relatively toxic, and given all uncertainties and unanswered issues, a third technical element may still decrease risks to public health: drinking water treatment plants can remove a large part of the micropollutants that are present in surface water.

1.2.3 Drinking water treatment plants and their removal efficiency

The degree to which a pollutant is removed in a drinking water treatment plant depends on several pollutant properties. In a drinking water treatment plant, use is made of several treatment steps, each able to remove a specific range of pollutants based on their properties. The Dutch drinking water treatment plants may be considered very good compared to other countries, partly because of the applied *multi-barrier* concept (i.e. a pollutant has to pass several barriers before finding its way to the drinking water). However, as will be described, there are limits to the removal possibilities: not all pollutants can be removed. There are numerous handbooks on drinking water treatment. Van Dijk et al. gives for instance an introduction to the urban water cycle and the role of drinking water treatment techniques therein (van Dijk, de Moel et al., 2005). On the other hand, other books focus specifically on analysis techniques for measuring pharmaceuticals, or on the occurrence of organic pollutants in the urban water cycle in general and possibilities for removal (Reemtsma and Jekel, 2006; Petrovic and Barcelo, 2007). Below, a concise chronological overview is given of the general development of treatment plants and according treatment steps.

Until 1850, no drinking water treatment plant existed in the Netherlands and drinking water was retrieved from groundwater wells or surface water. In the period 1850 - 1950, most of the first drinking water treatment plants were installed. The first developed treatment steps included screening (removing large debris), aeration (in case of groundwater), flocculation, sedimentation (settling of flocs) and rapid sand filtration (filtration of the flocs that did not settle). This treatment concept is regarded by several as *simple treatment*.

However, in the 1980s the concentrations of specific synthetic organic micropollutants – including pesticides – in surface waters increased, and the awareness of adverse (ecological) effects was raised. In combination with newly developed analytical techniques, the presence of these pesticides in surface water and drinking water indicated that used treatment techniques did not adequately remove certain pesticides and other micropollutants: their average size is smaller than the pore sizes of sand filter beds. Numerous of these pesticides are *hydrophobic*, which is expressed in a relatively high $\log K_{ow}$: this represents the logarithm of the octanol-water partitioning coefficient. The $\log K_{ow}$ is an indication for the inclination of a pollutant towards either oil (octanol) or water: a pollutant that dissolves better in oil than water is expressed by a higher $\log K_{ow}$. Using this specific pollutant property (high $\log K_{ow}$), a new treatment technique was developed which removes the pesticides from the surface water: filtration by *granular activated carbon* (GAC). Hydrophobic pollutants, like many pesticides, show large affinity for this hydrophobic carbon and are therefore

removed by adsorption onto the carbon. A practical limit which can be used as indication for the removal potential of micropollutants with activated carbon is $\log K_{ow} < 2$ (these pollutants are generally not removed by activated carbon) and $\log K_{ow} > 3$ (these pollutants are in general removed with activated carbon). *Atrazine* is known to have a $\log K_{ow}$ of around 2.50, whereas *glyphosate* has a $\log K_{ow}$ of around -1.0. Therefore, *atrazine* is removed to a larger extent with activated carbon than *glyphosate*. Drinking water treatment plants were gradually extended with this treatment technique.

However, a problem with compounds with high $\log K_{ow}$ is that such pollutants are bio-accumulating: they are not only adsorbed by activated carbon, but they easily attach themselves to other hydrophobic materials – such as adipose tissue – too. In the 1990s, it became clear that accumulation of such pollutants (like dioxins) was happening in adipose tissue of for instance fishes. As a result of the bioaccumulating property together with the persistent character of many pesticides, new substances were developed which better dissolve in water – i.e. with a lower $\log K_{ow}$, hydrophilic substances – and accumulate less in adipose tissue. However, a high solubility in water is achieved via high polarity. This specific property tends to make it very difficult for removal with current treatment techniques, including activated carbon filtration. Again, new treatment techniques were developed for the removal of pesticides, but also pharmaceuticals, with a low $\log K_{ow}$, small size and high polarity. The most important one at this moment is *membrane filtration*. Membranes come in all kind of variants, and the removal of pollutants – including pesticides and pharmaceuticals – with membranes has been studied extensively (Bellona, Drewes et al., 2004; Zhang, Van der Bruggen et al., 2004; Braeken, Ramaekers et al., 2005; Van der Bruggen, Verliefde et al., 2006; Verliefde, Cornelissen et al., 2007).

From this literature it can be concluded that the removal depends both on the membrane that is used (including pore size and membrane charge) and the pollutant (molecular weight, size, hydrophobicity, polarity, charge). For instance, a polar pollutant with a low $\log K_{ow}$ which is positively charged is found to interact with the negatively charged membrane, thereby reducing the removal of solutes by membrane filtration (Verliefde, Heijman et al., 2007). Furthermore, it can be concluded that even with the most advanced membrane techniques (reverse osmosis), not all organic micropollutants can be removed at this moment. This is also shown in figure 1.4 (borrowed with permission from Verliefde, 2008, p.43), which combines the characteristics *molecular weight* and *hydrophobicity* in relation with the *rejection* (i.e. the removal efficiency by membrane filtration).

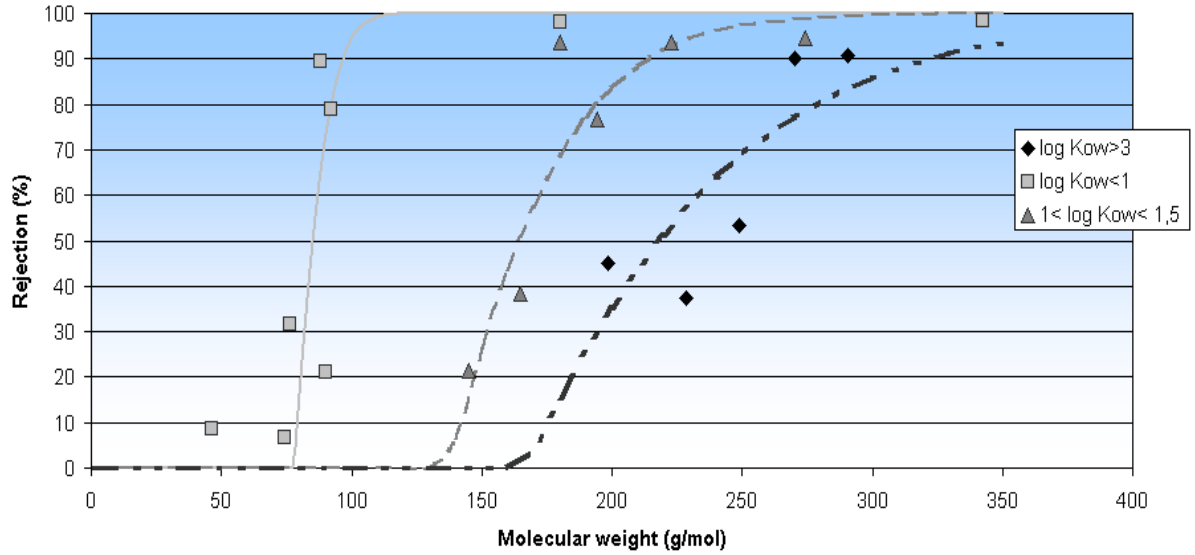


Figure 1.4: Removal of pollutants by membrane filtration in relation to the molecular weight (Verliefde, 2008).

Relating the above to pesticides and pharmaceuticals, it can be concluded that *simple treatment* would remove hardly any pesticide or pharmaceutical because of their relative small size and weight (typically between 50 and 300 g/mol). In addition, the common (Dutch) treatment set-up for the

production of drinking water from surface water, which typically includes granular activated carbon, removes these pollutants to a certain degree (especially the ones with a high $\log K_{ow}$). However, many others like *glyphosate* are not removed. The most advanced techniques like membrane filtration can remove a large majority of pesticides and pharmaceuticals, especially the ones with a low $\log K_{ow}$, including *glyphosate*. Although these more *advanced treatment* techniques are complementary, they cannot remove 100% of all pesticides and pharmaceuticals.

1.2.4 A modeling tool: quantitative structure-activity relationship (QSAR)

Quantitative structure-activity relationships (QSARs) were originally developed for drug discovery purposes to use modeling instead of experimental trial-and-error with animals. QSAR attempts to predict the activity in a well-known process based on – often chemical – properties of a molecule. For instance, in *drug discovery* (i.e. the process in which new drugs are discovered or designed) it is used to find new molecules that have low toxicity as property. Besides drug discovery it is nowadays used in general toxicological research, but also for assessing the behavior of molecules in the environment under influence of bio-degradation and persistence. However, recently QSARs are in the process of development to predict the behavior of a micropollutant in a drinking water treatment plant throughout several treatment steps based on the chemical structure: the removal efficiency can be estimated. Since not everything can be measured and experimentally analyzed, modeling tools like QSAR may be helpful in the future as assistance in reducing the technical uncertainty.

1.2.5 Technical synthesis: precautionary principle

From a technical point of view with regard to public health, a pollutant *could*[6] be defined as a problem if this pollutant is present in high concentrations in the surface water, and is toxically relevant, and cannot be removed with common treatment techniques. In order to guarantee undisputed drinking water quality and safeguard public health, these three aspects are important.

This paragraph has shown that there is a significant amount of technical knowledge available; however, on the other hand, there are at least as many gaps in knowledge resulting in uncertainties (long-term intake, formation of complex substances, mixture of pollutants and many more). Therefore, by many sanitary engineers, the *precautionary principle* is recommended since adverse effects cannot be ruled out: it is impossible to know and measure everything.

In addition, this technical perspective is only *a part* of the relevant context: these technical factors alone are not sufficiently reflecting the broad context in which the European Union decision-making is decided. Nevertheless, technical information *does* play a role in decision-making processes as will be seen later. The following paragraph will introduce aspects that are relevant to Vewin in addition to the technical aspects that have just been discussed.

1.3 Vewin's drinking water perspective

This paragraph will introduce Vewin's drinking water perspective[7]. *In addition to* the three technical aspects (surface water concentrations, toxicology and removal efficiency), Vewin's argumentation structure consists of two important aspects that will be shortly described here.

[6] Defining a problem is not straightforward in this case. All three factors (toxicity, surface water concentrations and removal efficiency in treatment plants) are continuous: a pollutant is not either toxic or not toxic, and its removal will depend on the specific treatment set-up. Besides, others define a problem already when two of three factors are present.

[7] This paragraph stems from an extensive overview, which originally was intended to serve as chapter 3. Due to new insights, it was judged that this material was too detailed to be included here. However, since this chapter is a substantive part of the research, and for completeness, the original chapter 3 can be found in Appendix B.

1.3.1 Public opinion and consumer confidence

Vewin thinks that public opinion is in line with their main objective: the delivery of undisputed drinking water (see appendix A). It is thought that consumers do not want pesticides or pharmaceuticals in their drinking water, even in very low concentrations and when current knowledge shows that there is no threat to public health. This is another reason for Vewin to adhere to the precautionary principle: you never know everything, so it is better to prevent than to cure.

In addition, Vewin thinks that public opinion is largely influenced by media and that public opinion is not only based on facts, but merely on incomplete facts or facts out of context that trigger emotions. Consequently, Vewin is cautious with bringing news with regard to – low concentrations of – pesticides and pharmaceuticals in drinking water.

Furthermore, besides threats to public health, several emerging substances are nowadays causing aesthetic problems. MTBE and ETBE[8] are gasoline additives which raise the octane number and consequently reduce the emission of carbon monoxide due fuel burning. However, due to their high water solvability they are extremely hard to remove in drinking water treatment plants. At concentrations of 15 µg/l they negatively affect odor and taste of the drinking water. Such pollutants are obviously unwanted in the drinking water since they have an impact on customer satisfaction, and maybe consequently on overall customer confidence in Dutch drinking water.

1.3.2 European Union decision-making processes and resulting legislation

Vewin attempts to pursue the objective of undisputable drinking water quality – in part – via suitable legislation regarding surface water quality. A large part of this legislation is established at the level of the European Union. Of course, the subsidiarity principle[9] is applied, but once an issue is governed at this EU level, from a decision-making process EU legislation results which must then be transposed in national legislation. To guarantee – and improve – surface water and drinking water quality, quite some European Union legislation has been established regarding standards on concentrations. For surface water quality, the Water Framework Directive has been developed. Its purpose is to *"protect and enhance the status of the aquatic environment"* (European Commission, 2000a, p. 5). To achieve this, a list of *Priority Substances*[10] has been established (European Commission, 2001b). Pollutants on this list are regarded as a threat to surface water quality: an Environmental Quality Standard (EQS) is established and measures must be taken by Member States to gradually reduce emissions to the aquatic environment to achieve surface water concentrations that comply with this EQS. Periodically, this Priority Substances list must be reviewed by the European Union. Via a comprehensive decision-making process, pollutants are added to this list. Obviously, many stakeholders are attempting to influence such decision-making process to safeguard their interests. This is exactly what Vewin is interested in: how can these processes be better influenced to serve the drinking water quality?

1.4 Demarcation of problem

Of course, not everything can be studied: choices must be made. Therefore, this paragraph will demarcate the explored problem context with regard to *subsystem* (§1.4.1) and pollutants that are of special interest (§1.4.2).

[8] Methyl-tert-butyl ether and Ethyl-tert-butyl ether.

[9] To govern topics at the lowest level of aggregation as possible. This implies that only issues that cannot be arrange on a national or regional (river basin) level, will be governed centrally on the level of the EU.

[10] In addition to Priority Substances, certain pollutants are labeled as Priority Hazardous Substance (PHS). These pollutants represent a direct threat and must be *phased out* altogether within 20 years. PHS are not further studied here, since they are not relevant to the drinking water quality or are already forbidden by other legislation.

1.4.1 Demarcation with regard to subsystem

The subsystem is regarded as that part of the world that is analyzed in this study. According to Zafonte, a *subsystem* can be categorized by topic, but also by the level of territory (Zafonte and Sabatier, 1998).

Surface water quality is one of the topics within the broader European Union Environmental policy. Other topics may include, for instance, water quantity and air quality (horizontal axis in figure 1.5). Clearly, this research will focus solely on surface water quality, and more specifically on *Priority Substances* since this is a very important topic for Vewin.

The level of territory that is studied needs more elaboration. At least five distinct levels of territory can be identified with the problem context of water quality. The highest of them is the European Union level[11]. *EU Law*, for instance the EU Water Framework Directive, is developed at that level, which should then be transposed and implemented in each of the Member States. Secondly, the – often international – river basins can be regarded as a separate level. This level serves as intermediate between the European Union and specific Member States: it stimulates coordination between national governments in order to reach good surface water status, and improves cooperation, which are two aims of the Water Framework Directive. Then, each of the Member States forms a third level. National legislation and policy can be made, as long as it is in line with (i.e. equal or stricter than) European Union legislation. Finally, a regional and local level can be distinguished. For instance, water boards (regional) operate the waste water treatment plants for a number of municipalities (local).

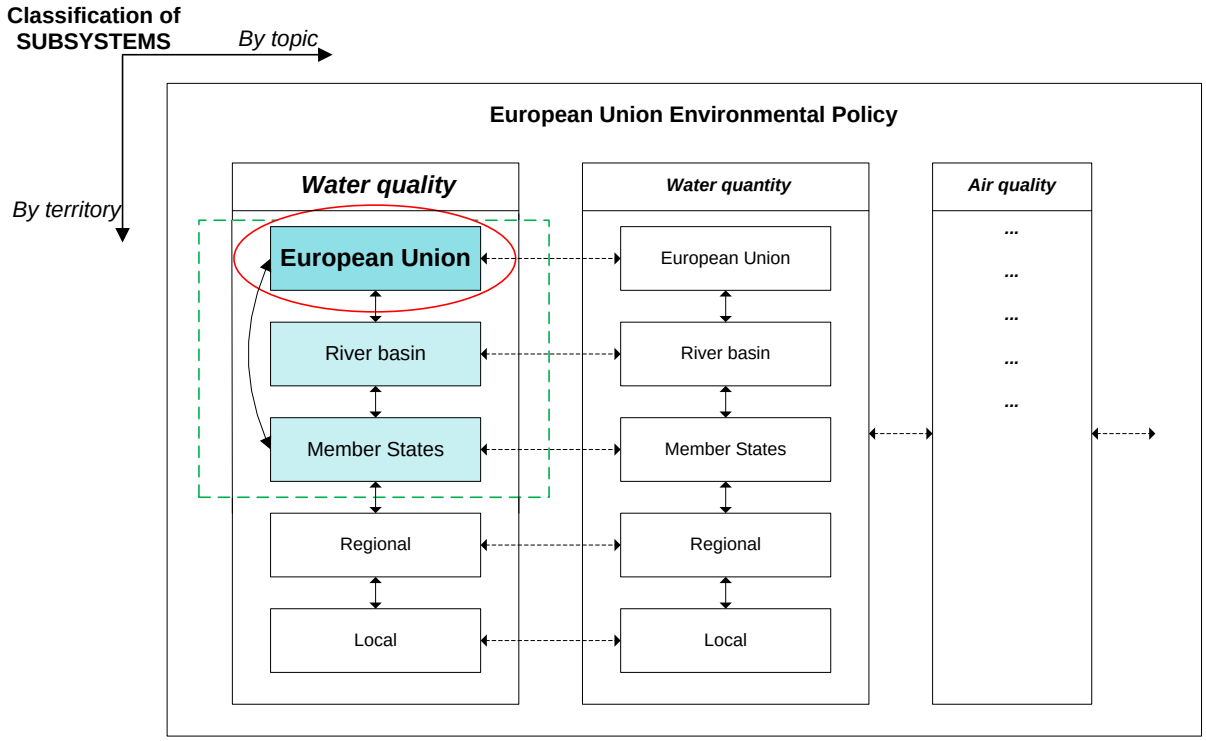


Figure 1.5: Classification of subsystems by topic and territory within European Union Environmental Policy.

The water quality problem is primarily taken on at the level of the European Union: high-level decision-making takes place in Brussels, resulting in legislative outcomes. These have to be transposed into the laws of Member States, and the Member States are responsible for implementing measures to comply with this *EU Law*. When measures must be taken to reduce the concentrations of a Priority Substance, a Member State can for instance regulate specific sectors, forbid the substance,

[11] Obviously, the global level could be regarded as 'higher' than the EU level. However, this global level is not concerned here since no *legally binding* documents are developed at this level with regard to water quality.

formulate policies to capture diffuse sources, etc. Although this *implementation trajectory* is also very interesting and important, the focus of this research is on the *decision-making processes* regarding Priority Substances. Therefore, the European Union is selected as subsystem: the other levels are mainly *implementing* the outcomes of the decision-making. This choice is also validated by the observation that the Dutch government, represented by the Minister of the ministry for the Environment, has expressed a desire to follow and await European procedures and decision-making, among others to have a *level playing field* (Cramer, 2007; Netherlands Ministry of housing spatial planning and the environment, 2007b). Indeed, although Member States have the flexibility for developing national legislation that is more strict legislation than EU Law, for environmental issues there is a tendency of the Member States to await EU legislation. Furthermore, the emergence of river basin management at a regional level has been studied to certain extent (Dieperink, 1997) and Vewin already has much experience with the implementation phase at a national and regional level, making it even more relevant both scientifically and socially to study the European Union level in this research.

Due to the focus on the *decision-making process* instead of *implementation*, pragmatic measures to reduce the concentrations of Priority Substances – like improved treatment possibilities, *green pharmacy* and improved product design – are not of primary concern here. Nevertheless, appendix C provides an overview to give an indication of possible measures for implementation.

1.4.2 Demarcation with regard to pollutants

Pesticides and pharmaceuticals are, for a number of reasons, the two selected cases on which this research is based. First of all, both are *synthetic* substances that are created by humans with a certain goal but may also have comparable adverse effects via (drinking) water, resulting in a comparable clash of interests. Secondly, there is a difference between the *maturity* of the problem: pesticides have been studied, discussed, regulated, and monitored for forty years, whereas pharmaceuticals are true *emerging* pollutants. It is this research' hypothesis, that exactly this difference between pesticides and pharmaceuticals – in combination with their large degree of technical comparability – gives an excellent opportunity for combined study: lessons from pesticides may also be used for pharmaceuticals, and serve as input for general strategy formulation. Moreover, from a decision-making point of view, pesticides and pharmaceuticals are equal: both may be selected as Priority Substance and are discussed in the same subsystem at the same moment. Thus, the context regarded here is Priority Substances; within this context, the focus is on pesticides and pharmaceuticals since these are relevant to drinking water. However, not all pesticides and pharmaceuticals can be studied in detail. This is impossible due to time-constraints. But, it is important to study *multiple* pollutants to find explanations for why the decision-making happened the way it did, and to what issues differences can be attributed (de Neufville, 1998). To this end, two pesticides and two pharmaceuticals will be selected to receive special attention.

For the selected pesticides, a difference in *decision-making outcome* is desired. This outcome is defined as whether or not a pollutant is currently listed as Priority Substance. By comparing the decision-making process of a Priority Substance and a non-Priority Substance, useful lessons may be derived: why has pollutant A been listed as a Priority Substance, while pollutant B has not? A clear example of a Priority Substance is the pesticide *atrazine* and will be used as such. This substance was not a large drinking water problem because the surface water concentrations were low and this hydrophobic pollutant can be removed for more than 90% with GAC. On the other hand, based on the technical aspects described in §1.2, Vewin would have expected the pesticide *glyphosate* to be listed as Priority Substance since this pollutant is difficult to remove – even with GAC – due to its hydrophilic property and occurs in relevant concentrations in surface waters throughout Europe (see figure 1.2 and §1.2.3). Glyphosate is a non-selective herbicide which is especially used to kill weeds, and was invented by Monsanto but is no longer patented. Although Vewin attempted to influence the decision-

making in this way, this did not happen. Vewin is puzzled what the reason for this difference in decision-making outcome is, and would like to learn from this for future purposes.

Just like with pesticides, there is a large range of various pharmaceuticals available and not all of them can be included in the current research. No pharmaceutical is currently listed as Priority Substance. Nevertheless, two pharmaceuticals that seem to be useful to focus on are *carbamazepine* and *17α-ethinylestradiol*. *Carbamazepine* is a mood stabilizing drug used in the treatment of epilepsy, invented by Novartis but no longer under patent. It is selected here due to its frequent detection in surface waters throughout the EU and its difficulty in removing it in drinking water treatment. *17α-ethinylestradiol* is the synthetic hormone used in most of the contraceptive pills around the world and is selected because of its proven adverse effects like fish feminization at very low concentrations.

It must be noted here that the selected pollutants are only examples of a much larger collection of similar cases that could have been used. Therefore, it is expected that the results can be generalized to a large degree. This possibility will be discussed in the reflection at the end of the study. Although special attention is paid to the selected pollutants to have more concrete observations, this is only pursued to have convincing evidence of the more general results.

1.5 Research objective and research questions

Based on the explored problem context in the previous paragraphs, it is clear that Vewin would like to better understand the decision-making processes within and around the European Union[12]. Although Vewin realizes that other stakeholders care about different aspects than the ones described in this chapter, it is often unclear to them why certain pollutants are added to the Priority Substances list whereas others are not. By better understanding these decision-making processes, Vewin can exert more influence and consequently achieve more favorable EU legislation.

Thus, the objective of this research is to assist Vewin in their strategy formulation with regard to threats from synthetic organic micropollutants for the drinking water quality. This will be done by making a reconstruction of the decision-making processes with regard to Priority Substances. Besides a thorough understanding of the formal processes itself, factors that seem to influence the outcome of these processes will be analyzed within this reconstruction: using this insight, strategic recommendations can be formulated for better countering drinking water quality threats from organic micropollutants.

Based on the problem context and the research objective, the following research question will be answered in this thesis:

"Which recommendations can be formulated for Vewin to counter drinking water quality threats from organic micropollutants, based on a decision-making reconstruction regarding Priority Substances and given the European multi-stakeholder setting?"

The main research question is divided in several sub-questions for two reasons: to reduce the complexity (solving a smaller block at a time is better manageable) and for structuring the research process. The sub-questions are:

i. What theoretical anchoring can assist in structuring the complexity of the decision-making processes and the factors that influence the outcome of these processes?
ii. What methodology can be used to integrate the theoretical anchoring with the Priority Substances reconstruction by application of the research methods?

[12] See Appendix A: Abstract visualization of Vewin's objectives.

iii. Which factors that influence EU decision-making processes and their outcomes can be identified using a decision-making reconstruction?
iv. How can the results from the decision-making reconstruction be interpreted?
v. Which conclusions and recommendations can be formulated based on the interpreted results?
vi. What can be learnt from critical reflection on and evaluation of the research?

The following paragraph will address the thesis structure, which presents the relation between the formulated research questions.

1.6 Structure of the thesis

This chapter has provided an introduction to the research problem. Within the problem context, aspects have been identified that are relevant from a sanitary engineering point of view. Vewin's perspective has provided a connection with decision-making and legislation. After the research was demarcated, the research objective and research questions could be formulated. Here, the structure of the remainder of this thesis is presented (see figure 1.6). As can be seen, this thesis structure is strongly based on the sub-questions.

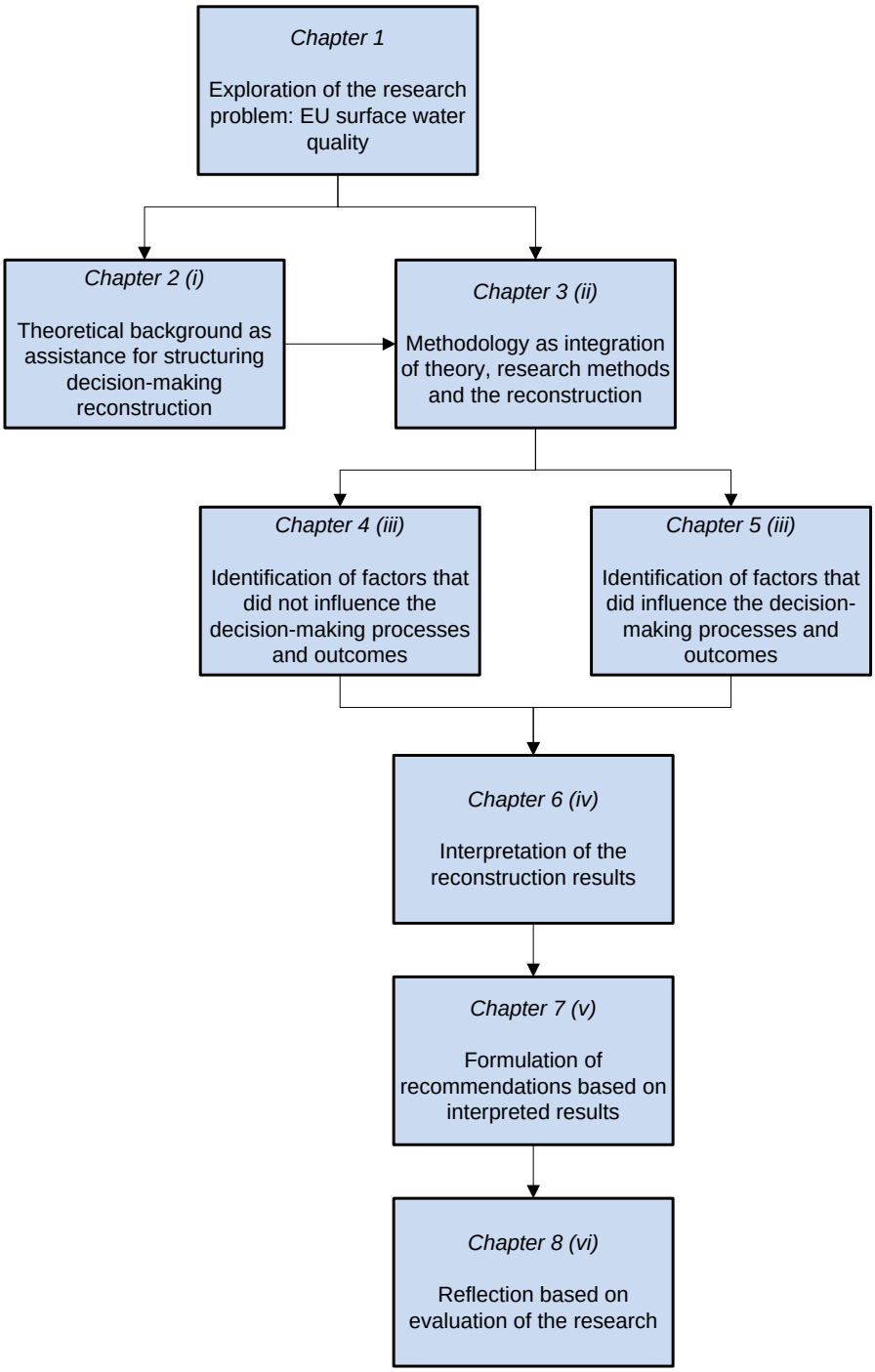


Figure 1.6: Abstract representation of the thesis structure (the Roman numbers relate to the sub-questions).

2. Theoretical background

This chapter presents the theoretical background for the research, which provides anchors for the description of the decision-making reconstruction. First, a general theoretical introduction is provided by explaining the policy analysis approach for dealing with complex problems (§2.1). Then, a short literature review will present a number of existing policy analysis studies to identify the kind of theories that can be used for structuring the context (§2.2). This limited overview will prove to be sufficient for selecting the main theory that will be used to structure the complexity of the decision-making reconstruction: Advocacy Coalition Framework (described in §2.3). It will serve as 'glasses' though which the problem context is observed. Afterwards, several components of this theory must be operationalized to prepare it for application. For this purpose, in §2.4 elements from additional theory are selected. This chapter is concluded with a short re-rap (§2.5).

2.1 General policy analysis approach to complex problems

A *policy problem* is defined as the gap between the current or expected future situation, and a desired situation, i.e. the difference between the client's norms and *perceived* facts of the reality (Hoogerwerf, 1987; Enserink, Koppenjan et al., 2003; Koppenjan and Klijn, 2004). Applied to Vewin's problem context, the *current* situation is that pesticides and pharmaceuticals are frequently found in surface water and drinking water, and the *expected future* situation is that this will happen more frequently and in higher concentrations. The *desired* situation is the absence of these pollutants in surface water and drinking water. In ´solving´ policy problems, there can be two kinds of complexity involved: *technical-substantive complexity* and *social-strategic complexity* (Enserink, Koppenjan et al., 2003). By taking the common role of 'policy advocate' as described by Enserink et al., the goal of this research is to provide better insight in both the technical-substantive and the social-strategic aspects that play a role, so that the client can use this for influencing the decision-making to better narrow the gap between the current and desired situation. The remainder of this paragraph is to a large degree based on the booklet 'policy analysis of the complex environment' of Enserink et al. (2003), which introduces policy problems and hands guidelines for dealing with them.

Complexity as a result of the technical-substantive dimension of the problem situation relates to uncertainty and complexity regarding technical, intellectual knowledge. Uncertainty is caused by a lack of knowledge, whereas the complexity is caused by the large range of variables that influence the water quality, the relations between them, the dynamics of the variables, and so on. Complexity as a result of the social dimension, on the other hand, is caused by the multi-stakeholder context: many stakeholders are present, with differing interests and therefore different perceptions and interpretations of the problem. If there is a low degree of *social consensus*, then the level of social-strategic complexity is high. As a result, all these stakeholders may try to influence the decision-making process to pursue their own interests, by either stimulating or frustrating the process. Van de Graaf and Hoppe have established an overview of four categories of policy problems, depicted in table 2.1 (van de Graaf and Hoppe, 1996). As can be seen, policy problems which are significantly complex from both a technical-substantive and a social-strategic perspective are called 'untamed problems'. Alternative labels are 'trans-scientific', 'ill-structured' and 'wicked' problems (Weinberg, 1972; Rittel and Webber, 1973; Dunn, 1994; van Bueren, Klijn et al., 2003). Such untamed problem context especially appears in the fields of environment and health, since such context often involves a large technical component and a high number of stakeholders.

Table 2.1: Overview of categories of policy problems, adapted from van de Graaf and Hoppe (1996)

		Technical-substantive complexity	
		small	large
Social-strategic complexity	small	*tame problems*	*untamed technical problems*
	large	*untamed political problems*	***untamed problems***

The problem context regarding organic micropollutants in surface and drinking water is an example of an untamed problem: there is *technical-substantive uncertainty* regarding actual concentrations, long-term effects, future development of the concentrations, potential measures for improvement of technical solutions, and *complexity* since the concentrations are highly dynamic as they are dependent on a large range of variables – like the pollution load, river discharge, biodegradability, removal efficiency and the solubility in water. Also, there is a large conflict of interests – public health and environment vs. economic growth – among stakeholders, resulting in different perceptions on the problem which are all 'valid' from an individual stakeholder's rational perspective, but together result in so-called *dialogues of the deaf* in which stakeholders talk but do not listen (Sabatier, 1988; van Eeten, 1999).

Although there are scholars that amplify the relative importance of either the technical-substantive or the social-strategic complexity, policy analysis acknowledges the importance of both in order to tackle an untamed problem (Enserink, Koppenjan et al., 2003, p. 32-33). In the previous chapter, the technical-substantive complexity has been described from the drinking water perspective. However, for describing the social-strategic complexity, a suitable theoretical model is needed that can assist in structuring this complexity of stakeholders with specific interests and perceptions of the problem. This search is described in the next paragraph.

2.2 Literature review: research on policy- and decision-making

Now that the general approach has been discussed, this paragraph will present a literature review of existing policy- and decision-making research in the environmental field. A selection of four books, which offer suitable opportunities to connect to theoretically, are included here. A concise summary of each will be presented, with a focus on the theories that are discussed in them.

2.2.1 Actor analysis for water resources management: Hermans, 2005

In his dissertation, L.M. Hermans starts off by acknowledging the gap between knowledge that water experts possess and the use of this knowledge by policy makers (Hermans, 2005). It is argued that stakeholder analysis offers a promising tool for water experts, since investigating the multi-actor context allows them to improve their work's relevance to policy-makers. The aim of the book is twofold: increasing insight of which practical use a stakeholder analysis currently is for water experts, and how such a stakeholder analysis should be executed. For the stakeholder analysis, a model-based approach is outlined. Hermans identifies three different categories of perspectives that can be used to describe the role of stakeholders and their interactions in policy- and decision-making processes. Each category has a focus on different aspects: either on the influence of the network structure (focusing on the relation between stakeholders and the institutional setting, like institutional analysis), on the perceptions of stakeholders (focusing on the exchange of policy arguments, like advocacy coalition framework), or on stakeholder's resources and interests (focusing on the power of stakeholders and their games of strategic behavior in interactions). Based on the problem at hand, it is recommended to choose a suitable stakeholder analysis model.

Using four case studies, namely the national water resources plan project in Egypt, water quality management regarding diffuse pollution in the province of North-Holland, the implementation of the EU Water Framework Directive in Turkey and water resources management with regard to the central Cebu Water REMIND project in the Philippines, the use of stakeholder analysis in practice is described. From these results, Hermans assesses the current use of stakeholder analysis. He concludes that it does not yet live up its promise for water experts, partially because water experts to a large degree stick to the role of supplier of objective knowledge instead of a strategic advocate of water quality. Stakeholder analysis can be part of the solution for closing the gap between water experts and policy-makers, but this will require a serious effort from both sides.

For the Priority Substances research, among the valuable parts of Hermans' work is the elaborate overview of theories and models that can be used for stakeholder analysis. One of them is Advocacy Coalition Framework, which depicts coalitions of stakeholders and their relations with the outside. In addition, *Discourse Analysis* (the *analysis* of *dialogue* regarding policy issues) is mentioned which assists in clarifying and structuring the arguments that are used by the various coalitions. Discourse analysis consists of four sub-models, of which *Argumentative Analysis* is the most suitable in this case. This model, which Hermans has applied in one of the cases, focuses on delineating the arguments by studying the structure and reasoning process behind the main policy argument.

Hermans concludes by arguing that stakeholder analysis does not yet live up its promise for water experts – partly because these experts strongly adhere to delivering objective knowledge instead of using it strategically.

2.2.2 Dialogues of the deaf: van Eeten, 1999

In his dissertation, M. van Eeten presents four environmental cases: the Dutch dike improvement controversy, the chlorine controversy, the green heart controversy and the civil aviation controversy (van Eeten, 1999). In each of these cases, stakeholders use arguments that are individually valid, but nevertheless in conflict with each other. For instance, on the one hand the environment must be protected to be sustainable, and on the other hand the number of flights must be increased to establish economic growth. This results in a *dialogue of the deaf*: a policy controversy in which stakeholders advance arguments that are individually valid, but differ fundamentally from each other. Alternatively said, stakeholders talk but do not listen (Sabatier, 1988). Van Eeten shows that the policy- and decision-making regarding these difficult issues has been *deadlocked* for many years: stakeholders cannot reach agreement on how to deal with the problem at hand, resulting in a *stalemate*.

The aim of this book is to provide a *crosswalk* that enables a more fruitful dialogue between these stakeholders to overcome such deadlocks. To do so, the *discourse* (discussion, dialogue) of each of the cases is thoroughly analyzed. This includes four steps. First, the arguments introduced by each coalition of stakeholders are identified, mainly based on document analysis and additional interviews. Secondly, the arguments are compared to explore the relations they have, and their reasoning structure is examined. Third, based on the relations between arguments of conflicting coalitions, a position that may serve as a crosswalk is identified, which may be used as bridge between the coalitions. Finally, based on that crosswalk, a new agenda is defined to renew the issue, hopefully solving the deadlock. Eight propositions are derived from the case studies, which are described in the final chapter.

In the problem at hand, the aim however is not to let coalitions talk to each other again to solve the deadlock: the European Union decides about the Priority Substances in any case. Since 'science' cannot objectively resolve the conflict among normative arguments, the final decisions are basically political and not rational. Thus, what is important is to have as good arguments as possible and base the strategy on this. As Jenkins-Smith argues, stakeholders over time learn their own and their opponents' arguments, and they attempt to improve these in a search of the most compelling argument to increase political support (Jenkins-Smith, 1990). It seems that to analyze and structure the arguments that are used in surface water quality decision-making, the first and second steps of Discourse Analysis as indicated by van Eeten (identifying arguments and their underlying argumentation structure) are very helpful. The other two steps may be very valuable too, but especially in a different scope: on a local and regional level to reach a compromise.

2.2.3 Dynamics and stagnation in manure policy: Termeer, 1993

In order to understand agricultural development, C.J.A.M. Termeer has studied the changing processes that occurred in the agricultural sector during the period 1970 – 1991 in her dissertation (Termeer, 1993). The research questions cover how these changes happened, how they can be

evaluated, and if it is possible to steer such change processes. The configuration approach is used as main theoretical approach, which assumes that reality is constructed, reconstructed and changed as a result of interaction: for instance, stakeholders enter and leave the decision-making process, and they regard the reality differently.

Using the configuration approach, stakeholders form *"social-cognitive configurations because of relative stable interaction patterns, shared interaction rules and shared definitions of reality"* (Termeer, 1993, p. 326). In this configuration approach, stakeholders are usually involved in multiple configurations, and their entrance and exit is rather dynamic. For the context of Priority Substances, this does not really seem to be the case; instead, it is assumed that the problem context is better reflected by a more static process with a rather stable number of stakeholder and their perceptions, and slow-moving decision-making processes. Although Termeer's research is valuable, including her quantitative approach to uncover the configurations, her approach is probably more useful in a context in which interactions between stakeholders and network characteristics are the focus of study. Here, the focus is on the stakeholder perceptions and the arguments in which they influence decision-makers instead of describing the interactions with other stakeholders. This is because the former may offer more room for technical knowledge than a network approach, and secondly because the client is primarily interested in influencing the decision-makers and not other stakeholders.

2.2.4 Playing with uncertainty: Klijn, van Bueren and Koppenjan, 2000

This book begins by stating that decisions regarding environmental problems are complex from both a technical-substantive as a social-strategic point of view: they are wicked problems (Klijn, van Bueren et al., 2000; van Bueren, Klijn et al., 2003). The technical-substantive complexity is not only based on a lack of knowledge, but also on the disagreement between stakeholders with regard to this knowledge. The latter is a result of the social-strategic complexity: the interests of stakeholders are in conflict with each other. However, to achieve their goals, stakeholders need each other: they are mutually dependent since a stakeholder cannot simply force his preferences on the process or another. This necessitates periodic interaction. But, there are often multiple subsystems in which parts of the policy- and decision-making takes place, which complicate matters even more: some stakeholders do not have access to specific subsystems, and knowledge may not be shared among subsystems. The largest dilemma for stakeholders is that they are primarily interested in protecting their own interest; but, without coordination or collaboration with other stakeholders, they often cannot achieve this. Overcoming uncertainty and disagreement seems to be rather difficult (van Bueren, Klijn et al., 2001).

To illustrate this, and to apply developed concepts, a case about zinc in the Netherlands is used: building materials containing zinc are a source of diffuse discharge of this metal into surface water. Their study has resulted in conditions under which collaboration strategies may evolve, including: know your network, search for new solutions and added value, create leverage in a creative way, the issue of trust and dealing with bottlenecks and conflicts in an intelligent way. To support the interaction between stakeholders and to reduce the risks that are attached to these interactions, *process management* is recommended as an important tool. Process management can assist in smoothening the process, for instance by connecting stakeholders with each other, agreeing on potential measures, stipulating rules that protect stakeholders' core values, and more. Other books may provide extensive insight in process management (de Bruijn and Ten Heuvelhof, 2002; de Bruijn, ten Heuvelhof et al., 2002); however, the focus of this research is on strategy formulation with regard to influencing the European Union decision-making processes, and not on managing the decision-making process itself (reaching an outcome) which is merely a role for a process facilitator.

The book focuses on four research parts: an analysis of the interaction patterns between stakeholders, an analysis of perceptions and changes therein over time, an analysis of the interaction process, and an analysis of the *steering attempts* including process management. For the Priority Substances research, two elements are of special interest. The analysis of perceptions to understand

and explain the different positions that stakeholders take are at the core of the study. For this, just as the authors of the book, document analysis and interviews will be used. Furthermore, for the reconstruction of the interaction-processes *decision-making rounds* are used.

2.2.5 Outcome of the literature review: selection of main theoretical approach

The descriptions of the existing studies have revealed an introduction to theories that can be used to analyze environmental policy- and decision-making. Of course there are many more policy analysis studies available – and it is acknowledged that the selection of the discussed books may be biased to some degree – it can be observed in the limited literature review that all of the books focus on the *perceptions* of stakeholders: apparently, stakeholder perceptions are important in analyzing empirical cases. Although there are numerous models that can be used for analyzing the stakeholder perceptions, a model must be chosen that fits the problem context and the research goal. Here, the model will be used conceptually as a *leading tool* for analyzing a case. Therefore, it is important that the chosen model can assist in unraveling the complexity of the Priority Substances context and structuring the factors that are of importance to EU decision-making, ultimately used as input for strategy formulation. Thus, the choice of the model must be adequate, but it is not necessary to identify the *ultimate* model and empirically test this specific model. Consequently, based on the models found in literature – of which some have been mentioned in the literature review – it has been chosen to select *Advocacy Coalition Framework* as main theory. Although other models could be very useful as well, this choice has been made because this theory:

- has proven in the past to be useful as an ordering framework to analyze stakeholder perceptions (Sabatier, 1998)
- has a focus on coalitions instead of stakeholders, which is a merit given the EU-context
- attributes a large role to technical knowledge

A more detailed motivation for this choice will follow in the next paragraph.

2.3 Advocacy Coalition Framework

This paragraph introduces the main theory that is used as basis of this study (§2.3.1), after which the motivation for this theory and purpose within the study is further explained (§2.3.2).

2.3.1 Advocacy Coalition Framework: an introduction

In 1988, Paul Sabatier has introduced the *Advocacy Coalition Framework* (ACF) for dealing with untamed problems and it is primarily aimed at identifying *policy changes* over periods of more than a decennium (Sabatier, 1988; Sabatier and Weible, 2007). Here, policy is regarded as a strategy (a plan of action) to either influence or make decisions. Thus, policy changes are changes in the strategy with which decision-making processes are influenced or by which decisions are made. In the analysis of these changes and the decision-making processes themselves, the *role of technical knowledge* in the applied strategies and *learning over time* (new knowledge, experience from past decisions, etc.) are important aspects within the Advocacy Coalition Framework. Over the last twenty years, several slight extensions and minor adaptations regarding various aspects have been made to the ACF (Heintz and Jenkins-Smith, 1988; Sabatier, 1998; Richardson, 2000; Weible, 2006; Sabatier and Weible, 2007). The Advocacy Coalition Framework consists of three parts (see figure 2.1): two sets of *exogenous variables* and a *policy subsystem*. Each of these parts is based on multiple *components*.

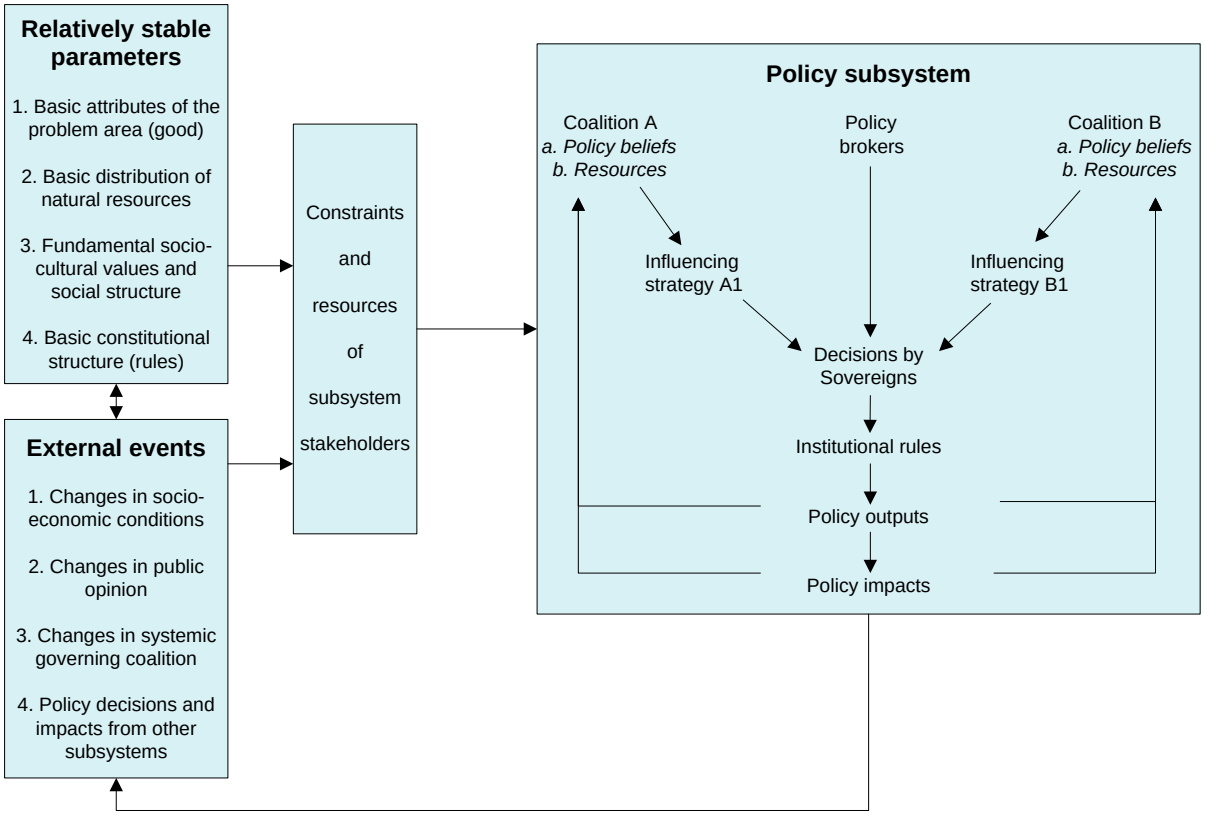


Figure 2.1: Sabatier's Advocacy Coalition Framework, slightly adapted (Sabatier, 1998, p. 102).

The ACF uses a specific *policy subsystem* as unit of analysis (see right-hand box). A policy subsystem includes all relevant stakeholders that either legally possess formal decision-making power in the decision-making regarding a specific topic (so-called *sovereigns*), or are trying to influence this decision-making process without formal decision-making power. A subsystem is found at a specific level of abstraction, in this case the European Union as discussed in §1.4.1.

Within a subsystem, stakeholders are clustered together to form an *advocacy coalition*. This clustering is based on a comparable *deep normative core*, which is the very basis of a *belief system* of a stakeholder. Such a belief system can include the stakeholder's *perception on the problem,* but also the *perception on the process*. However, the focus here is on a stakeholder's perception on the problem in order to balance the substantive content with the process content. The latter is sufficiently covered in the description of the decision-making processes.

Besides the obvious stakeholders – in this case the drinking water sector and the industry – legislators, multiple levels of government and researchers are potential members of a coalition (Sabatier, 1998). In addition to the belief system, a coalition of stakeholders possesses a range of *resources* that enables them to influence the decision-making using a certain *influencing strategy*. Resources can be powerful allies in the decision-making bodies, financial resources, access to media and support of public opinion, information, mobilizable troops and skillful leadership (Sabatier and Weible, 2007).

With their strategy, coalitions introduce *policy arguments* to the decision-making which express their *belief system* in an attempt to convince the *sovereigns* who possess formal decision-making power. Ultimately, the sovereigns make a political *decision*. This decision imposes an *institutional rule*, which has a practical *output* at the operational level and an *impact* on targeted problem parameters and on the coalitions within the policy subsystem. From this, they may learn as they gather experience regarding strategies that work or do not work – and may adapt their belief system and strategy before the next decision-making takes place. Besides the coalitions and

sovereigns, a third type of player in the policy subsystem is the *policy broker*. Policy brokers are concerned with finding a reasonable compromise to a conflict and can therefore be seen as mediators.

In addition to the subsystem, *relatively stable subsystem parameters* and *external events* are included in the Advocacy Coalition Framework as *exogenous variables*. Within the stable subsystem parameters, changes are not very frequent: this merely concerns the basic attributes of the problem area (i.e. water quality) and the basic constitutional structure (i.e. who has which authority and formal decision-making power). External events relate to events that take place outside the subsystem, for instance changes in public opinion regarding the water quality (demanding action) or crucial decisions at a different level of aggregation (for instance at the level of the United Nations, or at the level of the river basins). The existence of multiple levels of aggregations give stakeholders nowadays increased opportunities for *venue shopping* (Richardson, 2000): stakeholders have multiple access points to influence decision-making and continuously do so.

2.3.2 Advocacy Coalition Framework: motivation and research purpose

For this research, the Advocacy Coalition Framework will be used as theoretical framework for reconstructing and analyzing the decision-making processes regarding Priority Substances on the level of the European Union. This theory fits the problem context for a number of reasons.

First of all, the theory focuses on coalitions instead of individual stakeholders, which is beneficial regarding the high number of stakeholders in and around the European Union.

Secondly, the use of *belief systems* offers freedom with regard to *operationalization*: here, a focus will be on the policy arguments that are introduced to the decision-making. This will make it possible to do a more concrete analysis by comparing the arguments that are used. Concrete derivations may serve as input for the research objective – recommendations to counter drinking water threats: a comparison of arguments may illustrate factors that explain decision-making outcomes, or factors that were not thought of before. Such derivations may be used in a strategic way in the future, for instance by adapting the arguments.

Third, the ACF reconstructs decision-making and changes in the framework over an extended period of time (Sabatier, 1988). The Priority Substances context has lasted for over ten years. Policy changes occur as a result of either *policy-oriented learning* or because of *external forces* (Sabatier, 1988, 1998), which is also applicable for Priority Substances. Learning can take place within a coalition (new information) or between coalitions (convincing the other, changes in the belief system or reaction to a decision), which can be observed from analyzing changes in arguments over time.

Fourth, technical knowledge is valued in the ACF as support for belief systems (Sabatier and Weible, 2007). In environmental problems, technical knowledge normally plays a significant role, which is also the case for Priority Substances as extensively described in especially §1.2. The large role attributed to technical knowledge by ACF is therefore another reason why ACF fits.

Finally, the ACF can combine the context of pesticides and pharmaceuticals in one decision-making reconstruction analysis. Although the pesticides context can be regarded as a *mature subsystem* in terms of ACF (Sabatier, 1998), whereas pharmaceuticals are more of an *emerging* problem since they were not detected earlier, pharmaceuticals have entered this mature subsystem during the studied period (see chapter 3). Pesticides and pharmaceuticals are discussed in the same subsystem at the same time among the same participants, facilitating combined study.

2.4 Additional theoretical elements for operationalization ACF

Now that the main theory has been selected and described (Advocacy Coalition Framework), several (methodological) choices must be made with regard to the operationalization of the *ACF-components* that have just been discussed. For instance, a suitable way must be found for expressing the belief systems of coalitions, but also for a more detailed structuring of the decision-making processes. Naturally, there are multiple possibilities for operationalizing a specific component; below, the selected

theoretical elements are described. Although other choices could have been made, it is believed that these connect very well, both to the ACF and to the context of Priority Substances.

2.4.1 Identification of stakeholders

Before the coalitions can be established, the stakeholders that are of importance in a policy problem must be identified first. This can be pursued in several ways (Bryson, 2004). Here, the scientific soundness will not be discussed extensively; nevertheless, some analytical backing of the identification process that will follow in chapter 3 is given. Based on practical feasibility and suitability, two methods have been chosen as guideline for identifying the stakeholders.

First, Mitroff discusses the positional and reputational approach (Mitroff, 1983). The positional approach regards the formal structure of the network, and identifies the stakeholders that have formal power in the decision-making. Formal legislation, procedures and policy documents can be used (also proposed by Enserink, Koppenjan et al., 2003). Next, using the reputational approach, important persons are asked to identify additional stakeholders.

Then, Enserink et al. offers two more ways to identify additional relevant stakeholders (Enserink, Koppenjan et al., 2003). Causal relations between factors can be used to observe who can exert influence on the factors. Also, final stakeholders may be identified by considering who may experience positive or negative effects of the problem at hand. Finally, a streamlined overview should be created. For the study, it is important that the resulting list of stakeholders should cover a balanced set of interests and positions (Hermans, 2005).

2.4.2 Argumentative analysis

Discourse analysis can be used to obtain insight in stakeholder's perceptions on policy problems and belief systems, by *analyzing* the *discourse* (discussion, dialogue). It is especially valuable for complex, polarized policy issues in which belief systems differ (Hermans, 2005, p. 32). Argumentative analysis is a specific form of discourse analysis (Hermans, 2005, p. 27). It structures arguments and unravels the underlying reasoning process. Arguments are crucial vehicles in policy- and decision-making: they are based on a belief system and are used to influence the decision-makers and political support. The creation and injection of arguments into the decision-making can therefore be used as part of the operationalization of the Advocacy Coalition Framework, as *belief systems are expressed by arguments*. Since the belief systems of the coalitions differ, disagreements of arguments are the result. Or, even worse, in case of *dialogue of the deaf*, coalitions focus on arguments that are incommensurable: consequently, there is no real discussion (Sabatier, 1988; van Eeten, 1999). Majone notes that over time, debate encourages coalitions to adjust their views of reality and values as a result of *learning* (i.e., arguments change over time). He argues (Majone, 1989, p. 1):

> *"Whether in written or oral form, argument is central in all stages of the policy process (…). Political parties, the electorate, the legislature, the executive, the courts, the media, interest groups, and independent experts all engage in a continuous process of debate and reciprocal persuasion. This process (...) begins with expressions of general concerns and ends in concrete decisions."*

In this case, these concrete decisions are the decisions of the sovereigns – the formal European Union decision-makers – at the end of a decision-making process. Because belief systems are expressed by arguments and are here focused on the coalition's perception on the problem supported by technical knowledge (see §2.3), argumentative analysis is a very suitable theoretical element that can be used to operationalize this ACF-component.

Toulmin has developed a structural model of argument, in order to better understand the argumentation processes and their potential impact (Toulmin, 1958; Toulmin, Rieke et al., 1979). This model has been slightly refined by Dunn, and contains six elements: information I, policy claim C, warrant W, backing B, rebuttal R and qualifier Q (Dunn, 1994). It is displayed in figure 2.2. It must be noted that not always all elements have to be used. Sometimes, coalitions use an *incomplete*

argumentation; moreover, sometimes coalitions only *counter* another argument (van Eeten, 1999). Using Toulmin's structural model, insight is obtained regarding the form of argumentation, the issues included in the structure and the potential asymmetry in the used arguments. Based on this, crosswalks may be identified; however, it may also be used as input for strategy formulation.

For this research, argumentative analysis and the six elements will be used to structure and analyze the main policy argument (i.e. a coalition's *argumentation structure*). Special attention will be paid to the technical aspect within each policy argument: to what extent is technical knowledge used to support the argumentation structure, and what is therefore the role of technical knowledge in decision-making processes?

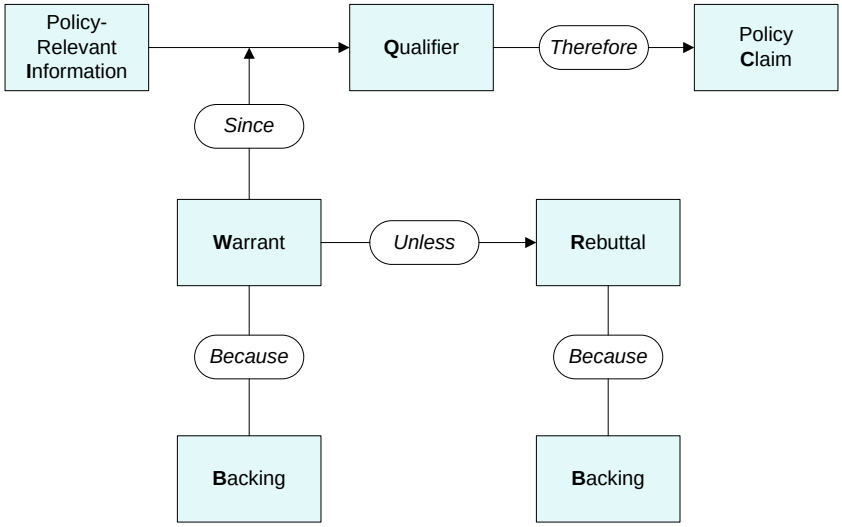


Figure 2.2: Six elements to model a policy argument. Adapted from Toulmin (1979) and Dunn (1994, p. 67).

These elements can be defined as (Dunn, 1994, p. 66-68):

Policy-relevant information I:	the evidence, for instance a statistical generalization, conclusions of experts or an expressed value or need. The information is always the start of a policy argument.
Policy claim C:	the conclusion of a policy argument. The policy claim is the subject of conflict: without a policy claim, there is no conflict. A policy claim is the logical consequence of policy-relevant information.
Warrant W:	an assumption in a policy argument, linking the policy-relevant information I and the policy claim C. It provides a reason for accepting the policy claim C.
Backing B:	additional assumptions or arguments to support the warrant W.
Rebuttal R:	a clause stipulating when the policy claim C is not acceptable.
Qualifier Q:	the probability that the policy claim C is certain, for instance 'probably' or 'very likely'. No qualifier is required when the conclusions are completely deterministic.

2.4.3 The role of technical knowledge and knowledge utilization

As has been noted, within Sabatier's Advocacy Coalition Framework, the role of technical knowledge as support for a belief system is important. This can be connected with the debate on (the lack of) knowledge utilization, and the search for ways to improve impact of technical knowledge on decision-making (Sabatier and Jenkins-Smith, 1988; de Bruijn and ten Heuvelhof, 2003). Often, technical knowledge carefully documented in reports is disregarded by policy- and decision-makers: different options than the ones suggested are chosen. This frequently results in agitated researchers and technical experts, for instance when they see *"how inches of their 'high quality' reports and analysis were pulverized in the grindings of the policy-making process"* (van Eeten, 1999, p. 2). From the

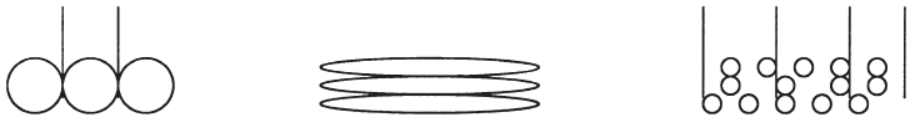
viewpoint of water experts, policy- and decision-makers have little understanding of water interests (Hermans, 2005). There appears to be a gap between research and technical knowledge on the one hand, and policy- and decision-making on the other. Sometimes this is because of the quality of these analyses, although often even sound analyses prove to have only little influence on stakeholders and their decision-making (de Bruijn and Porter, 2004). De Bruijn and Porter give several potential explanations for this, including the unstructured nature of these kind of problems, a lack of consensus regarding the trade-offs that have to be made between specific criteria[13], and an absence of a sense of urgency when the technical knowledge is presented[14].

In addition, an alternative explanation that can be thought of is the failure of stakeholders to introduce existing technical knowledge into the decision-making, who would otherwise benefit from it. Finally, the principle of 'dialogue of the deaf' may explain why technical information, although introduced, does not yield expected results: as a result of conflicts between the belief systems of two coalitions (Sabatier, 1988, p. 155), they talk past each other by using arguments that differ significantly from each other (van Eeten, 1999, p. 2). Therefore, the *utilization of technical knowledge* as such is not always as efficient as possible. Moreover, it is argued that sound science alone is often insufficient to overcome large economic interests (Shellenberger and Nordhaus, 2004).

In the remainder of this research, the role of technical knowledge within the decision-making processes will be investigated, and opportunities for *using* such technical knowledge to a larger degree in the future will be identified.

2.4.4 Models for decision-making processes

Several theories exist for modeling, or presenting, decision-making processes. According to Teisman, who has provided a summary of these theories, complex decision-making can be analyzed by three conceptual models: the phase model, the stream model and the rounds model (see figure 2.3).



The phase model	*The stream model*	*The rounds model*
Distinct stages of formation, adoption and implementation	Concurrent streams of problems, solutions and participants	Series of interacting decisions taken by several actors

Figure 2.3: Three models for analyzing complex decision-making (Teisman, 2000, p. 939).

The phase model is a classical model based on a number of distinct, more or less sequential, decision-making stages, normally policy formation, -adoption, -implementation and evaluation of a policy, where every phase has its own participants.

On the other hand, the stream model is a combination of three separate concurrent streams: one with problems, one with participants (called stakeholders here), and one with solutions. It finds its origin in the well-known garbage can model (Cohen, March et al., 1972): a decision can only be reached during a *window of opportunity*, when the three streams coincide. Kingdon has applied this model to public decision-making processes. He identifies three alternative streams (Kingdon, 1984): problem stream, policy stream and political stream, coinciding during a *policy window*. The focus is on

[13] With regard to the occurrence of pharmaceuticals in water, for instance, two competing criteria are public health and ecology: pharmaceuticals primarily serve public health, but may endanger ecology and public health due to continuous intake too. Stakeholders may differ in the way they value the importance of each criteria.

[14] Sense of urgency: at least some stakeholders experience the problem as significant and call for an immediate solution. Without such a sense of urgency, new technical knowledge is not directly embraced as stakeholders are busy with other problems (i.e. the technical knowledge at that moment lacks importance).

changes in political and societal climate, which result in the boost or drop of certain problems and solutions within the political system. This is not the focus of this research, however.

Finally, the rounds model departs from the idea that decision-making is formed by a series of rounds. A round is finalized by a *critical decision*, i.e. a decision that gives direction to the continuance of the decision-making process (Enserink, Koppenjan et al., 2003, p. 29). Stakeholders can lose in one round, and win in the next one. It is even likely that stakeholders are *wheeling and dealing* at different subsystems at the same moment (i.e. multi-venue setting opportunity). Also, the field of stakeholders can change each round, introducing new problems and solutions.

The rounds model depicts the problem context of water quality best: clear decision-making rounds can be identified, each resulting in a crucial decision which opens the next round. In this next round, new problems can enter (for instance the entrance of pharmaceuticals). Therefore, Teisman's methodology with regard to the rounds model can be used to understand the complexity and structure the decision-making processes. For this research, it will serve as supporting theory for identifying the various rounds in the decision-making reconstruction, within the main Advocacy Coalition Framework theory that is used.

2.5 Concluding: operationalized Advocacy Coalition Framework

This chapter has provided the theoretical background to the study. An introduction to dealing with complex problems from a policy analysis point of view has resulted in the definition of two types of complexity: technical-substantive and social-strategic. The latter reflects the numerous stakeholders involved, each with own interests and perception of the problem, influencing the decision-making. To structure this and to be able to analyze the decision-making processes, a suitable model must be chosen. Advocacy Coalition Framework will be used as main theory. Specific theoretical elements have been selected as operationalization of several ACF-components. Although other choices could have been made – both for the main theory and for the operationalization of components – it is believed that the selected choices connect very well to the empirical context (Priority Substances) and the research objective (strategy formulation by understanding decision-making processes).

It is important here to acknowledge that Advocacy Coalition Framework, just like Discourse Analysis (and Argumentative Analysis), focuses on differences in *perceptions*. The fundamental thought behind these theories is that there is no neutral, objective view on policy problems. Instead, a subjectivist research approach is taken: different perspectives (and belief systems) are observed, noted and analyzed. There is no 'true', 'correct' or 'objective' perspective, and it is also not possible to derive such an omniscient view from the *subjective descriptions*. This is also not the aim of this research: it is acknowledged that combining two such conflicting philosophical notions (subjectivism vs. objectivism) is unachievable since they are *incommensurable*. Nevertheless, even without an objective view, useful lessons can be derived from comparing the coalition's arguments and the development of the decision-making processes over time.

The resulting operationalized Advocacy Coalition Framework will be leading in the analysis of the case throughout the following chapters. The next chapter will present the *methodology*: how are the theory, case and research methods combined to reconstruct the decision-making processes? This methodology can be much better specified after identification in the case of some of the main ACF-components: the coalitions, the institutional setting and the decision-making rounds.

3. Identification and methodology

The first chapter has presented the perspective of the Dutch drinking water perspective, resulting in a research objective (strategy formulation). Chapter 2 has provided a theoretical background for pursuing this research objective: a means for structuring the technical-substantive and social-strategic complexity of the case. This chapter will identify in the case the main components that are causing the social-strategic complexity. First, stakeholders that play a role on the level of the European Union will be clustered into coalitions based on a comparable belief system (§3.1). As will be argued, both Vewin and the department of sanitary engineering are part of one of these coalitions. Next, the institutional setting is analyzed: the formal European Union decision-makers – the *sovereigns* – and the formal decision-making procedure that is frequently used will be described (§3.2). Then, in §3.3 specific decision-making *rounds* will be identified, each of them resulting in a crucial decision. Finally, the methodology will discuss in detail how theory and research methods will be applied to structure and present the complexity within the decision-making processes (§3.4).

3.1 Identification of stakeholders and forming coalitions

The coalitions that attempt to exert influence on the European Union decision-making regarding Priority Substances are based on clusters of stakeholders. So, to identify coalitions, the stakeholders must be identified first. As explained in §2.4.1, this is done by using the formal decision-making structure: as a result, the European Commission, the European Parliament and the Council are identified (discussed in §4.2). Then, 'common sense' has been applied to discover additional stakeholders that may experience positive or negative effects of the problem context as described in chapter 1. Furthermore, by analyzing the lists of participants in several EU stakeholder consultation sessions, additional EU-stakeholders have been identified. Lastly, with enquiries made during initial interviews at the start of the study, final stakeholders have been added.

These stakeholders have been clustered into coalitions, based on a presumed common *deep normative core* which is the fundament of a coalition's belief system (Sabatier, 1988). Since the problem is rather *fundamental* and *polarized*, the clustering into coalitions is relatively straight-forward, although some iterations have been made throughout the study[15]. Note that to be part of a coalition, it is not required to have intensive coordination with other stakeholders within that coalition. Instead, the level of coordination can vary from very strong to very weak (Sabatier and Weible, 2007). Thus, the clustering takes place based on the common normative core, and not so much on whether or not a stakeholder identifies himself with another stakeholder. Therefore, even independent research institutes can be part of a certain coalition: not because they necessarily engage in large lobby activities to protect their interest, but because they conduct research regarding this specific interest.

The list of stakeholders, clustered in three coalitions based on comparability of their belief system, can be found in table 3.1.

[15] An example is environmental NGO's. At the start of the research, it was thought that the interests of these stakeholders would differ too much compared to the interests of the water coalition. Therefore, these stakeholders were clustered into a separate environmental coalition. During interviews, however, it turned out that reality would be better reflected if these stakeholders would together be modeled within a more diverse water coalition.

Table 3.1: Overview of stakeholders, clustered into coalitions by comparability of belief system

Name coalition	**Water coalition**	**Agribusiness coalition**	**Pharmaceutical coalition**
Common deep normative core	*Protection of surface water quality*	*Protection of food production via pesticides*	*Protection of public health via pharmaceuticals*
Stakeholders	Association of Dutch water companies (Vewin)	European Crop Protection Agency (ECPA)	European Federation of Pharmaceutical Industries and Associations (EFPIA)
	Sanitary engineering department, Delft University of Technology	Monsanto Company	Novartis International AG
	Unie van Waterschappen	BASF Group	AstraZeneca PLC
	European Federation of National Associations of water and waste water services (EUREAU)	European liaison Committee for the Agricultural and Agri-food trade (CALCAA)	European Generic medicine Association (EGA)
	KIWA	COPA-COGECA	
	Technologie Zentrum Wasser (TZW)	European Seed Association (ESA)	
	European Environmental Bureau (EEB)	European Chemical Industry Council (CEFIC)	
	Brunel University		
	World Wide Funds for nature (WWF)		

The three coalitions are:

- the *water coalition*: cares about surface water quality
- the *agribusiness coalition*: cares about food production via pesticides
- the *pharmaceutical coalition*: cares about public health via pharmaceuticals

Note that the list with stakeholders by no means is conclusive. Also, note that not all stakeholders are necessarily equally active within a coalition. Furthermore, note that it is possible that coalitions *change* over time: stakeholders may enter and exit for several reasons, like ignorance, setting other (lobby) priorities and the arrival of new decision-making issues.

As can be seen, Vewin is part of the water coalition. However, also the sanitary engineering department from Delft University of Technology is part of this coalition. This logically follows from one of the fundamental ideas of ACF: independent researchers can be a part of coalitions (Sabatier, 1998). It is not claimed that the department is involved in strategic lobbying and share an influencing strategy; instead, it depicts that all stakeholders in the water coalition have the same *mindset*.

Not only drinking water interests are represented in this coalition, but also waste water interests and ecological interests. All stakeholders are proponent of measures at the source: prevent pollution of the surface water is something that is agreed upon by all. Whether they adhere to this principle to protect drinking water, waste water or ecological interests, the core principle is the protection of surface water quality. Here, one stakeholder requires further elaboration. The European Federation of National Associations of water and waste water services (EUREAU) is the umbrella organization for the European drinking water and waste water sector. This umbrella organization – as many others – consists of national associations. Thus, Vewin is also represented in EUREAU. This is also logical, since Vewin does not pursue all of its EU interests alone; instead, much of the interests and positions are – together with other national associations – coordinated within EUREAU. Consequently, Vewin and EUREAU are inextricably entangled; EUREAU can therefore actually be seen as co-client for this research, especially given the EU focus. However, since Vewin is the official client, this thesis is attributed to Vewin and written to Vewin. Nevertheless, the findings are applicable to both as will be seen later (chapter 7).

Also note that a coalition comprises a variety of types of stakeholders, both regarding the level they primarily interact on (local, national, EU, global) and their role (umbrella organizations, manufacturers,

users, research institutes). Although it may appear that the water coalition has more technical expertise because of the mentioned research institutes, it must be noted that the agribusiness and pharmaceutical coalition have much more of such technical expertise and researchers already *in-house.*

As discussed in chapter 2, each of the coalitions has a belief system that is expressed in their *argumentation structure* regarding the problem context; in addition, they have a *strategy* and *resources* (the means) to influence the formal decision-making process in such a way that it supports the coalition's belief system. They pursue this via the institutional setting: the *sovereigns* and the *formal decision-making procedure*.

3.2 Identification of the institutional setting

This paragraph presents the three *sovereigns*, who have formal decision-making power within the European Union – and therefore also with regard to Priority Substances. Their formal decision-making power is stipulated in the original Treaty on European Union, also known as the 1992 Maastricht Treaty, which has been adapted over time (European Union, 1992, 2008). The European Union Treaty identifies the following three Union's institutions (European Union, 2008, article 13): the *European Parliament*, the *European Commission* and the *Council of the European Union*. First, the role of each of the sovereigns will be introduced (§3.2.1); then, the frequently used c*odecision procedure* that is frequently applied within the European Union will be described (§3.2.2).

3.2.1 The European Union and its formal institutions: the sovereigns

Member States have delegated some of their decision-making powers to the three created institutions, namely the European Commission, the European Parliament, and the Council of the European Union. By pooling sovereignty, the Member States hand decisions regarding specific matters that are of joint interest to the level of the European Union. It is the Commission that proposes new legislation, whereas the Council and Parliament adopt the legislation. To match the theoretical framework, the three formal decision-making institutions within this *institutional triangle* are labeled *sovereigns* in the remainder of this study. The following description is to a large extent based on the 'Official directory of the European Union' (European Communities, 2005).

The *European Commission* (from now on: *Commission*) attempts to protect the interests of the European Union as a whole. Each Member State has at least[16] one member in the Commission (a *European Commissioner*), who is responsible for a specific field. The European Commissioners are appointed for five years, and are approved by the Parliament before they commence their duties. They should act only in the interests of the European Union and are independent of their Member States. The commission's primary task is to guard the Treaties. It can start infringements procedures against Member States but can also fine companies and individuals. Furthermore, the Commission is the *only* sovereign that can initiate new legislation based on their exclusive *right of initiative*. The Commission is housed in several buildings in Brussels and officially employs over 20,000 persons.

The *European Parliament* (from now on: *Parliament*) represents the citizens of the European Union, who directly elect the Members of the European Parliament (MEP) for a period of five years. The Parliament consists of 785 MEPs (Member of European Parliament), although over 3,000 persons are officially employed at the Parliament's secretariats. Meetings are held on a monthly basis in Strasbourg for plenary Parliament sessions, whereas additional part-sessions are held in Brussels. The

[16] The larger Member States, measured by amount of inhabitants, have two members. These are Germany, Spain, Italy, France and the United Kingdom.

Parliament has three fundamental powers: legislative, budgetary and monitoring the executive. Only the legislative power is discussed here.

Treaty after Treaty, the Parliament has obtained more and more legislative influence. In the Treaty of Maastricht in 1992, the codecision procedure was introduced (see §3.2.2), whereas since the Treaty of Amsterdam in 1997 the codecision procedure has become the standard procedure in many fields, including the environment: with the codecision procedure in place, no new legislation can be adopted without the formal approval of the Parliament (European Union, 1992, 1997). In addition, the codecision procedure has given the Parliament the power to make amendments instead of only accepting or rejecting proposals. With the proposed further democratization of the European Union in the signed – but not yet ratified – Treaty of Lisbon, the Parliament would obtain even more influence as the codecision making procedure would become the standard (European Union, 2007). Indeed, the role of the Parliament has moved from being a consultative body towards being co-legislator over the last decades. It must be noted that much work of the Parliament is prepared in specialized committees (for instance the Committee on Environment, Public Health and Food Safety, or *ENVI-Committee*). Such a committee consists of specific MEPs who have more knowledge of the topic; they study a new proposal of the Commission, formulate amendments and listen to lobbies. After agreement is reached within the specialized committee, the *Rapporteur* (one MEP is appointed for the Parliament to 'guide' a dossier through the whole decision-making process) is presenting the result to the Parliament, which often follows the voting advice of the specialized committee.

The *Council of the European Union*[17] (from now on: *Council*) represents the individual Member States. Within the Council, each Member State has one representative. The composition of the Council varies based on the field that has to be discussed (economic affairs, justice, environment, etc.), but he or she has to be authorized to commit his/her Member State. As a result, in practice the Council consists of the Ministers of Foreign Affairs, or the Ministers of Justice, or the Ministers of the Environment, etc. The Council exercises together with the Parliament legislative powers within the European Union, often via the codecision procedure (see §3.2.2): new legislation is adopted jointly. The actual work of the Council is prepared by *Permanent Representatives of the Member States*. First, the largest part of the groundwork is done in council working groups in which permanent representatives, supported by national experts, work through a Commission proposal and negotiate the Council's position. For environmental issues, each Member State has several permanent representatives on a full-time basis in Brussels with a national mandate to negotiate with the other Member States. Secondly, the *substitute* permanent representatives, supported by permanent representatives, negotiate remaining points of disagreements. These representatives are assembled in Comité des représentents permanents (COREPER) and meet on a weekly basis. Finally, the third and highest and most political level, is the Council itself: the assembled ministers of the 27 Member States, who ultimately reach official political agreement.

3.2.2 The European Union codecision procedure

The codecision procedure is stipulated in article 251 of the original European Community Treaty establishing the European Economic Community in 1957 (also known as the Treaty of Rome), and has since then not changed and consequently can also be found in article 251 of the current European Community Treaty (European Economic Community, 1957; European Union, 2006). This codecision procedure is frequently used in European Union decision-making as it covers 43 areas, including environment, of the *first pillar*[18] that was created by the Maastricht Treaty (European Union, 1992). As stipulated by article 249 of the Treaty, the codecision procedure is used for several kinds of *legislative*

[17] The *Council of the European Union* should not be mistaken for the Council of Europe (47 European countries) or the *European Council* (the assembled Heads plus ministers of the 27 European Union Member States).
[18] The first pillar is the European Community. Along with it, the second pillar on Common Foreign and Security Policy and third pillar on Police and Judicial Co-operation in Criminal Matters have been created by this Treaty.

Acts, including a Regulation, a Directive and a Decision[19]. The procedure is displayed in figure 3.1, and may seem rather complicated indeed. Nevertheless, these are the clear Rules of the Game within European Union decision-making. Based on several references, the formal codecision procedure can be summarized as follows (European Economic Community, 1957, article 251; Council of the European Union, 2000; European Parliament, 2007a):

1. The Commission sends a *Commission Proposal* for an Act to the Parliament and the Council[20].
2. *First Reading of Parliament*: the Parliament reviews the proposal and gives its opinion, by either agreeing with the proposal of the Commission, or by making amendments to the proposal (*amended proposal*). The Parliament is not allowed to reject the Act; however, if necessary, the Parliament can rewrite the whole Act by using numerous amendments.
3. *First Reading of Council:* by qualified majority the Council can either
    a. accept the Commission proposal if the Parliament has completely accepted it, resulting in a new Act
    b. accept the by the Parliament amended Commission proposal, resulting in a new Act
    c. establish and communicate a *Common Position* in case the Council does not agree with the (amended) Commission Proposal
4. In case of a common position, the Commission will give its opinion on the Council's common position. Then, within three months the Parliament has to either (this is the so-called S*econd Reading of the Parliament*):
    a. accept the common position of the Council, which results in a new Act
    b. fail to reply within three months, which automatically implies the acceptation of the common position, resulting in a new Act
    c. reject the common position of the Council, resulting in no Act
    d. amend the common position, which will be send to the Commission who will give its opinion on the amendments, and to the Council.
5. *Second Reading of Council:* the European Council has three months to accept the amended common position by qualified majority[21], resulting in a new Act. If not all amendments of the Parliament to the common position are accepted by the Council, then a *conciliation procedure* is started. The goal is to reach a solid compromise which is sufficiently supported by the Parliament and Council.
6. Within twelve weeks (six weeks until a conciliation committee is formed consisting of members from all three institutions, and six weeks to reach agreement), the conciliation committee must deliver an Act. This Act must then be accepted by the Parliament (simple majority) and the Council (qualified majority) within six weeks; this results in a new Act. In any other case, no new Act is established and the Commission must start all over.

[19] A regulation has general applicability and is directly in force in all Member States. On the other hand, a Directive is only connected with the result but gives freedom to the Member States regarding the choice of measures. Finally, a Decision is directly in force, but is targeted at a specific audience.

[20] This proposal is always reviewed by both the European Economic and Social Council and the Council of the Regions. Their opinion or advice is attached to the documents throughout the decision-making process, but they seem to have only little influence, if any at all (derived from various interviews).

[21] If the Commission has delivered a negative opinion on the Council's Common Position, the Council must agree by unanimity instead. This seriously impacts the possibility of reaching an agreement, and gives the Commission certain influence on the common position.

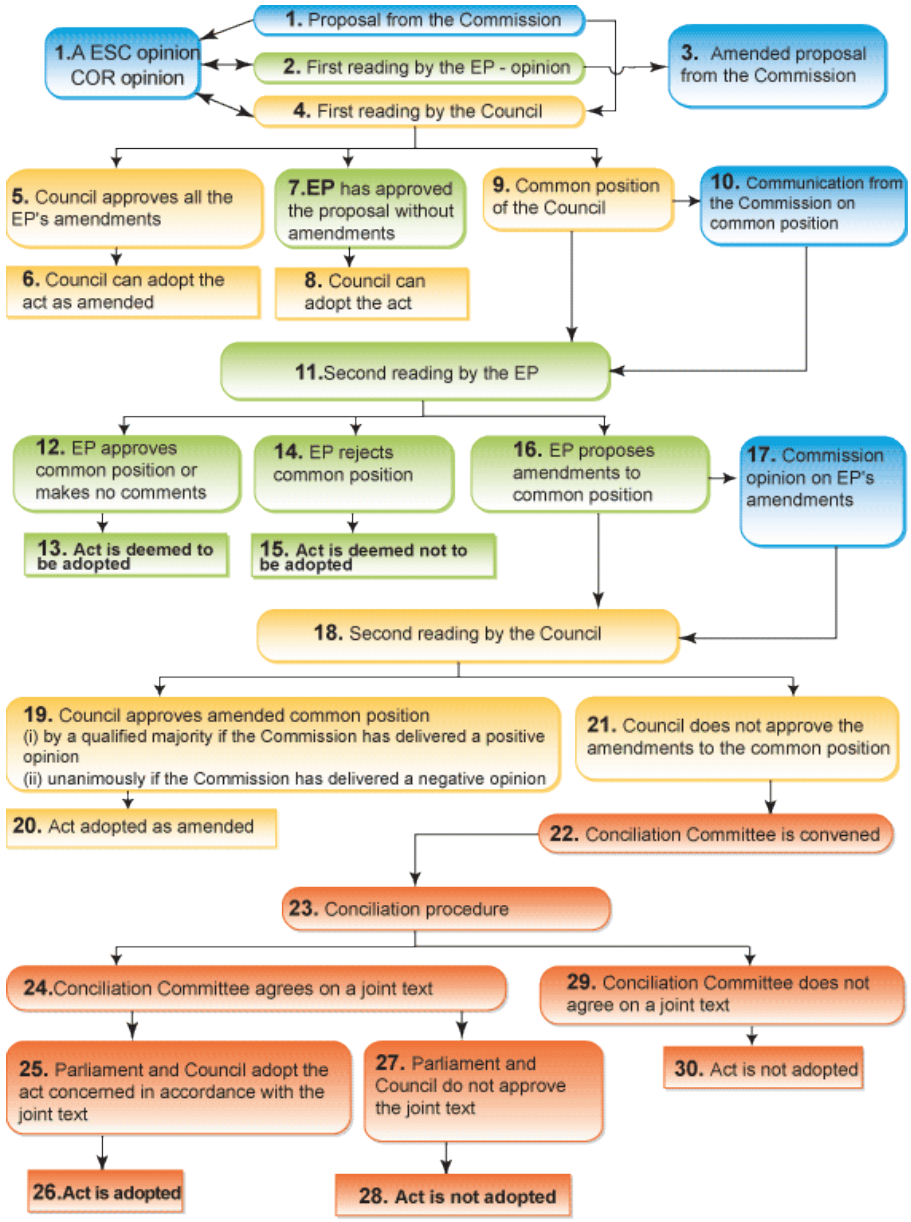


Figure 3.1: Flow-chart of the European Union codecision procedure according to the European Commission[22].

From the identification of coalitions and sovereigns, interesting questions that may be raised are:

- who is really making the decisions within the sovereigns?
- which coalition seems to succeed in influencing the sovereigns?
- how is the codecision procedure working in practice, i.e. how did the processes go?

Answers to these – and more – questions may result from the decision-making reconstruction.

3.3 Identification of decision-making rounds

Four decision-making rounds can be identified in the field of European surface water quality (see figure 3.2), each demarcated by a *crucial decision* colored blue which forms an input for the next round. To reach such a crucial decision, a codecision procedure is used (yellow). Although the decision-making rounds are not completely sequential but may partly overlap, the use of these rounds

[22] European Commission, *the codecision procedure*. The flow-chart is available online: see http://ec.europa.eu/codecision/stepbystep/diagram_en.htm, last visited June 14th, 2008.

helps in structuring the decision-making reconstruction. The four identified decision-making rounds are now shortly introduced, before the actual decision-making reconstruction.

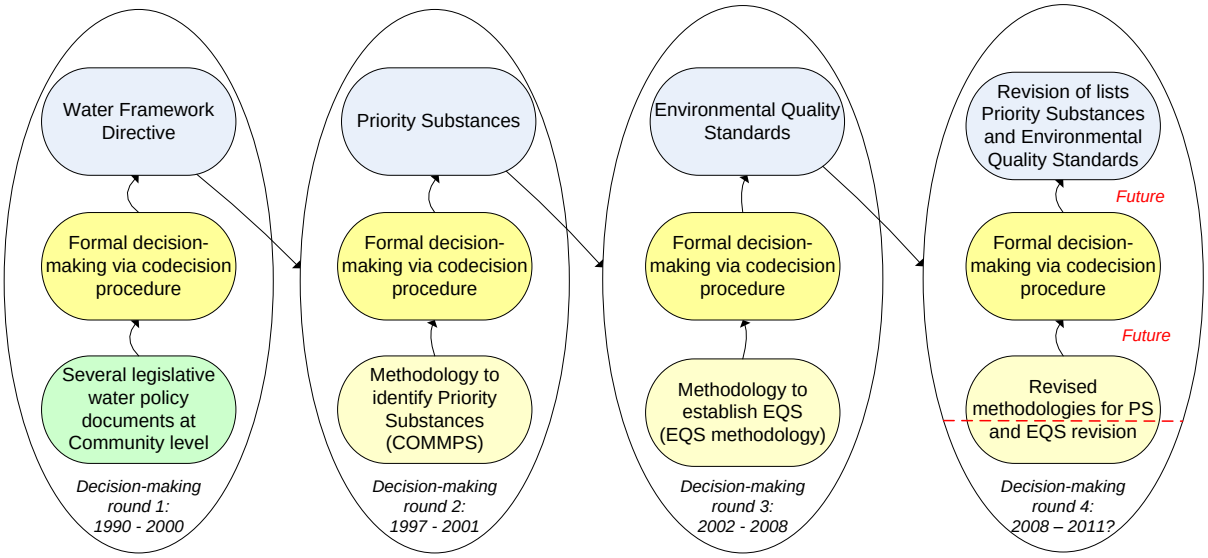


Figure 3.2: Schematic overview of the four identified decision-making rounds within surface water quality.

After preparations that started in 1990, in 1997 the European Commission proposed a framework for Community action in the field of water policy, known as the Water Framework Directive (WFD, European Commission, 1997b, 1997a). The main goal of the WFD is to achieve good chemical and ecological status of waters by establishing Community-wide legislation that really introduces integrated water quality management. After long and hard negotiations via the codecision procedure, agreement between Parliament and Council was only reached in November 2000 during conciliation. The WFD is regarded here as the crucial decision of the first decision-making round. It also marked the first step of a three-stepped process to manage dangerous substances in an integrated way at EU level by introducing the concept of *Priority Substances*. The second and third step are identifying the Priority Substances and establishing Environmental Quality Standards (EQS), respectively; each of these steps took place in an own round, which will now be shortly discussed.

Priority Substances have been identified using a methodology called COMMPS (combined monitoring-based and modeling-based priority setting; see §5.2). With the help of this methodology, a first list of Priority Substances would be identified and the Commission proposed them to the Parliament and Council as input for the codecision procedure. This formal decision-making process went relatively easy (agreement in first reading). The crucial decision of this second decision-making round is the *List of Priority Substances*, also known as decision no. 245/2001/EC.

Besides the identification of pollutants as Priority Substances, operational parameters must be set. This is done by establishing *Environmental Quality Standards* (EQS) for each Priority Substance: a maximum concentration in the surface water. Again, a methodology was required. Using the EQS methodology, the operational parameters have been derived. In the formal codecision procedure, the Commission Proposal based on the EQS methodology has been discussed, and recently in second reading an agreement has been reached between the Parliament and the Council. This is seen as crucial decision of the third decision-making round.

The fourth decision-making round has already started. In this round, the list of Priority Substances will be revised and – at the same time – EQS for possible new Priority Substances will be set. The Commission intends to come forward with a formal Proposal in 2010, based on a revision of the methodologies for identifying Priority Substances and establishing EQS. As the formal decision-making process via the codecision procedure takes about two years, agreement – and therefore a crucial decision for the fourth round – may be expected by 2012. Obviously, only a part of this round can be descirbed since the round is ongoing (the red line in figure 3.2 is indicating the present).

Before the decision-making reconstruction is presented, the following paragraph will provide a detailed methodology: how are the research methods applied to the case to fill in the theoretical components? Obviously, this methodology should not be confused with technical methodologies that are used to identify Priority Substances or to establish EQS (these are discussed in chapter 5).

3.4 Methodology

Now that the problem has been explored from the view of the drinking water sector in chapter 1, and the decision-making reconstruction has been structured in rounds, a detailed methodology can be given by integrating theory, the case at hand and research methods.

3.4.1 Exogenous variables vs. main policy subsystem

The ACF consists of three parts (as discussed in §2.3): relatively stable parameters, external events and the main policy subsystem. The relatively stable parameters and external events together form the exogenous variables. Theory suggests that changes in the relatively stable parameters are not likely, whereas changes in external events happen over periods of more than a decade (Sabatier, 1998). This implies that possible changes in the exogenous variables can only be identified over the complete studied period, and not in an individual decision-making round. Indeed, this seems to apply to Priority Substances; moreover, it appears that the exogenous variables are rather stable over the studied period. Therefore, their characteristics and impacts on the main policy subsystem are described separately from the individual decision-making rounds[23].

Needless to say, choices must be made: not everything can be studied in detail. In accordance with the research objective, the focus of this study will be on *structuring the complexity within the main policy subsystem*. Consequently, the exogenous variables are studied in less detail, while the advantage is that more concrete and comparable results are obtained with regard to the policy subsystem. For every decision-making round, the policy subsystem will be studied: both the content (i.e. coalitions, belief system and strategy) and the process (formal decision-making process resulting in an institutional rule) will be addressed. However, due to practical constraints, the main policy subsystem will not be studied as detailed for every decision-making round.

3.4.2 Level of detail per decision-making round

The first decision-making round is only modeled to set the context. It will describe how the concept of Priority Substances came about as a result of long negotiations, and identify consequent policy outputs and impacts.

The second decision-making round is studied in more detail: the coalitions with belief systems are identified, and the formal decision-making process is described. Although it would have been interesting to study the strategies of the coalitions in this round too, it proved to be impossible due to practical reasons (respondents not involved at that moment, limited memory, and limited – digital – documentation).

The third decision-making round is studied with the most emphasis. Since it is the most recent round, it can be modeled the most accurate. Another reason for focusing on this round is that, as will be seen, it contains much more discussion and conflict between coalitions and sovereigns than the second decision-making round. This round will also present some insight in the resources and strategies applied by the coalitions.

As one of the goals of this study is to develop strategic recommendations to counter synthetic organic micropollutants in the future, certain effort is dedicated to derive future developments. This is mainly focused on the way in which the decision-making process may process – PS and EQS

[23] An alternative option would have been to shortly repeat them in every decision-making round.

methodologies and formal codecision procedure – and what the potential crucial decision may be. Because, obviously, no coalition will give away new strategies and arguments, to this end a humble extrapolation is conducted by identifying trends from the second to the third decision-making round.

3.4.3 Research methods and their application to the case

This research will involve two research methods: *desk research* and *interviews*. Theory that is used for this research suggests using these research methods (Weible, 2006).

As support for the reconstruction a significant amount of document analysis has been conducted. This documentation for instance describes the position of the sovereigns at a certain moment in a decision-making round: under the motto of transparency, many documents are publicly accessible. Furthermore, coalition documents may reveal parts of their belief system – expressed as argumentation structure – like a *position paper*. It is acknowledged that redundancy in data collection can be both an asset (it increases reliability) and a liability (it may give same piece of information, which consumes time without additional insight): a decent balance must be targeted.

In addition to desk research, thirty interviews were conducted – seven with sovereign representatives, twenty-three with coalition representatives – with an average of 1,5 hours per respondent (at least four per coalition and two per sovereign; see appendix D). The respondents have been carefully selected, by balancing the knowledge of the topic a respondent may have and the representativeness/status within the respondent's organization. Although each interview was tailor-made to some extent to connect to the perspective of an individual respondent, two sets of *standardized interview questions* were used as basis (see appendix E):

- one for an interview with a respondent of a coalition, focusing on the position (perception on the problem, cause and solution), arguments and strategy
- one for an interview with a respondent of a sovereign, focusing on the formal decision-making process (impasses, breakthroughs, negotiations and final compromise)

The standardized questions were used for two reasons: to derive comparable data and to enhance representativeness. There is a certain degree of overlap between the two sets of questions. This has been done intentionally, to allow for cross-validation: parts of the coalition interviews have served as validation of sovereign data on the formal decision-making process, whereas parts of the sovereign interviews have been used to validate the coalition data regarding components like argumentation structure and strategy.

Prior to the interview, respondents were asked permission to digital record the interview, which was granted in every case. Using this recording, the obtained *raw data* from interviews has been carefully documented in *interview summaries* – which remain confidential. Due to the sensitive nature as indicated by the respondents, no direct quotes will be used from these summaries. Nevertheless, to present the results convincingly, a balance must be struck between the confidentiality of the summaries on the one hand and the need for evidence on the other. This is done by using *paraphrases*: restatements of quotes using other words, although the essential thoughts are conserved – without mentioning the name of the respondent. Care is taken that the original respondent cannot be traced via such a paraphrase either. But, wherever possible and relevant, the coalition or sovereign from where the paraphrase originates is indicated. Note that all paraphrases are placed between quotation marks and are displayed in italics: if no other literature reference is stated, then such paraphrase is derived from an interview. In addition, anonymous frequencies depicted in tables are used and divided over the coalitions to derive meaningful yet anonymous results. It should be noted that not all respondents could answer all questions, for instance because of their (expert) role or because they are part of a sovereign; therefore, the sum of the frequencies in a table does not equal thirty, but it nevertheless gives a good indication.

The combined approach of extensive document analysis together with numerous and detailed interviews is assumed to be sufficiently representative for an overall decision-making reconstruction that is pursued and reported in chapters 4 and 5.

Finally, it must be noted that the specific pollutants discussed in §1.4.2 are frequently used (and distinguished using *italics*) in the decision-making reconstruction to exemplify general results.

3.4.4 Overview of methodology

Figure 3.3 presents a visualization of the ACF-components in relation to:

1. the decision-making round(s) and paragraph(s) in which the component will be described;
2. the method(s) applied to describe each ACF-component.

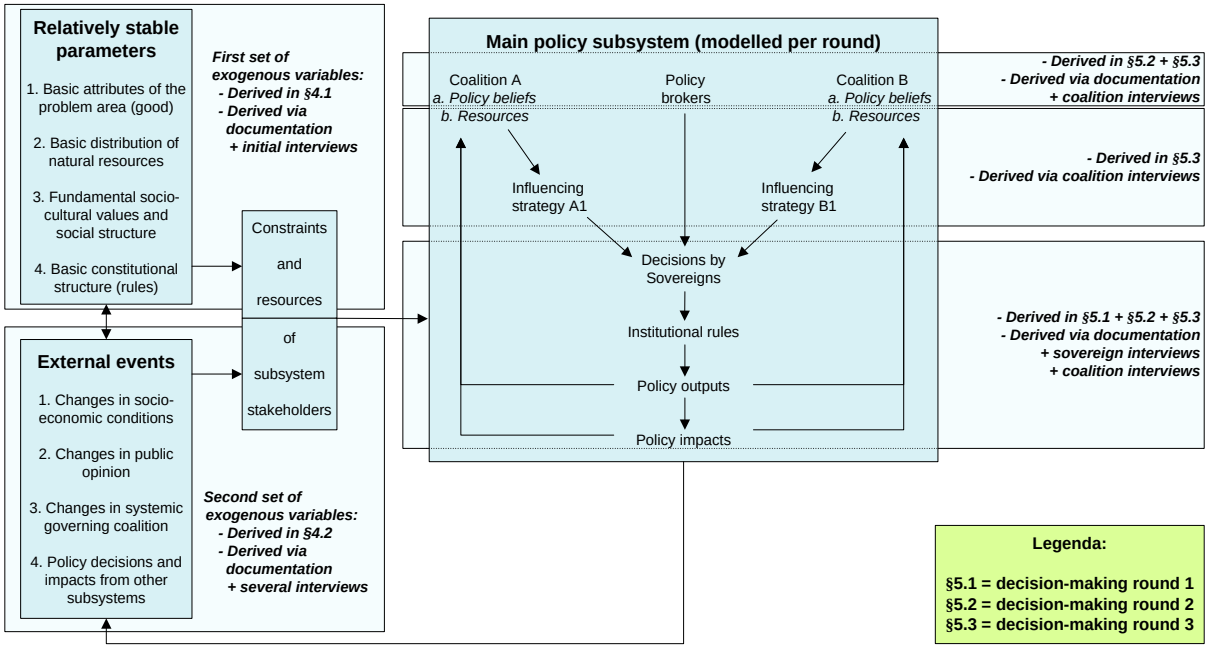


Figure 3.3: Visualization of ACF-components that will be described in the next chapters.

Thus, the exogenous variables are described in chapter 4, whereas the reconstruction of the decision-making rounds within the main policy subsystem is presented in chapter 5. At the end of each paragraph in chapters 4 and 5, a short review on this diagram will take place.

4. Description of exogenous ACF variables

As indicated in figure 3.3, this chapter will outline the Advocacy Coalition Framework *components* that have proven to be rather stable during specific decision-making rounds. Most of these components have had a stable impact on the whole studied period (1995 – 2008), whereas changes will be reported where applicable.

The components are in the ACF clustered into two sets of *exogenous variables*: the relatively stable parameters and the external events (see figure 3.3). First, the relatively stable parameters will be described (§4.1). Then, the external events included in the ACF are discussed (§4.2). Afterwards, §4.3 will conclude this chapter.

4.1 Relatively stable parameters

The relatively stable parameters present the first set of exogenous variables, and are not really prone to change according to the theory. Indeed, these parameters also did not change much throughout the studied time period if the definitions are applied as suggested by Sabatier (Sabatier, 1988, p.135-136). Therefore, these relatively stable parameters may be regarded as static for the remainder of the study. Although these parameters proved to be stable this time, it is acknowledged that changes in these parameters can potentially exert a significant impact on the subsystem.

4.1.1 Basic attributes of the problem area (good)

This parameter characterizes the good that is studied. Surface water, and more specifically surface water quality, obviously is the 'good'. As the first provision in the WFD stipulates, *"water is not a commercial product like any other, but, rather, a heritage which must be protected, defended and treated as such"* (European Parliament and the Council of the European Union, 2000). In the EU, surface water can be regarded as non-excludable and it is used for several functions (navigation, ecology, drinking water, leisure).

Furthermore, a very basic attribute is that surface water quality is geographically only bound to its river basin, not by national borders. Moreover, it is not bound in two but in three dimensions: surface water flows due to a difference in energy level. This process cannot be stopped nor reversed (open water does not flow upward). Also, physical attributes that impact water quality are diffusion and convection, ultimately causing an even distribution of pollution in the river discharge. These may seem to be trivial attributes of the good, but they obviously have introduced many potential inconsistencies in legislation. A difference in standards for a pollutant between two Member States will not stop the pollutant from passing a national border, nor does the water quality of a river suddenly change upon arrival at a 'drinking water intake point'.

Also, the good can be measured quantitatively, thereby positively impacting the ability to define the problem and identify its development. This also results in a large role for technical knowledge: for instance, new monitoring techniques make it possible to find pollutants in the surface water that could not be monitored before, whereas newly developed advanced treatment techniques may be proposed by certain stakeholders as solution for the problem.

Another attribute, related to the large role of technical knowledge, is that surface water quality is surrounded by a large amount of uncertainty, for instance with regard to the potential effects on public health and ecology, including consequences of long-term intake and the interaction between pollutants (mixture).

These attributes function as either constraints or resources for subsystem stakeholders, but did not change over time and will probably not change for a long time either.

4.1.2 Basic distribution of natural resources[24]

According to the ACF, this stable parameter indicates the degree to which alternative resources are available for accomplishing the same goal, and secondly who controls the resource.

Surface water, and adequate surface water quality, is of vital importance for a stabile ecosystem. Also for drinking water production, surface water is (nearly) critical: the demand cannot be completely satisfied by groundwater[25]. Consequently, there are no alternative natural resources for ecology and drinking water production.

Secondly, surface water quality is controlled by the polluters: factories, households, hospitals, agriculture, cars and more. Obviously, the direct users of the natural resource (ecosystem and drinking water producers) are not significantly controlling the pollution. Therefore, they cannot change the status of the pollution by themselves, but are dependent on cooperation and legislation.

This parameter is stable over the studied time, and sets constraints and limits resources for stakeholders.

4.1.3 Fundamental socio-cultural values and social structure

With this parameter, Sabatier attempts to target changes in very basic elements, like changes in the influence of specific social groups. Applied to the problem at hand, an imaginable example may be a swap from the ideology of the market as main governance structure in the direction of more governance by the state, which would perhaps result in less power for 'industry' and more power for the community. Another, less fundamental but probably correct example, is the amount of attention 'environment' receives within the European Union: much study and decision-making is conducted, especially compared to other parts of the world. Nevertheless, such basic elements did not change in the European Union during the time studied, and, as Sabatier notes, these changes normally take several decades, and therefore stakeholders instead learn to accept this as *facts of life* and adapt their strategy to it (Sabatier, 1988, p.135). This seems to be true indeed, as also the industrial coalitions heavily interact in environmental dossiers instead of attempting to change the amount of attention on environment.

4.1.4 Basic constitutional structure

In general, a constitutional structure is rather resistant to change. For the problem context at hand, this parameter has already been described in §3.2. Within the studied period (1990 – 2008), no large changes have occurred regarding the EU Treaty, although some changes were implemented concerning the codecision procedure: the role of the Parliament has been enlarged, and nowadays the formal position of the Parliament is as strong as the Council's position. This did have an impact during the first decision-making process, as will be discussed in §5.1. However, the relevant constitutional structure did not change afterwards anymore, and even a future ratification of the Treaty of Lisbon is unlikely to have an impact on environmental dossiers[26].

To conclude, although these relatively stable parameters seem to be stable over the studied period of time, they nevertheless do set constraints and resources for stakeholders within the policy subsystem (see also figure 4.1). A trivial, yet correct, example of a constraint is that the constitutional structure forbids stakeholders to write legislation; on the other hand, it is a resource for the Commission as the Commission may develop proposals and thereby set the agenda. Another example of a resource is the basic attribute 'uncertainty' as a result of knowledge gaps: it can be used by stakeholders to support

[24] Resources in this subparagraph present *natural* resources, i.e. not resources that coalitions employ to pursue their interests. Although this may be confusing, ACF is using the term resources for both components.

[25] Saline water from a sea or ocean needs extreme purification before it can be consumed, resulting in high costs. Large technological breakthroughs in this area are assumed to be far away.

[26] The most important change is the further 'democratization' of the European Union by making the codecision procedure the standard procedure for more and more areas. However, all environmental dossiers are already handled via the codecision procedure; consequently, for environmental areas the Parliament will not obtain more formal power: the constitutional structure can be regarded as stable.

their belief system, and typically causes discussion. These parameters exert a fairly stable impact on the main policy subsystem but are not prone to change.

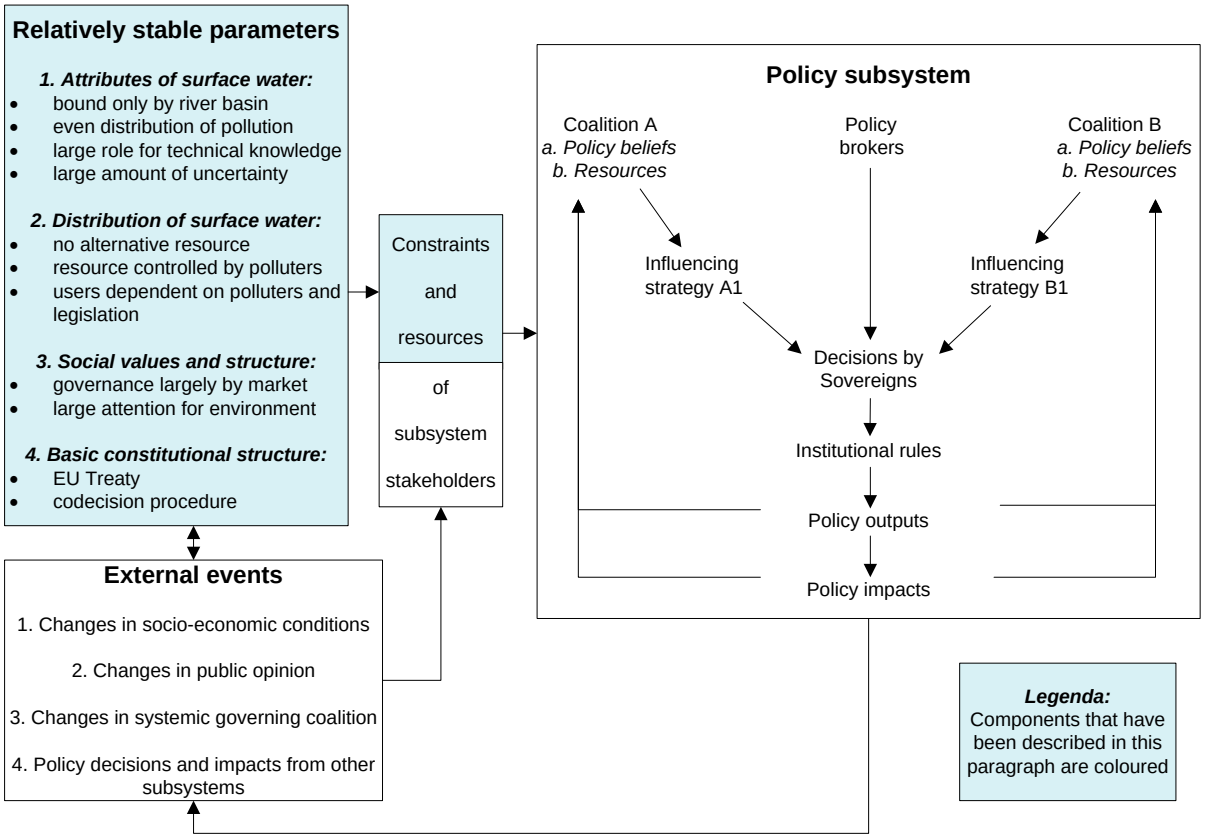


Figure 4.1: Specification of ACF's relatively stable parameters as described in paragraph §4.1.

4.2 External events

This paragraph will discuss the external events that have had, or could have had, an impact on the subsystem in general throughout the discussed period – and potentially beyond. As presented in figure 3.3, the external events are the second set of exogenous variables and will be discussed here as these did not impact one specific round, but instead have had a more general impact on the main policy subsystem over a longer period of time. As this impact has been rather steady over time, the external events are discussed here together; where relevant, specific examples are mentioned in the specific decision-making rounds (chapter 5).

4.2.1. Changes in socio-economic conditions

Changes in socio-economic conditions may have a significant impact on the subsystem. A trigger can be for instance economic recession, which may swing the balance from environmental awareness, seen as something that is very European, towards a larger focus on economic output. After some enquiries, it seems that no influential changes in socio-economic conditions happened that are relevant for this case during the studied period. Alternatively, if they took place, then its impact on decision-making has been rather small. Nevertheless, such changes can, and do, happen if a larger (or different) period is studied, but this component can be regarded as steady in the given context.

4.2.2 Changes in public opinion

If public opinion changes because of a large amount of media attention for residuals of pharmaceuticals in drinking water, then it may directly have an impact on the policy subsystem in

which the decision-making regarding surface water quality is decided. Although this did not happen in the given context, an example is the March 2008 publication of the Associated Press article in the United States, indicating the *"presence of drugs in drinking water supplied of 41 million U.S. citizens"*[27]. This resulted in live coverage by CNN and others, and news distribution by over a hundred national newspapers; subsequently, questions were asked in the U.S. Senate.

From the interviews it appears that for the discussed period, "*public opinion did not have a large impact on the decision-making*". Nevertheless, by the same respondents it is also indicated that public opinion *can* play a role in decision-making. Moreover, besides being an external event, public opinion is also a *coalition's potential resource* (Sabatier and Weible, 2007). Therefore, public opinion and media are discussed to a larger extent from a subsystem internal perspective in §5.3.7.

4.2.3 Changes in systemic governing coalition

Changes in systemic governing coalitions are not clearly applicable in case the European Union is taken as context, as Sabatier has acknowledged (Sabatier, 1998, p.120). This can be explained by the fact that the final decision-making outcome is based on consensus between Parliament and Council as they possess an equal amount of legislative power. Although the possible majority coalitions within the European Parliament can change on a five-year basis, it is not likely that this has resulted in a large impact on the subsystem during the studied period. As will be seen later, in contrast with many national parliaments, political affiliations in the European Parliament do not present one stabile block: although influenced by their affiliation, an MEP votes the way an MEP wants to vote. In addition, it is very likely that changes occurred in the governing coalitions within Council, and this is based on the politics in the 27 Member States. Therefore, to seriously study the changes in coalition formation in the Council, the national politics of 27 Member States has to be analyzed throughout the studied period. Obviously, this is not feasible given the limited time available: priorities must be set, and it is chosen to spend this valuable time on studying the subsystem itself as this is expected to yield more results.

4.2.4 Policy decisions and impacts from other subsystems

The relation between the main policy subsystem and other subsystems is rather interesting. Whereas it has been chosen to regard the EU decision-making arena as main policy subsystem (see §1.4.1), the regional and national level can be regarded as other subsystems. As will be seen to a larger extent in chapter 5, throughout the studied period they have continuously influenced each other: the Member States have delivered input to the European subsystem (monitoring data, lists of known pollutants, methodologies for settings standards), whereas the decision-making outcomes impact the Member States as they are responsible for the implementation (more monitoring, taking measures for pollution control). In addition, the other subsystems give stakeholders further options for lobbying: if they did not succeed at the national or regional level, they may try at the European level and vice versa. Indeed, a *multi-venue setting* is offered to stakeholders to influence the decision-making. Although the interaction between the subsystems is very interesting, it appears that the impacts of the other subsystems to the main policy subsystem have remained fairly constant over time. Also, due to time constraints it could unfortunately not be studied in much detail. However, wherever relevant, specific interaction between subsystems is concisely mentioned throughout the description of the decision-making rounds in the next chapter.

[27] A summary of and reactions to the Associated Press release can be found at http://www.usatoday.com/news/nation/2008-03-10-drugs-tap-water_N.htm. The CNN newspaper article is online accessible via http://edition.cnn.com/2008/HEALTH/03/10/pharma.water1.ap/index.html, whereas CNN's live coverage can be seen via http://www.youtube.com/watch?v=_SV8q6r_2CM (all three last visited 14 September 2008).

Concluding, although the impacts from the external events seem to be stable over the studied period of time, they nevertheless do set constraints and resources for stakeholders within the policy subsystem (figure 4.2). For instance, the monitoring data from the national and regional level provides a resource for the policy subsystem stakeholders in the water coalition, whereas the actions of coalitions are constrained by potential repercussions via public opinion. The latter is supported by the *environmental awareness* that all types of organizations – claim to – have nowadays.

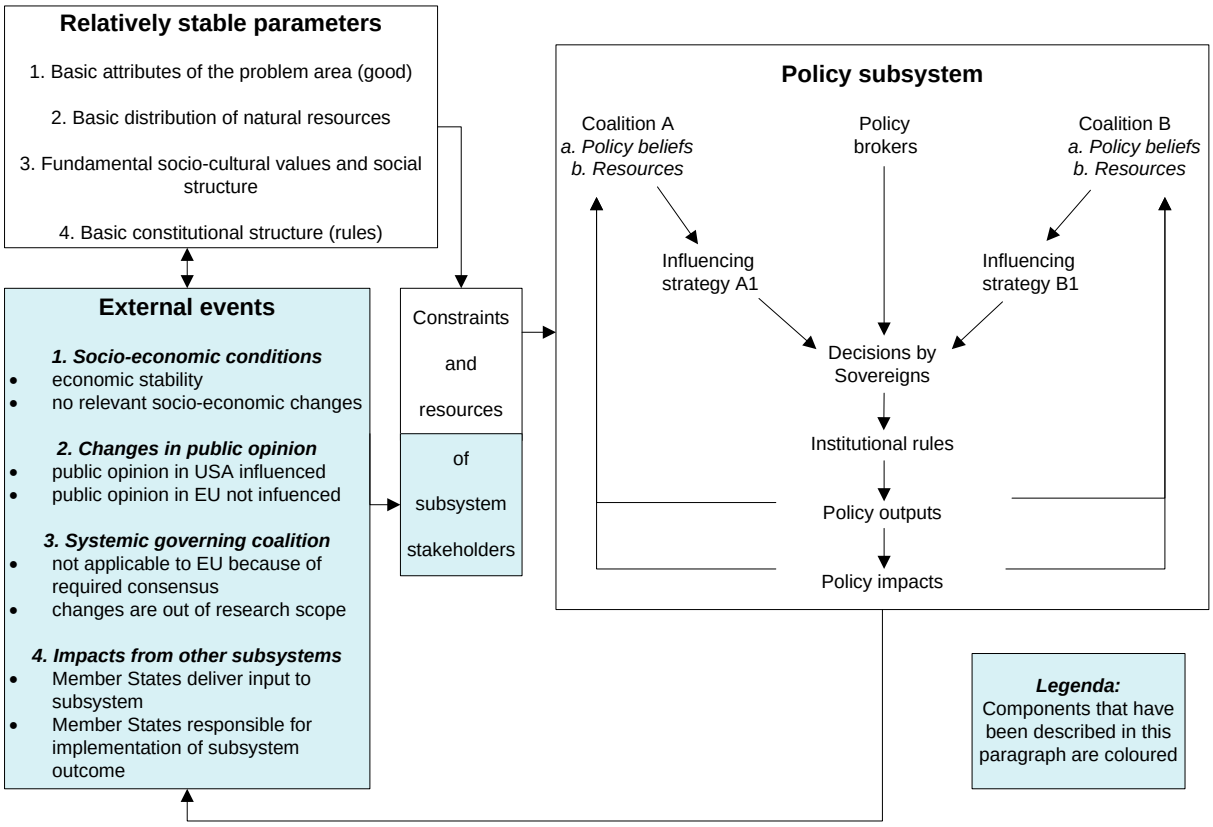


Figure 4.2: Specification of ACF's external events as described in paragraph §4.2.

4.3 Conclusion

This chapter has outlines the two sets of exogenous variables in the Advocacy Coalition Framework: relatively stable parameters and external events. The individual components within these variables have been described, and their impact – setting resources and constraints for the main policy subsystem – seems to be steady over the studied period of time. The next chapter will present the main focus of the study: the developments in the main policy subsystem, structured by the identified decision-making rounds (see figure 4.3).

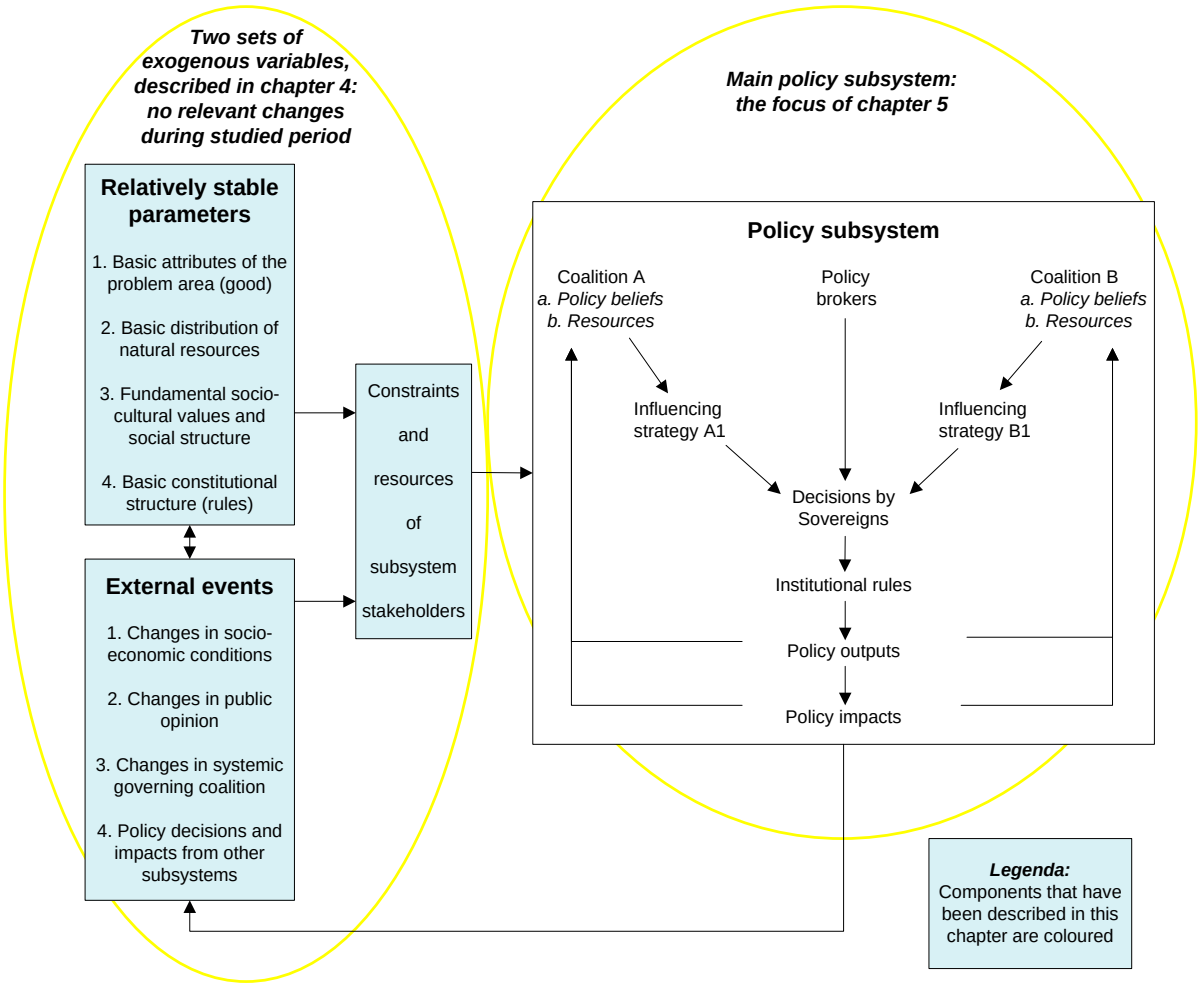


Figure 4.3: The exogenous variables from the Advocacy Coalition Framework have been described in chapter 4.

5. Results: decision-making in subsystem per round

This chapter will present the results of the decision-making reconstruction within the main policy subsystem per round in chronological order, using the identification and methodology provided in chapter 3. For reader convenience, a summarizing overview of the methodology for describing the main policy subsystem has been depicted in figure 5.1.

The first decision-making round is described in §5.1. Then, in §5.2, the results for the second round are presented. Afterwards, the third round is described (§5.3). The current status of the fourth decision-making round is addressed in §5.4, together with a forecast of its outcome by extrapolating the results of the second and third round. This chapter is finalized with a conclusion (§5.5). As explained and justified in §3.4, the focus of this chapter is on the third decision-making round.

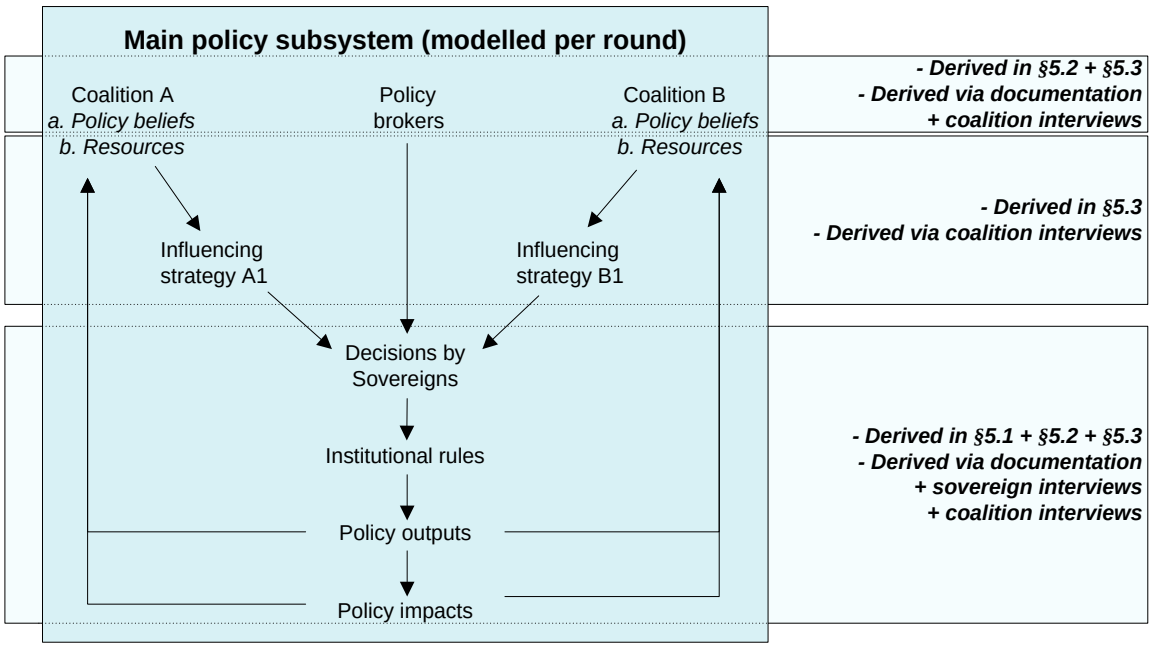


Figure 5.1: A summarizing overview of the methodology for describing the main policy subsystem per round.

5.1 First round: to integrated water management (1990 - 2000)

The first ideas for a Water Framework Directive (WFD) already stem from the early nineties. As expressed by two interviews, it was attempted to "*integrate all water quality policy that was formed in the 1970s and 1980s in Europe*". With this rather consolidating approach, the WFD would, together with the 1996 Directive on integrated pollution prevention and control, also replace the 1976 Directive on dangerous substances, which never really worked (Council of the European Communities, 1976; Council of the European Union, 1996). Reasons for the perceived failure are for instance the lack of operational parameters (no standards), which made it hard to tackle diffuse pollution, and no deadlines nor clear responsibilities which delayed the implementation (European Commission, 2003). These issues have been incorporated in the negotiations for the Water Framework Directive, and the concept of *Priority Substances* has been introduced as new system.

The negotiations for the WFD were rather fierce, which is evident from the fact that a *conciliation procedure* was required to reach agreement. The tension at the end was very high, especially since many complex issues still had to be solved. Kaika and Page give a good overview of the negotiations and the influence of lobbying stakeholders on the final agreement (Kaika and Page, 2003a, 2003b). Here, the focus will be on the final decision and the future implications (see figure 5.1), based on the two articles, two interviews with sovereigns and one coalition interview.

The initial Commission proposal was finished in 1997. Originally, the decision-making happened under the *cooperative procedure*, in which the Council has a stronger position than the Parliament: the Council was the only institute with legislative power, and the Parliament's role was consultative. However, as the Parliament assessed the Council's position towards the Parliament as rather arrogant, and since the Parliament wanted more influence on the decision-making outcome, the Parliament started to use delay tactics in November 1998 until the Treaty of Amsterdam came into effect in May 1999 (European Union, 1997). This Treaty stipulated the codecision procedure to environmental Directives, and therefore also to the WFD. Therefore, the Parliament now had an equal amount of legislative power as the Council. Consequently, "*the Council had to give way to the Parliament as the Parliament was willing to let the whole WFD fail*", as respondents from sovereigns expressed. This meant an increased influence of the water coalition (especially active non-governmental organizations, NGOs) since the Parliament was more open to the environmental lobby whereas the Council was dominated by the – agribusiness – industry (Kaika and Page, 2003a).

In the end, the compromise that was reached between the Council and the Parliament included concessions on both sides. Although this process is very interesting to study, as stated in §3.4.2 this round is only used to set the context, therefore just the elements that are of relevance for this study are covered here. Focusing on the connection with the next decision-making rounds, the most important elements are (European Parliament and the Council of the European Union, 2000, articles 7 and 16):

- the introduction of *Priority Substances* (PS), which are substances that present *"a significant risk to or via the aquatic environment, including risks to waters used for the abstraction of drinking water … measures must be aimed at the progressive reduction of discharges, emissions and losses"*;
- to obtain good water status, the status quo must be retained for all pollutants that are not identified as Priority Substances (i.e. concentrations are not allowed to increase);
- Member States shall ensure that the resulting water will meet requirements of the Drinking Water Directive 98/83/EC, and will protect the bodies of water in order to reduce the level of purification treatment required in the production of drinking water;
- the Commission will propose the PS based on a methodological three-tier framework: in order of favorability, either a *risk assessment*, a *targeted risk assessment*, or when necessary a *simplified risk-based assessment procedure* based on scientific principles like eco-toxicology, toxicology and widespread contamination;
- the Commission shall propose *Environmental Quality Standards* (EQS) for the identified Priority Substances;
- the list of PS and EQS is to be reviewed every four years, and the Commission will come forward with proposals as appropriate;
- Member States are responsible for the implementation of EQS, and as they are compulsory to draft River Basin Management Plans they have to include the identified Priority Substances in their Monitoring Programmes to demonstrate that the EQS are fulfilled (alternatively, the Member State must take measures to reduce concentrations).

Indeed, it can be concluded that the WFD is only a first step into the direction of integrated water management: many issues still had to be discussed, making the WFD acceptable to everyone and guaranteeing or even provoking lobbying in the next rounds. Nevertheless, as one respondent points out, *"the WFD really did pave the way for further decision-making"* with regard to the list of Priority Substances (covered in the second round) and ultimately the establishment of EQS (discussed in the third round): *"the Parliament and the Council refused to consider Priority Substances and EQS until agreement was reached on the WFD"*.

Figure 5.2 revisits figure 5.1 by specifying the components *decision, institutional Rule, policy output* and *policy impact*. Note that policy output and policy impact not only are a result from the WFD, but also have an impact on the coalitions. Furthermore, note that the blank area is not specified – i.e. coalitions and their strategies are not described here – since that is not this paragraph's focus.

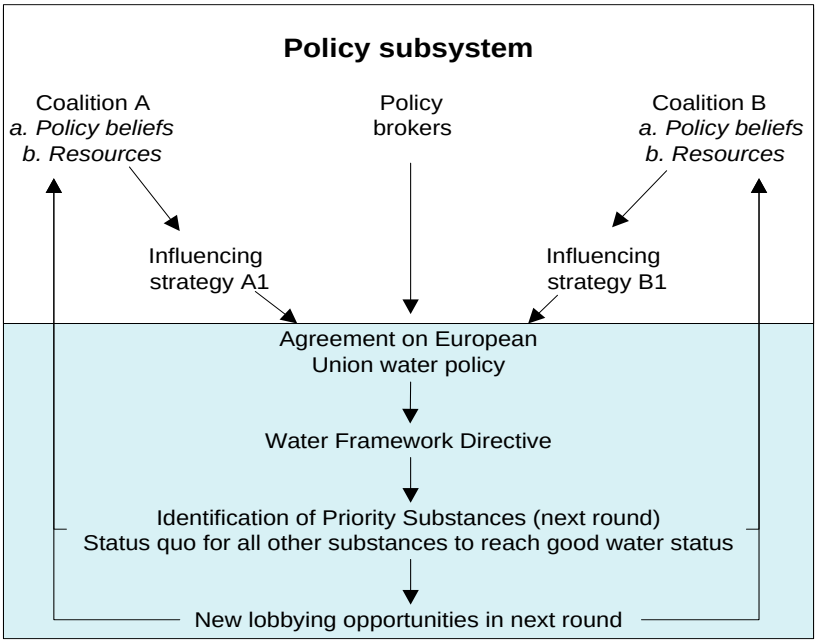


Figure 5.2: Specification of the main policy subsystem of the ACF based on first decision-making round.

5.2 Second round: identifying Priority Substances (1997 - 2001)

5.2.1 Outline of the second decision-making round

Article 16 of the WFD stipulates that the Commission must come forward with a proposal for Priority Substances based on a risk-based approach (European Parliament and the Council of the European Union, 2000, article 16(2)). As it takes *"at least eight years to do a Risk Assessment, with the best efforts it would still be impossible to develop a risk assessment or even a targeted risk-based assessment for all substances*" (stated in a sovereign interview). Consequently, the third and final option has to be used by the Commission as an alternative as basis for their proposal: a methodology for simplified risk-based assessment procedure. This *methodology* must be based on scientific principles like eco-toxicology, toxicology and widespread contamination.

As a result, this round consists of two distinct phases:

- first phase: informal, pre-decision making phase that is of a more technical-substantive nature, which establishes and uses the *methodology to identify Priority Substances*, resulting in recommendations for PS. Taking these into account, the Commission writes a Proposal;
- second phase: formal, decision-making phase that is of a more political nature, which starts with the Commission Proposal and follows the *codecision procedure*. The result is an agreement between the Council and the Parliament, establishing a list of Priority Substances.

Although this is a sequential process, for enhancing readability and to better reflect reality it is modeled as a single round as the outcome of the first phase (the methodology for identifying PS) does not change throughout the remainder of the round. Instead, the first phase can be seen as *setting the rules of the game* as part of 'good' process management (de Bruijn and Ten Heuvelhof, 2002; de Bruijn, ten Heuvelhof et al., 2002): the process rules are discussed, negotiated and ultimately agreed upon among the participants. The second, political phase is significantly constrained by these rules of the game.

5.2.2 First phase: COMMPS procedure for identifying PS

The Commission appointed an external Consultant *"to assist in the difficult task of developing a scientific methodology for identifying Priority Substances among the thousands of substances that exist"*. The German Fraunhofer Institut for environmental chemistry and ecotoxicology (Fraunhofer Institut) has been selected as leading Consultant. Together with other institutes as support – including the Dutch institute for public health and the environment, RIVM – a science-based methodology to prioritize substances based on their risk to the aquatic environment and human health via this aquatic environment was drafted in 1997. An outline has been presented to experts from Member States and stakeholders in February 1998, and using these comments the *COMMPS methodology* was established: combined monitoring-based and modeling-based priority setting. As the name indicates, both monitored exposure levels via databases (concentrations of pollutants in surface water) and modeled exposure levels (using production volumes, use pattern, environmental distribution and biodegradation as input parameters) are used. Ultimately, expert judgment is applied to cover potential mistakes in either the monitoring or modeling outcome. Later in 1998 and 1999, two more workshops with the experts were hosted by the Commission and Fraunhofer, where according to sovereigns "*both the procedure and the outcome* (i.e. list with recommended Priority Substances) *were discussed. Directly visualizing the outcome makes it more concrete, triggering more reactions from participants as the consequences for them are more visible*". Not only experts from Member States, but from stakeholders as well, were invited to give comments, including the delivery of additional information (monitoring data or research). During the last meeting in 1999 there was general acceptance among the experts of the methodology and the outcome, after which Fraunhofer Institute finalized their report that describes both the methodology and the outcome in a detailed manner. Although the COMMPS methodology is rather complex, extensive and specific, a simplified summary is given here of the procedural steps, based on the final report (Fraunhofer-Institute, 1999).

Methodological procedure of COMMPS

Step A: The selection of candidate substances. Substances have been selected as PS- candidate based on official lists within the European Union, including Directives and international cooperation agreements[28]. In addition, substances for which monitoring data was delivered were also candidates. In total, 658 substances have been entered in the COMMPS methodology.

Step B: Calculation of exposure indices. Two lists are compiled, one based on monitoring data (surface water concentrations) and one based on modeling data. These lists present the relative exposure levels of a substance, i.e. a substance that is occurring in higher concentrations according to monitoring or modeling data will be indexed higher.

Step C: Calculation of effect indices. For organic compounds (like the organic micropollutants), the effect index is based on direct aquatic effects (eco-toxicity), indirect aquatic effects (bioaccumulation) and effects on humans (toxicity; carcinogenicity, mutagenicity and effects on reproduction and chronic effects). The higher the effect compared to other substances, the higher the relative index.

Step D: Computation of the risk-based priority index. The risk-based priority index is calculated by multiplying the index for exposure (step B) and the index for effect (step C). Consequently, two lists (one for monitoring, one for modeling) are obtained. The higher the calculated risk-based priority index, the more likely it is that this substance will be recommended as Priority Substance.

[28] This includes lists from the dangerous substances Directive, risks of existing substances Directive, pesticide Directive, OSPAR and HELCOM substances, and annexes from the third North Sea conference.

Step E: Expert judgment. The obtained two lists are screened, and the remaining candidate substances that seem to be a real candidate are judged by experts: on a case by case basis, each substance is carefully considered, resulting in a recommendation for either inclusion or exclusion in the list with Priority Substances using certain exclusion and inclusion criteria. For instance, as a majority of experts suggested that more weight should be applied to the monitoring list compared to the modeling list due to uncertainties in the modeling-based approach, it was decided that high-ranked substances on the monitoring list would not be easily *excluded*, and that high-ranked substances on the modeling list would not be easily *included*: for either, significant evidence proving otherwise is needed. Consequently, the recommended Priority Substances after expert judgment can be expected to be based on the monitoring list to a large degree.

Outcome of COMMPS

As a result of this methodology, including expert stakeholder consultations, 32 substances were finally selected and recommended to be included in the list of Priority Substances (see Appendix F, table F.1 for an overview). As can be seen, the monitoring-based list indeed had much more weight; only 5 of the 32 substances have been recommended primarily based on the modeling-based list, thereby applying a reactive instead of a pro-active focus to cope with model uncertainty.

The recommendations from the final COMMPS report have been used by the Commission as input for their official Commission Proposal of February 2000, marking the end of the informal pre-decision making phase and the start of the formal decision-making phase along the codecision procedure (European Commission, 2000b). This proposal is largely based on the recommendations from the COMMPS report, as the Commission Proposal identifies 32 Priority Substances that largely overlaps with the recommended substances (compare table F.1 with table F.2, Appendix F)[29].

Before the formal decision-making is discussed, a concrete answer is given to the question: why has *atrazine* been listed as Priority Substance whereas *glyphosate* has not?

5.2.3 Explaining the difference in outcome between atrazine (PS) vs. glyphosate (non-PS)

The answer is found in the COMMPS methodology. After studying the annex to the official report closely, it can be derived that exposure indices (step B of the COMMPS methodology, which *before* the application already clearly defined the requirements a substance must fulfill) are only calculated for substances for which monitoring data is available from surface waters in at least **two** Member States. Note that this data does not necessarily have to be delivered by a governmental institution within a Member State; stakeholders also had the opportunity to supply such monitoring data (for instance EUREAU, but also national drinking water associations are mentioned in the report). Now, examining the provided data for *atrazine* in the Annex shows that monitoring data was available from rivers in nine different Member States[30]. However, examining the provided data for *glyphosate* indicates that there is only monitoring data from one Member State: Germany[31]. Consequently, *glyphosate* did not fulfill the requirement and was therefore not taken into further consideration, no matter how high the measured concentration levels were. Then, *glyphosate* was modeled but even if it ended high in that list, still sufficient monitoring data had to be available to overcome the uncertainty that was attributed to the modeling approach: there needs to be evidence of European-wide contamination. As this was not the case based on the very limited amount of data, *glyphosate* was not recommended to be a Priority Substance. *Atrazine*, on the other hand, fulfilled all requirements and finally ended as

[29] Compared to the recommendations, two substances have been rejected, whereas two other substances have been added. The Commission has the freedom to not follow the recommendations, *"based on alternative considerations"*.

[30] 1,010 samples in total for atrazine: nearly 14,000 measurements of which more than 6,000 were above the detection limit.

[31] 5 samples in total for glyphosate: 120 measurements, of which 72 were above the detection limit.

proposed Priority Substance. This explanation behind the difference in methodological outcome between *atrazine* and *glyphosate* has been validated via the interview with the Commission, and indeed it was assumed that "*probably monitoring data was available from an insufficient number of Member States*". After the claim, the respondent carefully checked the report and data and indeed the explanation turned out to be correct.

What is remarkable is that for *glyphosate* much more monitoring information was available than has been delivered to the database. For instance, figure 1.2 shows that *glyphosate* was intensively monitored already in the Netherlands in 1994. Apparently, not all information was communicated. Probably, if this information would have been delivered appropriately, then *glyphosate* would have been processed similar to *atrazine*.

5.2.4 The position of the coalitions in the second round

The coalitions that were involved in the second round are the agribusiness coalition and the water coalition[32]. They took part – at least to some degree – in both the informal pre-decision making phase and the formal decision-making phase. As already indicated in §3.4, because of practical constraints it has not been possible to study the strategy of the coalitions in this round. In addition, because not much coalition documentation like position papers is available for this period, only the main argumentation lines are sketched here. It can be assumed, however, that the discussion was not as fierce as for instance in the next round (see §5.3): the coalitions were not so much involved in Brussels yet at that moment (much less lobbying and very few position papers), and political agreement was easily reached (see §5.2.5). Also, as a respondent from the water coalition argued, *"the first list of Priority Substances was seen as a first attempt; it would be reviewed after four years anyway"*.

As the agribusiness coalition produces (the manufacturers) and uses (the farmers) a significant part of the organic micropollutants that were detected in surface water and potentially could be listed as Priority Substances, they actively attempted to introduce their arguments in the debate. The main argument is that "*although we strive to minimize the concentrations of pesticides in surface water, pesticides are needed for the production of food. Farmers need tools in their box to fight pests and produce this food; if you take away a large part of the tools, then the food production is severely threatened*". Parts of the coalition are emphasizing their message by saying that listing a large amount of pesticides as Priority Substance would basically mean illegalizing farming. As we all want to have food, we need to accept the fact that pesticides occur in the surface water in very small concentrations. It is a matter of trade-off: either you want to produce food, or you want to have perfect surface water. Obviously, it is acknowledged that "*there must be a balance*". According to the agribusiness coalition, "*this balance is already included in the authorization procedures: pesticides are extensively tested for their environmental impact, and a risk-benefit analysis is conducted*". Nevertheless, "*if there is scientific evidence that a pesticide has unforeseen environmental or human health related adverse effects, then we would never oppose to measures and we never did*", including listing it as a PS. However, "*so far we are not aware of a pesticide used that is known to have such effects at current concentrations*". Therefore, the agribusiness coalition opposes to – in general – list pesticides as Priority Substances. Their argumentation structure – based on the policy argument elements defined by Toulmin (see §2.4.2) – is presented in figure 5.3.

[32] This is derived not only from interviews, but also presence lists of stakeholder consultation meetings.

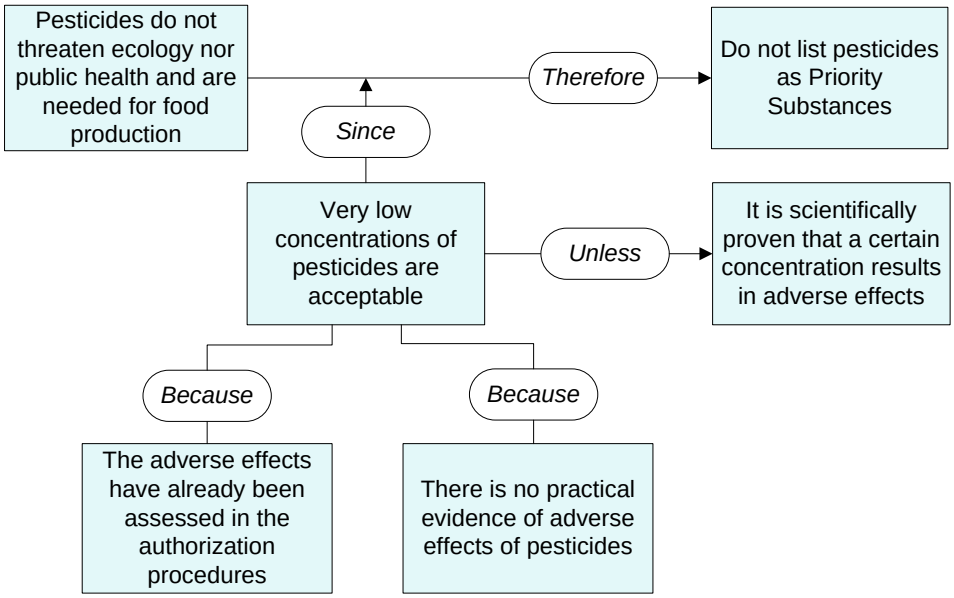


Figure 5.3: Argumentation structure for agribusiness coalition in second decision-making round.

The water coalition mainly consisted of the (drinking and waste) water sector, environmental NGOs and according research institutes and universities. Their common deep normative core is to protect surface water quality, as this is needed for an adequate ecosystem but also for water production. Consequently, the water coalition does not want any synthetic organic micropollutants, including pesticides, in the surface water. In fact, the position within parts of the coalition is rather fundamental: *"all substances that are not naturally present in surface water, do not belong there"* is a frequently pronounced phrase in the water coalition. The philosophy behind this zero-tolerance belief is the precautionary principle: it is better to prevent than to cure. Measures for pollutants should not only be taken based on the monitoring data, eco-toxicology and human toxicology, but *"the concentrations in surface water must be so low that simple treatment should suffice for the production of drinking water"*. Consequently, many pesticides should be listed as Priority Substance, including *glyphosate*. The argumentation structure adhered by most of the respondents in the water coalition is presented in figure 5.4. The specific argumentation structure regarding *glyphosate* is depicted in figure 5.5; a likewise argumentation holds for *atrazine*.

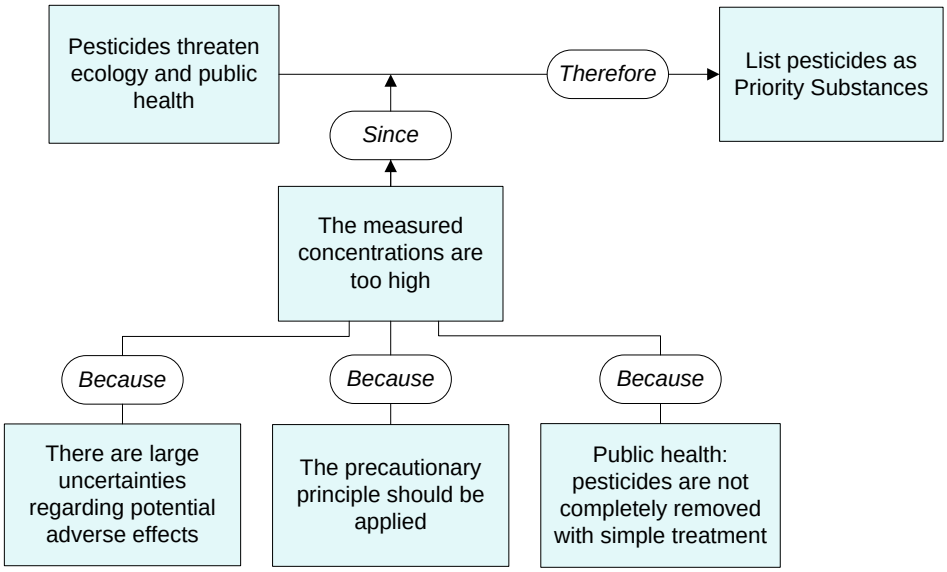


Figure 5.4: Argumentation structure for water coalition in second decision-making round.

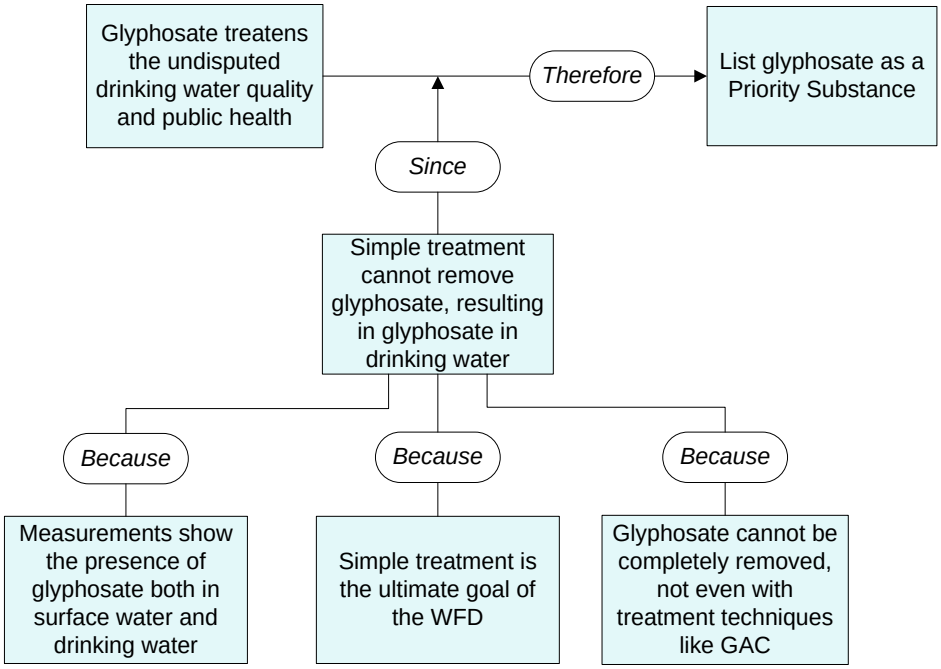


Figure 5.5: Argumentation structure of drinking water sector with regard to glyphosate.

To summarize, there is agreement between the coalitions regarding the cause and presence of pesticides in surface water. However, there is no agreement on whether they pose a significant problem. As a result, there is also no agreement on the solution, as the agribusiness coalition does not see a need for solutions – and definitely no solution in a PS-list.

The outcome of the pre-decision making phase (see appendix F, table F.1) seems to be an acceptable compromise between the two coalitions: the pesticide *atrazine*, already banned in many Member States, would be listed as Priority Substances, whereas others like *glyphosate* would not.

5.2.5 Second phase: codecision procedure in second decision-making round

The second phase indicates the start of the formal decision-making phase, initiated by the Commission Proposal of February 2000. After the agreement on the final text of the WFD, the Commission had to slightly amend the Proposal. To a very large degree, the recommendations from the COMMPS-report have been followed (European Commission, 2000b, 2001a).

As there was agreement on the WFD, the Parliament and Council agreed to consider the list of 32 proposed Priority Substances. Within four months, the Parliament discussed the Commission Proposal and only slightly amended it (addition of one substance: fluoranthene). One month later, the Council agreed with the amendments to allow for quick action in the field of water policy. Consequently, after publication the decision was finalized: a list of 33 Priority Substances for the European Union to improve surface water quality (Council of the European Union, 2001; European Parliament, 2001; European Parliament and the Council of the European Union, 2001a). The impact of this decision is that *Environmental Quality Standards* (EQS) would have to be established for these substances, and that Member States would have to include these substances in their monitoring programmes. Furthermore, it is acknowledged that COMMPS is a *dynamic* methodology, which should be based on the *best available knowledge* and, in this light, COMMPS can be improved in future and be used for the periodic revision of the Priority Substances as stipulated in the WFD.

Persons who were closely involved at the time think that there are two reasons for the fast agreement. First, *"the agreement on the WFD enabled the Parliament and Council to give up their inflexible positions of not negotiating the list"*. Second, the "*strategic move of the Commission to show the Parliament that the work was done and the Commission was ready for implementing article 16 on Priority Substances paved the way for both the WFD and the agreement on PS*". In addition, an

alternative but slightly related explanation given by some respondents is that "*probably no one in the Parliament really felt like engaging fiercely on this dossier because of the complex and technical character of the list*": the Parliament cannot contribute much without expertise, and consequently cannot gain much political appraisal.

It can be concluded that the coalitions were quite satisfied with the outcome of the COMMPS-procedure and the subsequent Commission Proposal, as the political decision-making went relatively smooth (agreement in first reading). If one of the coalitions would really have felt their interests would be harmed in a disproportionate manner, then they would have more actively have lobbied in this second phase too (either at the Parliament or at the Council), which would have resulted in a much longer decision-making process.

5.2.6 Recap of the second decision-making round: filling in the ACF

Figure 5.6 shortly recaps the specification of the Advocacy Coalition Framework components that would be analyzed in this round according to figure 5.1. Indeed, the COMMPS methodology has served as an important constraint for the second phase as it clearly set the *rules of the game*. The coalitions, the Council (via the Member States) and the Commission have had the opportunity to exert influence already during this first phase, and the participants agreed on the outcome.

As a result, a severe discussion did not take place during the formal decision-making phase (phase two of the decision-making round). The coalitions did not heavily engage in lobbying as the COMMPS outcome was accepted, and the Parliament did not have sufficient technical information itself nor sufficient motivation to really revolt against the Commission or Council.

The Commission – as initiator and defender of the Proposal – besides sovereign can be regarded as *policy broker*. The *formal decision* of the second round taken by the other sovereigns (Parliament and Council) is decision no. 2455/2001/EC. The list of Priority Substances is the new *institutional rule*, which has *policy outputs* for Member States (including substances in their monitoring programmes) and the Commission (proposal for Environmental Quality Standards for these substances), resulting in new lobbying opportunities for the coalitions (*policy impacts*). This is the input for the third decision-making round: establishing the Environmental Quality Standards, discussed in the next paragraph.

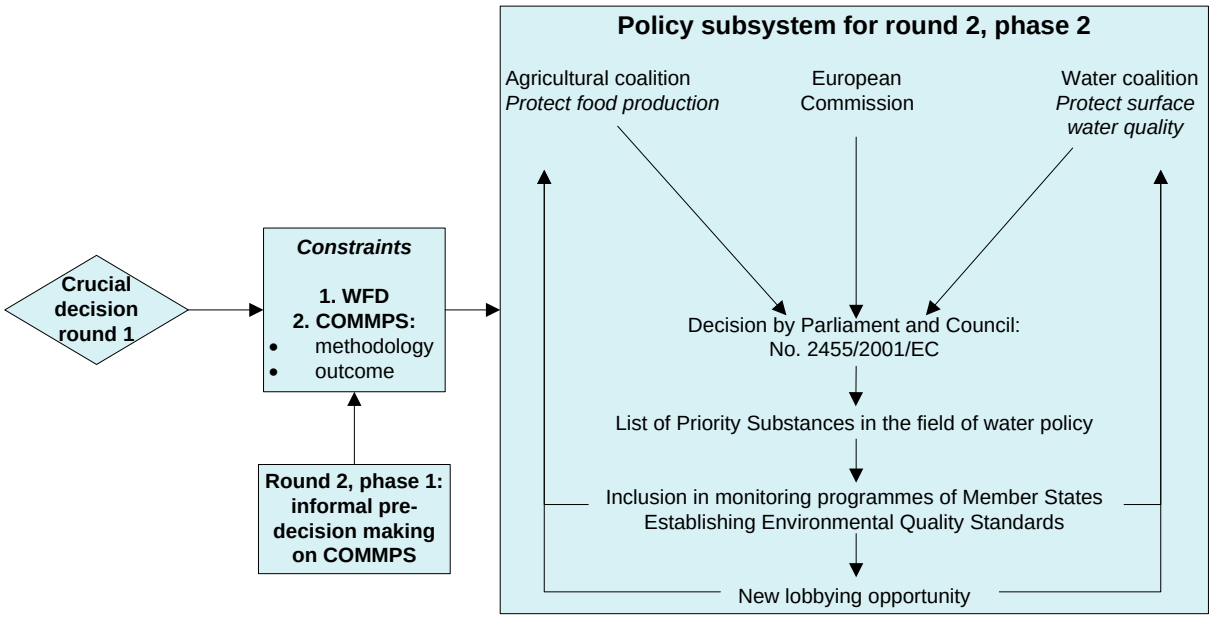


Figure 5.6: The main policy subsystem of the ACF filled in based on the second decision-making round.

5.3 Third round: Environmental Quality Standards (2002-2008)

5.3.1 Outline of the third decision-making round

The third decision-making round concerns the Environmental Quality Standards (EQS), which have to be established for the identified Priority Substances (PS) that pose a significant risk to, or via, the aquatic environment. This Community Strategy to establish harmonized standards is, just like the strategy behind PS, stipulated in the WFD (European Parliament and the Council of the European Union, 2000, article 16). According to the sovereigns, the decision-making outcome of this third round "*is the final major piece of legislation that is needed for the WFD*": this building block provides the operational parameters to achieve good chemical and ecological water status, applicable to the concentrations of PS in surface water, sediment and biota.

This decision-making round again, just like the second round, consists of two phases:

- first phase: informal, pre-decision making phase that is of a more technical-substantive nature, which establishes and uses the *methodological framework to derive Environmental Quality Standards* (from now on: *EQS methodology*), resulting in recommended EQS values. Taking these recommendations into account, the Commission writes a Commission Proposal;
- second phase: formal, decision-making phase that is of a more political nature, which starts with the Commission Proposal and follows the codecision procedure. This ultimately results in an agreement between the Council and the Parliament, *establishing Environmental Quality Standards for the Priority Substances*.

5.3.2 First phase: Environmental Quality Standards methodology

Again, Fraunhofer Institute was appointed to assist the Commission, in this case to draft a methodology to derive Environmental Quality Standards and to give recommendations regarding these EQS (i.e. apply the methodology). Just like with COMMPS in the previous round, stakeholders and Member States were involved at different stages during the development of the framework. In 2001 and 2002, several workshops were hosted by the Commission in which experts met in an Expert Group on Quality Standards to discuss technical issues regarding the methodology, and in the *Expert Advisory Forum* (EAF) on Priority Substances[33], in which the same stakeholders are represented[34], to agree on the methodology and its outcome. The comments from the discussion were then used by Fraunhofer in their draft report of September 2002, in which several methodologies for standard setting used throughout the European Union were described[35], including proposals for the new EU-wide EQS (Fraunhofer-Institute Molecular Biology and Applied Ecology, 2002). As the discussions for pending issues continued in the EAF in 2003 and 2004, and the Scientific Committee on Toxicity, Ecotoxicity and the Environment had to give its opinion first too, using these comments the final manual for the methodology to derive EQS for Priority Substances was presented to the Commission in June 2005 (Fraunhofer-Institute Molecular Biology and Applied Ecology, 2005). Although it would be interesting to analyze the position of each of the stakeholders during the workshops and assess the impact of their comments over time, it is impossible to do so as there are no reports to these workshops (publicly) available. However, based on the report, it is possible to give a concise summary

[33] Nowadays, the Expert Advisory Forum (EAF) on Priority Substances is called Working Group E on Priority Substance, aligning the move from the decision-making phase towards the implementation phase.

[34] The expert working group is seen as purely technical-scientific, whereas more political-driven positions are represented in the EAF as the impact of the methodology is visible (i.e. Fraunhofer applied the framework and presented the EQS if the current methodology would be used); consequently, in an attempt to serve their interests best, stakeholders deliver new information if this can help their interest. The same happened during the development and application of COMMPS in the second decision-making round.

[35] Consequently, for an extensive overview of methodologies on standard setting see this report. Included are methodologies used in Germany, France, the Netherlands (MTR), United Kingdom, Denmark, Spain and Finland; but also the methodologies of risk assessments for existing substances, plant protection products and biocides.

of the final EQS methodology in the remainder of this paragraph – although it must be noted that in reality the methodology is more complex and extensive.

Summary methodological framework

The methodology is aimed at deriving EQS that protect the following *individual objectives*: surface water, sediment, biota (top predator) and human beings (drinking water and ingestion of food). All valid information and data that is available for adverse effects on an objective is taken into account; for each individual objective, an *equivalent surface water standard* is calculated which represents the maximum concentration that is allowed in the surface water to achieve the individual objective. The lowest of these individual standards is then used as overall EQS for the Priority Substance: thus, the lowest (strictest) equivalent standard is set as maximum allowable surface water concentration.

Besides bioaccumulation and persistence, all modes of toxicity (direct and indirect toxicity for ecosystems, and oral toxicity, carcinogenicity, mutagenicity and toxic effects on reproduction for public health) are included in the methodology. However, there is still a lack of toxicity data, necessitating the use of safety factors. Also, it is acknowledged that currently there is no approach to account for the combined (toxic) effect of micropollutants mixtures; the BEAM-project[36] should fill this knowledge gap in the future, and the methodology should be updated accordingly.

To cope with both the long-term and short-term effects as a result from exposure to a PS, two kinds of EQS are derived: a maximum acceptable concentration (MAC-EQS) based on acute toxic effects and an annual arithmetic mean concentration (AA-EQS) based on long-term intake.

Deriving quality standards: drinking water objective as an example

As an example of the calculation of the quality standard for an individual objective, the exposure to a micropollutant via the consumption of drinking water is used. The individual standard is derived as follows:

1. If a value is set in the *Directive surface water quality required for the abstraction of drinking water, 75/440/EEC* (Council of the European Communities, 1975), then this value should be used as EQS if this value is lower than all other individual quality standards;
2. If a value is not set in *75/440/EEC,* but a Drinking Water Standard is available in the *Drinking Water Directive, 98/83/EC* (Council of the European Union, 1998), and this standard is lower than all other individual quality standards, then experts are included to derive the EQS as *"there is no sufficiently accurate method for the prediction of removal efficiencies for surface water treatment available"* (Fraunhofer-Institute Molecular Biology and Applied Ecology, 2005, p.26). Expert assessment is used regarding the specific removal efficiency in drinking water treatment, and therefore the final standard is the drinking water standard divided by the fraction not removed;
3. If there is no value set in *75/440/EEC* nor a drinking water standard in 98/83/EC, then a provisional drinking water standard should be set[37]. In addition, expert knowledge should be used regarding the removal efficiency in drinking water treatment and toxicological appropriateness of the provisional drinking water standard.

It must be noted that it is not stipulated which experts should be consulted. Also, it is not explicitly stated that their assessment should be based on the principle of *simple treatment*.

[36] The European Commission has commissioned the BEAM project to solve this gap in knowledge, in which mixtures of toxic chemicals in the aquatic environment are analyzed to come to valid approaches to deal with such mixtures in regulation.

[37] The following assumptions apply: 2l/d water uptake, body weight of 60 kg, and a threshold level for human health based on 10% of either TDI (tolerable daily intake), 0.01*NOAEL (no observable effect level), or 10^{-6} unit risk level in case of cancer risk.

Output of application of methodological framework

After deriving the standards for all individual protection objectives, the lowest standard is set as Environmental Quality Standard. For each Priority Substance, the methodology is applied and the information is compiled in a *Substance Data Sheet*. Consequently, the Commission has used these data sheets as basis for their Commission Proposal. This proposal marks the end of the informal pre-decision making phase (phase 1) and the beginning of the formal decision-making phase (phase 2).

5.3.3 Application of methodology: impact of drinking water goals on EQS atrazine

Using the methodological framework that has been shortly outlined in §5.3.2 – and after discussions with the Expert Group on Quality Standards and the Expert Advisory Forum – data sheets have been developed. Such sheets contain a large amount of information and are concluded with the derivation of the Environmental Quality Standard. As an example of how the drinking water interests are represented in the methodology, the data sheet of *atrazine* is analyzed (European Commission et al., 2005).

The individual standard for the *atrazine* exposure via the consumption of drinking water is following the three-step that has been discussed (1. value in 75/440/EEC, 2. standard in 98/83/EC, 3. provisional drinking water standard).

Step 1: Council Directive 75/440/EEC for drinking water abstraction by simple treatment sets a surface water value of 1.0 µg/l for the *total amount* of pesticides. However, as *atrazine* is not the only pesticide and its contribution cannot be estimated, Council Directive 98/83/EC is used (step 2);

Step 2: The drinking water standard for an individual pesticide is 0.1 µg/l. However, this is the maximum concentration at the tap. Expert assessment is required to estimate which fraction of the amount of *atrazine* that is present in surface water can be removed by *simple* (!) drinking water treatment. Consequently, the maximum acceptable concentration (MAC-EQS) is the 0.1 µg/l divided by the fraction not removed. However, *this has not been done for atrazine, therefore effectively ruling out the drinking water interests in the derivation of the EQS*. Based on the equivalent standards for the other individual objectives, a MAC-EQS has been established of **2.0 µg/l**[38], which is unusable for drinking water purposes (see figure 1.2).

Instead, assuming that 20% of *atrazine* is removed by simple treatment – i.e. without techniques like GAC, NF/RO – which is rather positive in itself (percentage based on interview with a drinking water expert), then the fraction not removed is 80%. Consequently, the MAC-EQS for the drinking water objective is **0.125 µg/l (**0.1 µg/l divided by 80%). Thus, *if expert judgment would have been applied, the overall MAC-EQS for atrazine would be much lower* – and much more useful with regard to drinking water purposes – than it currently is.

5.3.4 Position of the Parliament in the formal decision-making process

The Commission finalized its Commission Proposal for a Directive on Environmental Quality Standards in July 2006 and transmitted it to the Parliament and the Council, marking the beginning of the formal decision-making phase (European Commission, 2006). The proposed EQS for the previously 33 identified Priority Substances can be found in Appendix G, table G.1.

Soon it emerged that the Parliament would not simply settle for Environmental Quality Standards only: the WFD (article 16) stipulated that the list of Priority Substances would be reviewed every four years (i.e. 2005 at the latest). As this did not happen, according to several respondents from the coalitions, "*the Parliament was rather agitated with – in their eyes – a lack of progress of the Commission"*. The Parliament did not only want the EQS that deliver the operational parameters for the identified PS, but also an extension of the PS-list. Consequently, as the Commission did not review

[38] And an AA-EQS of 0.6 µg/l.

the list, the Parliament took a firm initial position in the negotiations and proposed to add a whole range of 28 pollutants as PS to the existing PS-list. Not only were pesticides included (for instance *glyphosate*), but among others also some pharmaceuticals (including *carbamazepine*) that are present in surface waters. An overview of the proposed pollutants is given in Appendix G, table G.2. Thus, the Parliament attempted to do the work for the Commission, thereby really sharpening the decision-making at the start. Before the remainder of the decision-making process is described, first the positions, resources and employed strategies of the coalitions are discussed.

5.3.5 The argumentation structures of the coalitions

Besides the water coalition and the agribusiness coalition, a third coalition emerged in the third decision-making round: the pharmaceutical coalition. This coalition consisted of the manufacturers of pharmaceuticals. Potentially, medical professionals, pharmacies and patient groups are part of this coalition as well, although in this decision-making round they did not engage in the discussions. Although the pharmaceutical coalition was not represented in the first informal phase in which the EQS methodology has been developed, the pharmaceutical coalition was pulled into the formal decision-making phase as the Parliament proposed to add several pharmaceuticals as Priority Substance based on information that was unmistakably handed to them by the water coalition (see §5.3.9). Consequently, the pharmaceutical coalition countered with own arguments why pharmaceuticals should *not* be listed as Priority Substances. This paragraph will outline the main argumentation structure applied by each of the coalitions. As will be seen, the arguments mainly focus on the potential addition of Priority Substances, and not so much on the quantitative EQS. The potential addition of Priority Substances seems to have really ignited the decision-making, and has polarized the conflict.

From 2000 onwards, the technical research in the water coalition focused mainly on "*both the presence of micropollutants in surface water and removal possibilities in water treatment*". Besides pesticides, pharmaceuticals have drawn more and more attention (Sacher and Stoks, 2003; Technologiezentrum Wasser Karlsruhe, 2006; Sacher, Ehmann et al., 2008). According to four respondents of this coalition, many pharmaceuticals, but also pesticides, "*are nowadays found in the surface water because of new analysis techniques which enables more detection, and due to more monitoring*". As an example, the development over time of the *carbamazepine* concentration in the Rhine is given in figure 5.7 on the left (Sacher, Ehmann et al., 2008, p.667). This figure indicates that the detection limit decreased over time (nowadays fewer samples below the detection limit), that *carbamazepine* has been intensely monitored over the last decade and that surface water concentrations of *carbamazepine* are still periodically exceeding 0.1 µg/l. The latter is also shown on the right for *carbamazepine* concentrations in the Meuse, which seems to follow a seasonal pattern.

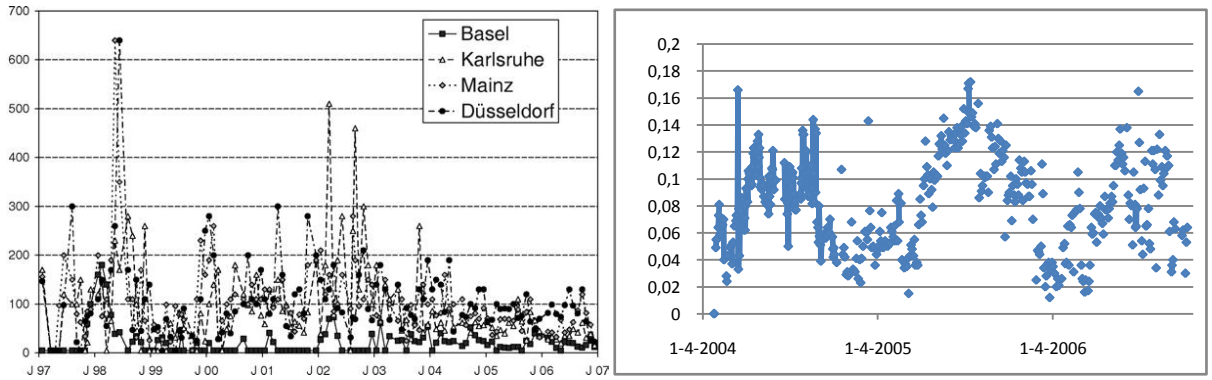


Figure 5.7, left: Carbamazepine concentration in the Rhine in ng/l, borrowed with permission from TZW. Right: carbamazepine concentrations in the Meuse at Keizersveer in µg/l, derived from data supplied by Evides.

Furthermore, research shows that not all pollutants can be completely removed, not even with the most sophisticated treatment steps (see §1.2). Moreover, with simple treatment only, several pollutants (including *carbamazepine*) are hardly removed – if at all. On the other hand, at least five respondents from the drinking water sector indicate that "*drinking water interests play no significant role in the methodologies"*, referring to the COMMPS methodology and the EQS methodology.

In addition, there are a number of gaps in technical knowledge, including the absence of full toxicological information for any pollutant, the absence of information with regard to toxicity of a *cocktail mixture* (combination of micropollutants), the absence of agreed toxicological concept regarding long-term exposure and the potency of pollutants to cause very toxic compounds as a result of treatment (Kiwa Water Research, 2004; Andrzejewski, Kasprzyk-Hordam et al., 2005; IAWD, RIWA-Meuse et al., 2008). It are exactly such gaps in technical knowledge resulting in uncertainties, that are the reason for the water coalition to strongly embrace the precautionary principle: *"as long as not all adverse effects are entirely known, pollutants do not belong in drinking water, nor in its sources"* (i.e. surface water) as argued by the majority of the water coalition respondents.

Therefore, several parts in the water coalition strongly advocate that many substances, including *glyphosate* and *carbamazepine*, must be listed as Priority Substance and that the EQS must be much lower than the (agreed) outcome of the methodology to guarantee that ecosystems and public health are not threatened (IAWR, 2005; WWF and EEB, 2007). In line with the latter, Dutch research institutes also developed more conservative methods to cope with the given uncertainties from the viewpoint of precautionary, like the RIVM's indicative environmental quality standard and KIWA's threshold of toxicological concern (RIVM, 2006a; van der Hoek, Stoks et al., 2008). Other parts of the water coalition would like to see only those pollutants to be listed as Priority Substances which have been recognized as a problem for the drinking water production for many years – like *glyphosate* – and suggest to wait with the addition of emerging substances – like *carbamazepine* – until the Commission has conducted its scientific review, as listing these may result in high costs for the waste water sector (Vewin and Unie van Waterschappen, 2008). Finally, EUREAU points out that the proposed EQS are too high, but does not argue that new substances should be added to the list of Priority Substances at this moment in time (EUREAU, 2006).

Nevertheless, the argumentation structure of the water coalition depicted in figure 5.8 covers the line of reasoning that is followed by most of the stakeholders within the coalition. Compared with the argumentation structure in the second decision-making round (figure 5.4), a shift is made from regarding only pesticides as a problem towards both pesticides and pharmaceuticals.

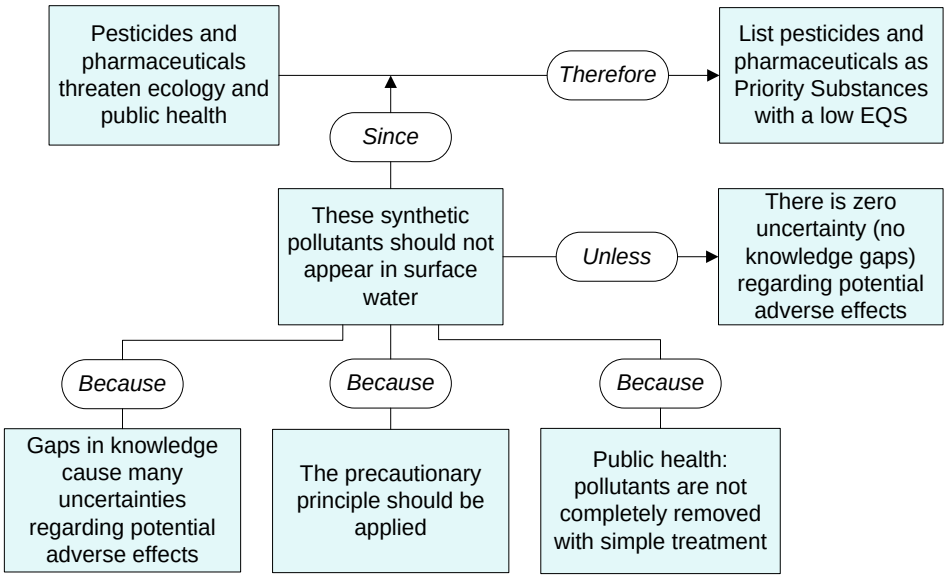


Figure 5.8: Argumentation structure of water coalition in third decision-making round.

The agribusiness coalition, on the other hand, is strongly opposing the addition of new Priority Substances without going through a prioritization process which is stipulated in the WFD. Such a decision must "*always be based on a scientific risk assessment which is included in the transparent prioritization process, for which COMMPS has been developed and has been agreed upon*". So, the agreed procedures should be followed: the Commission will come forward with a proposal to review the list of Priority Substances once the work is finalized, based on a scientific rationale (ECPA, CEFIC et al., 2008). Furthermore, the agribusiness coalition is of the opinion that there is not much more to gain at the regulative side: "*even if a pesticide is forbidden, there will always be another pesticide to fill the spot. The concentrations found in surface water will always be high if a pesticide is popular (very effective, cheap and non-specific), like glyphosate*". Instead, much ground can still be covered via other measures (COPA-COGECA, 2006), including awareness and training: educate the user. Pilot programs with this goal are already developed and brought into practice, of which ECPA's TOPPS[39] is a good example. Also, respondents indicate that it should be acknowledged that probably the largest part of the pesticide concentration in surface water is stemming from municipal and amateur use, among others as a result of paved area (increasing runoff) and inappropriate use, although this is difficult to analyze.

The argumentation structure of the agribusiness coalition is presented in figure 5.9. Compared with the second decision-making round (figure 5.3), this line of reasoning is more complete: it does not only counter the argument of the water coalition ("*pesticides are not causing proven adverse effects*"), but it is also attempted to establish a shift from a strictly legislative approach towards awareness and education. This way, the agribusiness coalition is "*showing the sovereigns that there are multiple solutions to this* issue[40] *besides the strict regulation and phase-out of pesticides*".

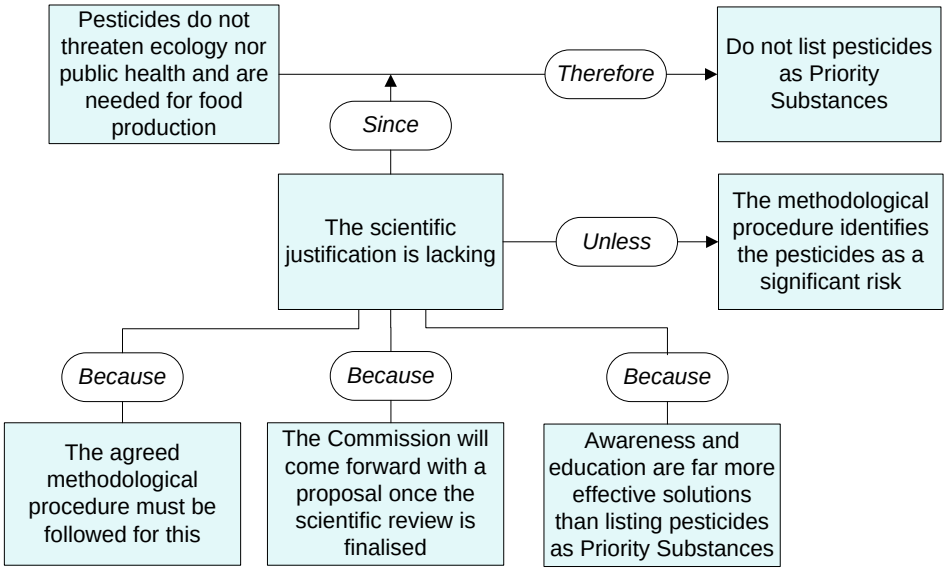


Figure 5.9: Argumentation structure of agribusiness coalition in third decision-making round.

The pharmaceutical coalition has entered the mature subsystem in this third decision-making round, as a result of the Parliament's proposal to add pharmaceuticals as Priority Substance (including *carbamazepine*). Like the agribusiness coalition, the pharmaceutical coalition does not want products that are relevant to them to be listed as Priority Substance as "*it may potentially endanger patient's care*". However, compared to the agribusiness coalition, the pharmaceutical coalition reasoned also on

[39] Train the Operators to Prevent Pollution from Point Sources. This multi-stakeholder project is developed by ECPA and is aimed at disseminating advice, training and information in the EU. The goal is to raise awareness and thereby changing the behavior of operators (users) in order to decrease the pesticide discharge to water.
[40] The agribusiness coalition, like the pharmaceutical coalition, does not label the given context as a problem. Instead, it is merely labeled as an issue, also during interviews.

technical-substantive grounds besides procedural grounds as can also be seen in figure 5.10: although the pharmaceutical coalition is committed to minimizing the environmental impact, the levels currently found in surface water do not present a health risk for humans as they are below the doses that are approved as safe according to current knowledge and authorization procedures[41] (European Parliament and the Council of the European Union, 2001b; European Medicines Agency, 2006; Novartis, 2006). For instance, for *carbamazepine*, "*extensive research that has been published by Cunningham in 2006 shows that carbamazepine does not fulfill the scientific criteria including toxicity"* stipulated for positive identification as a Priority Substance, and therefore *"carbamazepine does not pose a significant risk to or via the aquatic environment*" and should not be listed as PS.

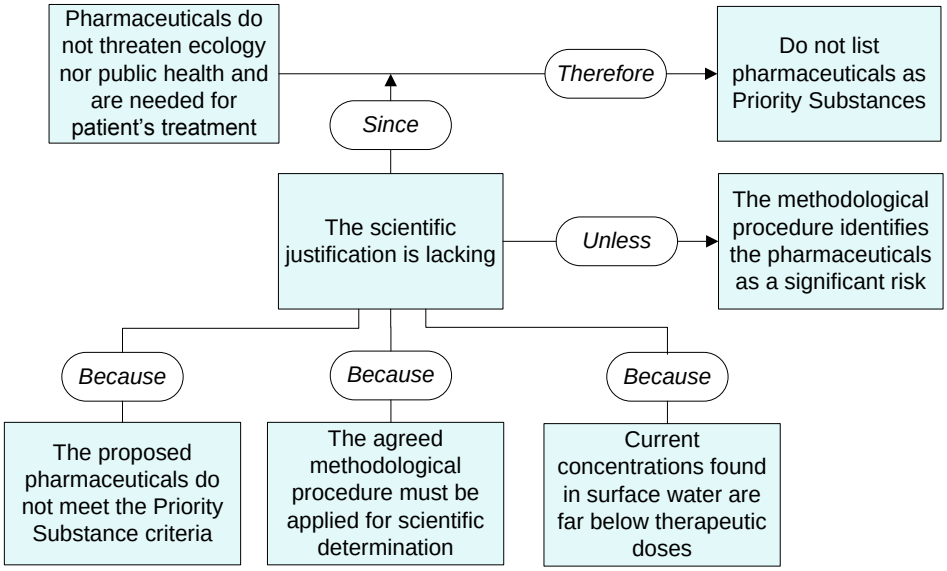


Figure 5.10: Argumentation structure of pharmaceutical coalition in third decision-making round.

Interview data in table 5.1 confirms the view that emerges from a comparison of the argumentation structures: there is agreement regarding the presence of pollutants in surface water, but there is no agreement to whether or not this presence poses real problems, nor agreement regarding solutions.

Table 5.1: Interview data regarding coalition's belief system

Question		***Water*** *(10 resp.)*	***Agribusiness*** *(4 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (18 resp.)
Are pesticides /pharmaceuticals present in surface water?	yes	~~IIII~~ IIII	III	IIII	~~IIII~~ ~~IIII~~ ~~IIII~~ I
	no				
Do they pose a serious problem for the environment or public health?	yes	~~IIII~~ IIII			~~IIII~~ IIII
	no		III	IIII	~~IIII~~ II
Is labeling these substances as Priority Substances a solution?	yes	~~IIII~~ IIII			~~IIII~~ IIII
	no		III	IIII	~~IIII~~ II

It appears that the lack of agreement regarding the problem (and consequently for a large extent regarding the solutions) is the result of the technical uncertainties. *Gaps in* technical knowledge are the cause of uncertainty, and the water coalition consequently applies the precautionary principle, whereas the agribusiness and pharmaceutical coalition base their analysis of the issue on current *technical knowledge* and not on the *gaps in it* and the resulting uncertainty. Therefore, it seems to be that not technical knowledge or science in itself is the cause for conflict, but instead how to handle the gaps in technical knowledge which produce uncertainty. So, the underlying mechanism for the

[41] Although the registration regarding pharmaceuticals intended for human use includes an environmental risk assessment, the registration may never be rejected on environmental effects but solely on human effects. This is an interesting difference with pesticides and veterinary pharmaceuticals, of which the authorization may be rejected based on environmental effects too.

differences in belief system is based on a coalition's stance towards risk (Douma and Schreuder, 1992): risk-adverse like the water coalition or risk-taking like the agribusiness and pharmaceutical coalition. A risk-taking person welcomes risks if the potential benefits can compensate the potential costs that may result from taking the risk. A risk-adverse person, on the other hand, does not like to gamble and weights potential costs as a result of risk more than an equal amount of potential benefits. Translating the risk stance to the context results in either the embracing the precautionary principle (risk-adverse) or risk-benefit analysis (risk-taking). Applying it to *carbamazepine* yields, for instance: *"even low concentrations of carbamazepine may have adverse effects since we do not know everything"* (water coalition) vs. *"carbamazepine is at the currently measured concentrations, and given current knowledge, not a problem"* (pharmaceutical coalition).

It should be noted that both approaches can be *rational* from the perspective of the coalition: choosing one above the other is a *normative* consideration instead, bound to a coalition and ultimately decided upon by politicians. Table 5.2 presents the interview data regarding this normative consideration, based on whether respondents mentioned the precautionary principle or a more risk-oriented assessment.

Table 5.2: Interview data regarding normative values in coalition's belief system

Core principle	***Water*** *(10 resp.)*	***Agribusiness*** *(4 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (18 resp.)
Precautionary principle	~~IIII~~ IIII			~~IIII~~ IIII
Risk-benefit approach		III	IIII	~~IIII~~ II

Clearly, the water coalition advocates the precautionary principle based on the gaps in knowledge, whereas the other coalitions base their position on current knowledge. Confronted by the observation that the water coalition strongly embraces the precautionary principle instead of a risk-benefit approach, one respondent attempted to counter*: "we are not against a risk-benefit approach. Instead, our organization holds on to the precautionary principle until all uncertainties have been solved, and then we agree with a risk-benefit approach*". Indeed, the conflict would be solved if the uncertainty would be reduced and ultimately vanish; however, given the technical complexities involved, this is not likely to happen within the next decades.

5.3.6 General resources of the coalitions

Coalitions possess resources which provide the means to pursue their belief system by introducing their arguments into the decision-making using a certain strategy (see §5.3.7). During interviews, respondents have been asked what resources they possess, resulting in table 5.3.

Table 5.3: Interview data regarding the resources possessed by the coalitions

	Water *(10 resp.)*	***Agribusiness*** *(4 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (18 resp.)
1. Legal power				
2. Public opinion	III			III
3. Information	IIII	II	III	~~IIII~~ III
4. Mobilizable troops		II	I	III
5. Financial resources		I	I	II
6. Skillful leadership				

Legal power

At a first glance, it seems like none of the coalitions has legal power, which seems logical as everyone tries to influence the persons who have this decision-making power. However, one of the characteristics of the ACF is that it challenges the scholar to think of everyone as a potential member of a coalition, including the formal decision-makers. Therefore, using the definition of legal power given to Sabatier, coalitions can possess legal power (Sabatier and Weible, 2007). Throughout the remainder of the paragraph it can be recognized that this indeed applies here too to some extent.

Public opinion and media

Public opinion appears to be a resource of the water coalition as several respondents indicated that public opinion can be used to influence the decision-making. The population wants a good environment and clean drinking water. Or, as easily though cleverly expressed by one of the respondents, *"people will not accept the presence of drugs excreted by their neighbors in their drinking water"*. It is argued here that a distinction must be made between *possessing* this resource, *activating* this resource and *using* this resource.

A coalition *possesses* this resource if the public opinion is aligned with the argumentation structure, especially regarding the problem and solution. On the other hand, as an example, if the public is in favor of good ecological quality then it is not possible to use media and public opinion as a resource in lobbying for fewer emission control measures of dangerous substances. Thus, it is assumed that only coalitions can use public opinion and media if they possess this resource. Therefore, in this case only the water coalition can use this resource actively.

But, before you can use public opinion and media as a resource, it must be *activated*. Activation can happen either as a result of an external event outside the subsystem (reports on climate changes may trigger the public demanding even more environmental awareness), intentionally by the coalition that possesses this resource within the subsystem (for instance, seeking media coverage for the results of a new report on substances in drinking water) or even unintentionally by an opposing coalition as result of a related accident (for instance the well-known Sandoz chemical spill disaster in 1986; "*bad news sells*"). After activation, it can be used by supporting the lobby activities with the various publications and by using the political climate.

Information

Each of the coalitions possesses a significant amount of technical information stored at the experts. Whereas the water coalition uses the *gaps in knowledge* and the advices of institutes to adhere the precautionary principle, the other coalitions point to current knowledge and risk assessments that have been conducted for their products.

Furthermore, an important difference between the coalitions is that the industrial coalitions often have the experts *in-house*, whereas the technical knowledge of the water coalition is stored in separate stakeholders (research institutes and universities). For instance, an organization like EUREAU consists of members who are *political lobby* organizations. Consequently, there are not many technical experts *in-house* (f.i. individuals holding a PhD in chemical technology or another engineering discipline), especially not compared to the expert working groups found in opposing organizations like EFPIA (representing the innovative pharmaceutical companies). A reason for this is that the members of EFPIA invest much in research and development (since the continuation of their business depends on this), whereas similar knowledge in the water coalition is mainly found in external research institutes and universities like TZW, KIWA Water Research, Delft University of Technology and Brunel University.

Mobilizable troops

Mobilizable troops are member organizations and individual networks at national and regional level from, for instance, an umbrella organization which represents a sector at the level of the European Union. It is important to communicate sufficiently with these member organizations, as they may be an asset in influencing especially the Council at a national level, like the ministries for the environment: lobbying them influences the national position that is brought in at the negotiations with the other Member States within the Council – and consequently will have an *indirect* impact on the EU decision-making. The agribusiness and pharmaceutical coalitions seem to have a large number of mobilizable troops. On the other hand, the respondents from the water coalition do not seem to think they possess a large number of mobilizable troops; or at least they are not really activated (see §5.3.7).

Financial resources

The discussed resources can only be used if there are sufficient financial resources. As Sabatier quite correctly points out, "*money can be used to purchase other resources*" (Sabatier and Weible, 2007, p.203). Financial resources can be used for a media campaign, for improving the decentralized network to stimulate mobilizable troops or for acquiring technical information. Financial resources influence the capacity that is available for EU-lobby activities. All coalitions tend to have a deficit of this resource, as about ten respondents divided over all three coalitions have claimed that "*due to limited resources, priorities must be set for certain dossiers*".

Skillful leadership

Skillful leadership refers to entrepreneurs who pull the organization as a whole by presenting an attractive vision and attracting new resources for the coalition (Sabatier and Weible, 2007, p.203). As such, it has not been identified as a resource that any coalition significantly possesses since neither the respondents nor documents point in this direction.

5.3.7 Strategy and resources of the coalitions

Respondents divided over all coalitions seem to agree on three issues, which seem to hold in general as they were not mentioned specifically in relation to the third decision-making round. But since they were expressed during the interviews in 2008, they are reported here. Afterwards, the resource public opinion and media – and its potential use in coalition's lobby activities – is individually described because it has not been actively applied so far. Then, per coalition specific strategies and resources that they have employed in this round are presented. After some extra attention on financial resources, this subparagraph is finalized by an overview regarding the lobby activities and lobby effectiveness of the coalitions.

Three general issues regarding strategy

First, as indicated by seven respondents in one way or another, *"the success-rate of lobby activities cannot be measured"*: you never know if it were your efforts which ultimately changed the opinion of the decision-maker. Moreover, you cannot guarantee that your efforts will have effect. "*Sometimes you go all the way to Brussels for a meeting of 15 minutes and in the end nothing is done with your information*", or, *"in the end it may very well be that your information is only used by the decision-maker as ammunition against another decision-maker*". Although success is not guaranteed and you cannot measure it, some respondents point out that *"you can choose to play the game or not. But if you don't play, you for sure will not have influence. So, you simply have to play".* And being confronted with the observation that their organization and EU-activities were very well-structured, a respondent from the agribusiness coalition reasoned "*maybe we are well-organizing our strategy and structure, but this is only because it is our only way to survive. Without it, the battle would be lost*". Indeed, lobbying may be regarded as a *necessary evil*: you have to play the game, since your opponents will, and you need to at least counterbalance their efforts.

Secondly, eight respondents have expressed that *"timing is essential"*. Most of the respondents meant that "*you need to approach the specific decision-maker at the right moment*", while respondents from especially the agribusiness and pharmaceutical coalitions think that "*the earlier you lobby, the more influence you can exert on the outcome*". Of the latter coalition, two respondents even claim that if you really want to have influence, you should "*approach the Commission long before the informal stakeholder consultations, since during the informal stakeholder consultation your voice is only as much worth as any other*".

Third, seven respondents have indicated the importance of *lobbying with one voice*, as "*most of the decision-makers are only interested in talking to the sector, not to an individual organization*". This seems to be related with the observation of several respondents that if you have large support behind you, you are more interesting to a decision-maker since there is more political appraisal to gain. Thus, there seem to be several advantages of speaking with one voice.

Public opinion as a potential resource

Following theory, besides an external event as was discussed in §4.2.2 (see also figure 4.2), public opinion can emerge as a resource. First, it is observed that public opinion cannot be easily used actively as a resource for the agribusiness and pharmaceutical coalitions, but only be applied as a defensive mechanism: "*we do not often initiate press statements ourselves, but we merely have to reply to something that was published by opponents*". Second, public opinion was not actively used by the water coalition either, nor was it triggered from outside the subsystem in any of the described decision-making rounds. But, since many respondents from especially the water coalition have an interesting – and partly distinct – opinion on the role of public opinion and media, the results are reported here in more detail.

At least eight of the respondents think that media and public opinion can really influence EU decision-making to a large extent. However, some other respondents point out that it is unlikely for a dossier like EQS to attract much media attention as it is regarded as "*boring and complex"* due to their technical nature: what the EQS of *atrazine* should be will never be covered on the front page of a newspaper. But, if the problem context is presented in a general shape like the Associated Press report ("*drugs found in drinking water of 41 million US-citizens*"[42]) will trigger the engagement of many in the discussion, including the public and politicians: it is much closer to reality for non-experts. For instance, a publication in national media related to the finding of *carbamazepine* can influence the amendments and votes of MEPs and the position of Member States. Obviously, such media attention can be used as support for stakeholders' arguments towards specific MEPs, and *"the MEP wants to show these stakeholders that they did what they were asked to do and tables an amendment".* In addition, both MEPs and the Member States to a large extent seem to *"react to national problems"*. So, although the technical details are too technically complex and boring for media and public opinion to have an influence, this seems to be only true until the resource is activated. Once activated, it can unleash a large impact on the decision-outcome. Besides this direct impact, by many respondents it is acknowledged that public opinion and media can have an even larger indirect impact because it can set the agenda: *"it is easier to sell a policy that is in line with public opinion and that people actually care about"*.

Nevertheless, media and public opinion was not employed as an active part of the water coalition's strategy in the third round. Partly, this is because several respondents from this coalition indicate that *"it is a dangerous game to play as it may backfire to you",* referring to the potential harm to consumer confidence in drinking water once it is communicated that there are (residuals of) pesticides and pharmaceuticals present in drinking water. However, at least four respondents argue that it is possible to explain to the population "*the difference between an acute public health problem with the drinking water, and taking action on a potential issue to prevent future problems. We should not be so afraid of using* (media and) *public opinion"*. Moreover, three respondents strongly argue that "*we should realize that sometimes publicity is essential to make progress and reach your goals*". These proponents of actively using public opinion as a resource reason that all it takes is good *risk communication*, which should therefore be an integrated part of the strategy.

Another explanation for not using this resource actively is that "*the drinking water sector likes to present itself as a mature industry, so we will not initiate a media circus and twist the facts to our benefit"*. But, using public opinion and media as a resource does not necessarily mean that a *media circus* must be initiated, like the *Michael Moore* type of scary movies[43] that have been developed

[42] A summary of the publication release can be found at http://www.usatoday.com/news/nation/2008-03-10-drugs-tap-water_N.htm, last accessed 14 September 2008.

[43] Such videos can readily be found on the internet. See for instance http://www.youtube.com/watch?v=qGWWarqyp8I (last visited 13 September 2008). Although it seems that this

following the described Associated Press publication. Instead, this resource can also be used in a more 'honest' way: provide the facts and get a public discussion via media to "*determine whether the public really demands undisputed drinking water, or if the consumers accept that (residues of) pesticides and pharmaceuticals – and other organic micropollutants – may be present in drinking water*". In case of the former, the water coalition would have a strong and influential argument; in case of the latter, "*we may adapt our goal of undisputable drinking water which we now adhere purely because we think that this is what consumers want*". Of course it must be acknowledged that there are limitations to media coverage: "*because they know it is going to pass by within a few days, politicians do not always anticipate to media publications*", thereby closing the *window of opportunity* again. Nevertheless, if the attention to an issue is serious then it may attract the consideration of politicians – like the example of the Associated Press report demonstrated.

A short summarization of the possible functioning of public opinion and media is provided in figure 5.11, indicating the relation between the ways in which it can be employed: as a countermeasure to negative publicity which "*simply happens to me*" or as active resource to be used by especially the water coalition. Furthermore, if public opinion is activated and used (see top grey area), then a good risk communication strategy is essential, since it seems that it otherwise indeed may backfire (to the bottom grey area).

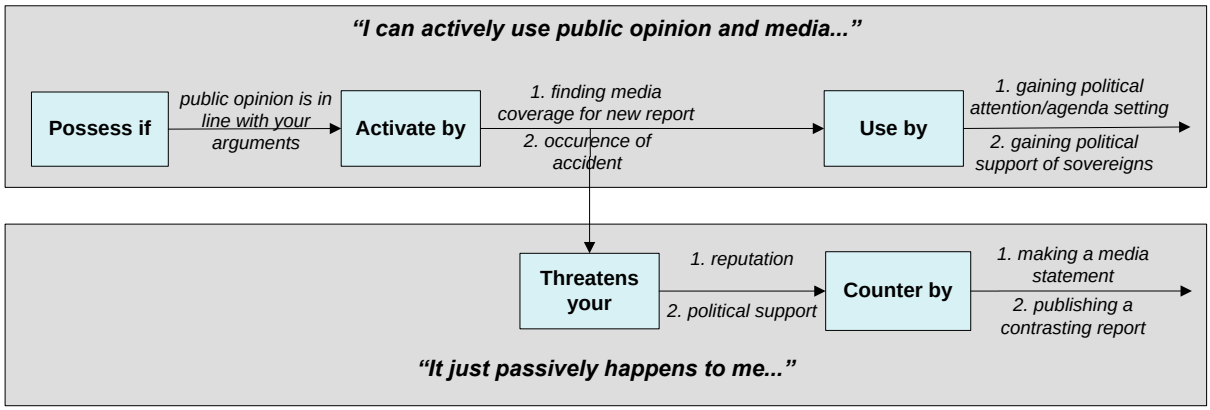


Figure 5.11: The relation between the active and passive way in which public opinion and media is employed.

Finally, besides the EU-level, it was also mentioned by four respondents from the water coalition that media in individual cases[44] has been used as a pressure towards an individual company to obtain cooperation for reducing the emissions of a specific micropollutant. Based on real evidence (i.e. monitoring data), and realizing the reputation damage due to information potentially leaked to a national newspaper, this nearly always "*is successful and much faster than any EU decision-making process. In Brussels they fix the problem when there no longer is a problem",* according to a more skeptical respondent.

Strategy and resources of the water coalition

For the water coalition, the most important derivation regarding the strategy seems to be that most of their efforts were spend on the second phase of the decision-making, i.e. the political, formal part. For instance, although EUREAU has a seat at the EAF and has been invited to the expert group workshops, it seems that these opportunities in the informal pre-decision making phase have not been used accordingly by the water coalition. As an example, the participants list to an EQS expert workshop in 2002 can be found in appendix G, table G.3, which indicates that EUREAU did not attend

'documentary' was made by an amateur, such online videos give a new dimension to media and public opinion given the fact that it has been watched over 25,000 times.

[44] Because of promised non-disclosure due to confidentiality, these very interesting cases and aspects of media cannot be pursued.

the technical expert group where the EQS methodology and EQS outcome were discussed. An explanation for this is that the members of EUREAU are national associations, who are political lobby organizations themselves. They do not primarily possess technical knowledge: such knowledge is mainly found in external research institutes and universities like TZW, KIWA Water Research and Delft University of Technology. Consequently, there are not many technical experts (f.i. individuals holding a PhD in chemical technology, sanitary engineering or another engineering discipline) in – or near – EUREAU, and it seems EUREAU did not frequently hire or ask such experts to represent them in the technical workshops. Some respondents relate this to the limited financial resources: EUREAU is a very light organization with only three full-time employees, which according to a key member is "*not intentionally, but it is hard to get budget from members to engage in EU-affairs. They apparently do not seem to see the relevance of a strong EU-lobby yet*". But, as several respondents know, "*such a limited budget is very strange because it is clear that we are all affected by what is decided in Brussels".* In addition, one water expert has expressed that "*I should be the one who goes to those technical workshops*". But instead, "*non-experts call me at the last moment to explain the scientific knowledge to them. I refuse this and tell them they should let me go to the technical workshop instead because I will be able to explain and defend it much better. It is experts from our organization or likewise organizations throughout the EU that should be representing the drinking water sector*".

The general strategy of the water coalition during the formal decision-making was to write position papers and send these to mainly MEPs. However, there was not one common message expressed, as for instance Vewin, IAWR and EUREAU communicated different messages in their position papers. For example, IAWR requested in their message to decision-makers to list both *glyphosate* and *carbamazepine*, whereas Vewin asked only for *glyphosate*, while EUREAU did not ask for either as "*in the end, no agreement could be reached whether we should support the Parliament's proposal or not*" (IAWR, 2005; EUREAU, 2006; Vewin and Unie van Waterschappen, 2008). Besides (often national) MEPs, the Rapporteur and shadow-rapporteurs have been contacted during the formal decision-making. Nevertheless, several respondents indicate that the effort of the water coalition in general is not sufficient compared to, for instance, the agribusiness coalition.

Strategy and resources of the agribusiness coalition

In contrast with the water coalition, the agribusiness coalition really did participate with several participants in the informal pre-decision phase in which the EQS methodology has been developed and applied (see again appendix G, table G.3).

Within the formal political decision-making phase, for the agribusiness coalition clear strategies can be identified. "*A list of key people was established, and it was discussed at which moments in time, and how, each of them would be contacted*". Furthermore, it was decided *who* would do this: an umbrella organization as one body, a specific member of the umbrella organization, or together. As the Commission is only interested in the opinion of the sector, umbrella organizations have approached them. Also, it was expressed that efforts need to be focused, especially for the Commission: "*only act when you really have to, as this improves the chance that you are being taken serious*". On the level of individual MEPs (to influence the Parliament) and individual Member States (to influence the Council), it is recognized that it often works better to use specific members who are in close contact with the sovereign. Speaking the same language helps as well (i.e. pairing based on nationality or language), and is therefore taken into account.

Also, from the interviews it appears that especially the agribusiness coalition actively used the members to contact and influence the national Member States, using the same position paper and message as the umbrella organization. This large number of mobilizable troops was activated both via the main political coordination and via the expert working group within an umbrella organization. In addition, (confidential) memoranda and lobby notes were distributed to spread the word in an attempt to significantly influence the Council. Before these troops were mobilized, they were first consulted to identify which proposed substances proposed by the Parliament would be a problem for the

agribusiness coalition; *glyphosate*, for instance, is still a very important product for both the manufacturer and many farmers. The collected information was then used to produce the common message of the sector, which indicates the substances that especially are critical to their business. As described, this message has been forwarded to the members to approach the decision-makers.

On a final note, the agribusiness coalition was not only very active in the formal decision-making process, but they definitely were present with many stakeholders (CEFIC, ECPA, EuroChlor, EuroMetaux) in the informal stakeholder consultation sessions as well. They were represented by experts – normally from members organizations themselves – who often hold a PhD in an engineering discipline (see appendix G, table G.3) and were sometimes "*even flown in from all around the world*". And from visual observation around and verbal confirmation during interviews, it is obvious that the agribusiness – just like the pharmaceutical – coalition has much more capacity dedicated to EU-affairs in Brussels than the water coalition.

Strategy and resources of the pharmaceutical coalition

The pharmaceutical coalition did not really have a comprehensive strategy in this decision-making round as they were only pulled in at a late moment, and "*because we were rather confident of the outcome*". In the expert working group of the umbrella organization, the potential threat of the Parliament's position has been identified. Following internal discussion, it was decided to review the proposed pharmaceuticals, including *carbamazepine*, and demonstrate to the Commission that these pharmaceuticals do not meet the technical criteria stipulated in the relevant methodological procedures; therefore, it is not justified to add them directly as Priority Substance. It was argued that "*they should first be scientifically reviewed by the Commission using the COMMPS methodology*". This has been communicated in a (confidential) letter to both the key WFD person in the Commission, and the Rapporteur. Normally, via member associations (Member States) and via umbrella organizations the Council would be lobbied, although that was not needed in this case.

It is interesting to note that the umbrella organization for *patented* pharmaceuticals (EFPIA) did all the work for the pharmaceutical coalition, although the *"innovative pharmaceutical industry had almost no commercial interest in any of the proposed pharmaceuticals"* because the patents of these pharmaceuticals expired[45], instead making these pharmaceuticals generic and of importance to the umbrella organization for generic pharmaceuticals (EGA). From interviews it is clear that engaging in this dossier had more of a strategic reason for the innovative industry: first, if you allow the addition of substances without scientific justification once, it may happen to a product that is of interest to you in the future. Secondly, having pharmaceuticals blacklisted is never good as *"it will always have repercussions in the political field. Many decision-makers do not differentiate between innovative and generic pharmaceuticals, or their specific companies"*.

The importance of financial resources

Although respondents of all three coalitions argued that they must set priorities regarding which dossiers to actively participate in due to limited financial resources, from visual observation and verbal confirmation during interviews in the Brussels offices it is obvious that the industrial coalitions are investing more in *employed capacity in Brussels* than the water coalition. In addition, five respondents from the water coalition expressed that "*our organization has a much lower budget compared to the others*". Whereas the industrial coalitions easily have a capacity of fifty full-time equivalent (fte), the water coalition is protecting the ecological and water interests with maybe ten fte[46]. Although the size

[45] It may even be profitable for the innovative industry to have generic pharmaceuticals listed as Priority Substances, as this eventually means that other pharmaceuticals must be used. Indeed, newly patented pharmaceuticals.

[46] The fte capacity is based on a rough estimation of the manpower of the stakeholders that are located in Brussels with an office, totaled for a coalition. Because of confidentiality reasons no stakeholder breakdown is given, but it may be noted that the estimation of 50 for the industrial coalition is rather conservative.

of the sector based on annual turnover may be an explanation for the ratio 5:1, it must be clear to all stakeholders that this EU-battle cannot be won without proper capacity. It takes time and effort to:

- understand how to lobby and have experience in convincing others with your lobby
- understand and have insight in how European Union (pre-) decision-making works
- build a formal network and maintain it by participating in formal meetings
- build an informal network and maintain it via informal meetings
- lose oneself in a dossier, find the right contact persons and estimate what direction it is going
- possess sufficient technical knowledge, or have active support of experts

Furthermore, financial resources indeed are likely to support many of the discussed mechanisms that have been discussed in this thesis, including being better informed, have a better strategy, participate more effectively, and ultimately, obtaining a more satisfying decision-making outcome and thereby improved protection of a coalition's interests. Nevertheless, it must be noted that the *return on investment* is not linear with the employed capacity: investing very little (less than an fte) will likely produce no result at all, whereas the *marginal revenue* of one additional fte on top of a hundred existing fte will be close to zero too. Figure 5.12 visualizes the *hypothetical* relation between the employed EU-capacity and the total revenues, with an *indication* for the current employed capacities of the coalitions. Note that the total revenues and employed capacity do not relate to one specific dossier, but to all lobby activities in total. The presented curve also seems to be in line with the expression of five drinking water representatives that the "*drinking water sector does not have sufficient capacity at this moment to counter the other coalitions. If you really want results, you will have to invest more*". An anecdote from a respondent clearly indicates the need for more dedicated EU-capacity to protect the drinking water interests: "*we received a distress e-mail a few days before the revision of the pesticide Directive was discussed, pleading that someone should be representing the sector*". Clearly, more financial body is needed: heavy lobbying simply is a necessary evil.

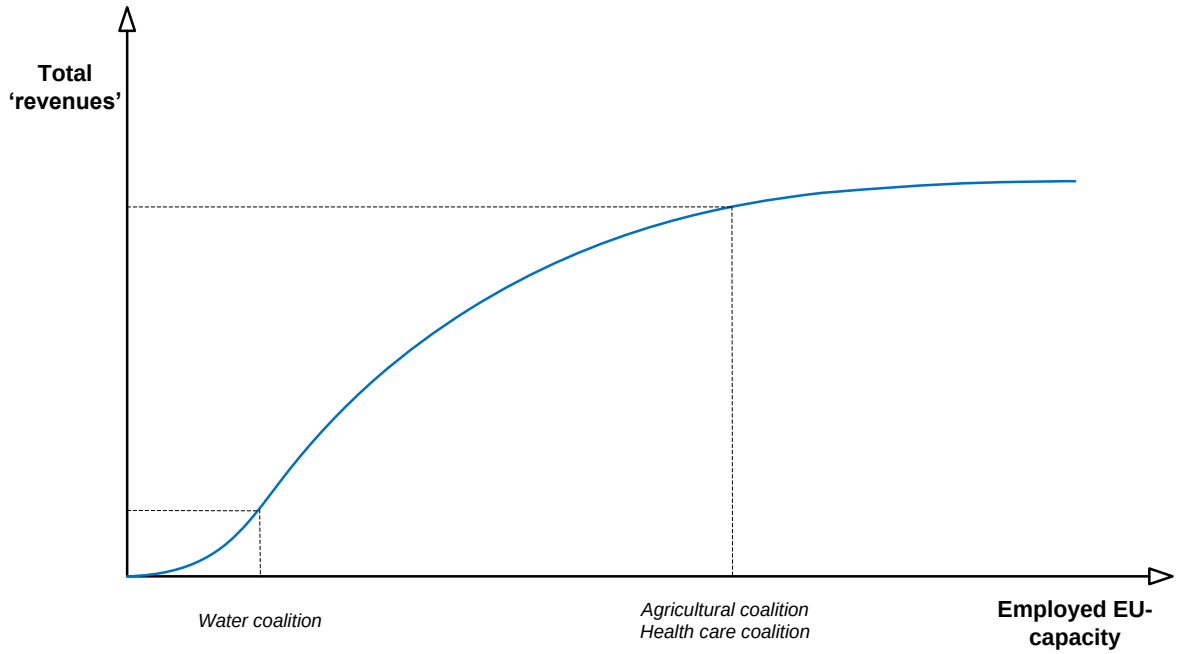


Figure 5.12: Total revenues as a function of the total employed EU-capacity.

An obvious question is: why does the water coalition not invest more, then? Respondents from this coalition have indicated that "*the individual members are not convinced of the importance of a strong EU-lobby*", and secondly that "*it is difficult to get budget if there is no guarantee for success*". Apparently, the agribusiness and pharmaceutical coalitions have overcome these two barriers. Part of the explanation may be that the members from those coalitions are larger, commercial and have an international focus – like the manufacturers who sell products worldwide. Therefore, they are more

dependent and aware of EU decision-making and convinced of its importance. Secondly, although EU decision-making can indeed be seen as a large black box[47], the agribusiness and pharmaceutical coalition seem capable of unraveling it to a larger degree than the water coalition as they are very active in the informal pre-decision making phase and in frequent contact with the Commission; consequently, their lobby activities seem to be more successful and more structured, easing justification of the EU-expenditure.

Besides the two reasons that have been indicated by respondents, a third reason why it is difficult for coalitions to obtain budget from members is found in the fact that the EU-lobbying efforts are a *collective action*. The common goal of the coalition is pursued by multiple stakeholders as they have common interests. However, a pharmaceutical company who produces *carbamazepine* but does not financially support the activities of EFPIA enjoys the success without having to pay for it: "*we are all affected by EU decision-making*", whether you invest or not. Such entities are labeled *free riders* as they consume more of a resource (i.e. EU-umbrella organization) than they invest in this resource. Given the context, the EU umbrella organizations apparently meet – in contrast with the classical example of the tragedy of the commons – requirements under which voluntary self-organization can take place without governmental intervention (Ostrom, 1990); nevertheless, their activities can be regarded as a *Common Pool Resource*[48], as it is practically impossible to exclude free-riders from the benefits (Ostrom, Gardner et al., 1994). Supposedly, this barrier is overcome in all coalitions due to the "*frequent interactions* (within a coalition) *resulting in trust and cooperation*" and absence of opportunistic behavior: Priority Substances is not the only dossier that must be tackled together, and stakeholders within a coalition are aware that they need each other.

Lobby activity and lobby effectiveness of the coalitions

Tables 5.4 and 5.5 present the lobby activity and lobby effectiveness of the coalitions.

Table 5.4: Interview data regarding lobbying the sovereigns

Did you actively lobby the…		***Water*** *(8 resp.)*	***Agribusiness*** *(3 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (15 resp.)
European Commission?	yes	III	III	IIII	~~IIII~~ ~~IIII~~
	no	III			III
European Parliament?	yes	~~IIII~~ I	III	IIII	~~IIII~~ ~~IIII~~ III
	no				
Council?	yes	II	III	III	~~IIII~~ III
	no	IIII		I	~~IIII~~

From table 5.4, it emerges that the European Commission is lobbied by everybody, although the water coalition is less engaged. The European Parliament is clearly lobbied by everyone, probably as everyone has easy access to at least some individual MEPs. Finally, the Council is especially lobbied by the agribusiness coalition and pharmaceutical coalition, and much less by the water coalition.

Table 5.5: Interview data regarding perceived effectiveness in case of lobby

Were you able to influence the…		***Water*** *(8 resp.)*	***Agribusiness*** *(3 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (15 resp.)
European Commission?	yes	I	III	IIII	~~IIII~~ III
	no	II			II
European Parliament?	yes	~~IIII~~	I		~~IIII~~ I
	no	I	II	III	~~IIII~~ I
Council?	yes		II	II	IIII
	no	II	I	I	IIII

[47] A black box is a system with inputs and an output, whereas all components and processes used to convert the inputs to an output are complex, numerous, difficult to analyze and have an ad-hoc characteristic. Applied to the context, the inputs are the argumentation structures of the coalitions, whereas the output is the final decision-making outcome (i.e. a new Directive).

[48] More correctly, it can be regarded as a mirrored version of classical Common Pool Resource problems since the resource must be build up instead of exploited.

Table 5.5 indicates that the agribusiness coalition and the pharmaceutical coalition perceive lobby activities aimed at the Commission and Council as effective, but the Parliament as ineffective. For the water coalition, this is the other way around: lobbying the Parliament is effective and lobbying the other sovereigns is not. This also explains why the water coalition focuses its lobby activities especially at the Parliament. Nevertheless, both the agribusiness and pharmaceutical coalition expressed in interviews that "*especially the Commission is open to have a meeting and discussion as long as you deliver sound* (scientific) *information*". Next subparagraph will zoom in on how the coalitions perceive the sovereigns.

5.3.8 Perceived relation between sovereigns, coalitions and technical information

The respondents from the coalitions have been asked what the role is that a sovereign is playing in the decision-making process: merely scientific or political. Second, the level of technical knowledge that is present in each of the sovereigns according to the coalitions is presented in the tables below: low, average or high. Third, the perceived favoring of a certain coalition by a sovereign has been indicated based on the respondents, although this proved to be difficult to derive from the interview data, which can also be observed by the low frequencies. The results to each of the three issues are provided in table 5.6 (Commission), table 5.7 (Parliament) and table 5.8 (Council).

Table 5.6 suggests that the Commission's role within the decision-making is rather scientific and they possess a high level of technical knowledge. The latter is also supported by the fact that they have 20.000 employees, among them many experts, and a *"very good technocratic apparatus"* as a result. They do not tend to favor the interests of a certain coalition.

Table 5.6: Interview data regarding the perceived position of the Commission by the coalitions

Commission		***Water*** *(6 resp.)*	***Agribusiness*** *(3 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (13 resp.)
The Commission's role is merely…	political	I			
	scientific	II	II	III	~~IIII~~ III
The level of technical knowledge in the Commission is…	low				
	high	II	II	III	~~IIII~~ II
The Commission tends to favor the interests of…	water/env				
	industry			I	I

Table 5.7: Interview data regarding the perceived position of the Parliament by the coalitions

Parliament		***Water*** *(6 resp.)*	***Agribusiness*** *(3 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (13 resp.)
The Parliament's role is merely…	political	IIII	II	III	~~IIII~~ III
	scientific				
The level of technical knowledge in the Parliament is…	low	II	II	III	~~IIII~~ II
	high				
The Parliament tends to favor the interests of…	water/env	II	I	II	~~IIII~~
	industry				

Table 5.7 indicates that the Parliament's role within the decision-making is strongly political. Furthermore, they do *"not possess much technical knowledge as they do not have the means for this, neither is it their role*". The majority of the respondents seem to think that the Parliament favors the interests of the water coalition over the industrial coalitions.

Table 5.8: Interview data regarding the perceived position of the Council by the coalitions

Council		***Water*** *(6 resp.)*	***Agribusiness*** *(3 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (13 resp.)
The Council's role is merely…	political	I			
	political-scientific	I	II	II	~~IIII~~ I
	scientific				
The level of technical knowledge in the Council is…	low	I			I
	average	II	II	II	~~IIII~~ I
	high	I			I
The Council tends to favor the interests of…	water/env				
	depends		II	I	IIII
	industry	I	I	I	I

Table 5.8 shows that the Council's role is a mixture of politics and science. The level of technical knowledge in the Council is average. One respondent probably connected both observations best: "*some Member States are backed by much technical expertise, whereas others with less technical expertise reason purely political*". Finally, some respondents indicate that the Council favors the interests of the industry. Others, on the other hand, express that this is only because the interests of the Council (feasibility/implementation of measures) and the industry (protection of their products) are served by the same position in this decision-making: do not add pollutants to the PS-list at this moment. Or, *"especially on environmental dossiers, the Council often seems to be grey, whereas the Parliament seems to be green. This is not because the Council is grey by nature, but grey and feasibility often coincide"*. The next subparagraph will now outline the final play of the formal decision-making.

5.3.9 Continuation of the codecision procedure for formally establishing EQS

Towards the Parliament's position

As discussed in §5.3.4, the Commission presented their Commission Proposal in July 2006 which would establish EQS for the identified Priority Substances (European Commission, 2006). Before presenting her draft report in which amendments are proposed to the Commission Proposal, the appointed Rapporteur for the Parliament (Mrs. Laperrouze of the Liberals) had initial discussions with certain research institutes and members from the responsible Committee on the Environment, Public Health and Food Safety (ENVI-Committee). This draft report did not include the addition of new Priority Substances yet; instead, even the agribusiness coalition was not unhappy with this draft report from December 2006 (ENVI-Committee, 2006). Then, the draft report was discussed at several moments in the ENVI-Committee; additional amendments were tabled by MEPs within the Committee, including the addition of 28 substances like *glyphosate*, MTBE, ETBE but also pharmaceuticals like *carbamazepine* and x-ray contrast-agents like iopamidol (see Appendix G, table G.2). As part of this research, some questions with regard to the amendments have been e-mailed to specific MEPs and Parliament advisors to confirm the connection with the water coalition (partly presented in appendix H). As can be observed, many of these amendments were indeed directly handed to them by or formulated in cooperation with water supply organizations and environmental NGOs. Furthermore, it is now obvious that the water coalition possesses the resource formal power – at least to some extent – as a former Greenpeace associate is now political advisor to the Greens in the Parliament. Moreover, as there is close and frequent collaboration between certain drinking water and stakeholders and environmental NGOs with political affiliations in the Parliament on a broad range of dossiers, at least elements of the Parliament can be regarded as part of the water coalition. This is also backed by the frustration of two respondents of the agribusiness coalition, who indicate that *"a significant part of the MEPs do not want to talk as they are simply against us*".

Under influence of the coalition within the Committee between Greens and Socialists backed by the affiliation of the Rapporteur, among the more than 60 amendments to the Commission Proposal the ENVI-Committee decided to add a large range of 28 substances as Priority Substance in

their legislative Report of April 2007, which served as input for the plenary Parliament vote in first reading (ENVI-Committee, 2007b). In general, the justification provided by the specific MEPs who tabled the various amendments is that these substances occur in specific river basins, that they are water soluble and that measures must be taken to reduce their concentrations as they tend to be a problem. For instance, two amendments were tabled by MEPs within the ENVI-Committee for *carbamazepine* and one for *glyphosate*, with the following (unedited) justifications (ENVI-Committee, 2007a):

"Carbamazepin is an active substance used in anti-epileptica. It is being found in relevant concentrations in various rivers, such as e.g. the rivers Elbe, Rhine and Danube. Carbamazepin is very water-soluble and persistent. It is important that EU-wide control measures are taken against the discharges, emissions and losses of Carbamazepin to surface water. It should be added to the list of priority substances"

and

"The anti-consulvant drug Carbamazepine, which is used throughout the EU, has been found in relevant concentrations in the Elbe, Rhine and Danube for many years. Carbamazepine is soluble in water and a persistent pollutant. As yet there are no EU-wide control measures for this substance."

and

"Glyphosate is a widely-used herbicide which is found in significant concentrations in surface water. There is a lack of data about the hazards of glyphosate"

The first two reveal the power of lobbying as the almost equal amendments probably originate from information provided by the same stakeholder, whereas the latter really described the precautionary principle. However, the justifications are not backed by technical knowledge or specified evidence: no reference is made to toxicological research or known adverse effects, for instance.

The legislative report of the ENVI-Committee was then discussed in the plenary session of the first reading of the Parliament. No significant amendments were made, and the plenary voted in favor of the legislative report, thereby establishing the Parliament's position that significantly differed from the Commission Proposal (European Parliament, 2007b). Even if not all political affiliations[49] necessarily agree with the rather extreme position taken, from interviews it is derived that from a strategic point of view the plenary in first reading often accepts the Committee's report to "*assure a firm negotiation position against the Council*".

From studying the low number of MEPs that tabled the high number of amendments in the ENVI-Committee, from the laid-back position of the rest of the ENVI-Committee and of the plenary in first reading, and from the concern of certain stakeholders it may be concluded that indeed "*only a handful of people are deciding on the course of the Parliament as a whole*". These people include especially the Rapporteur, Shadow-rapporteurs and a few active MEPs in the Committee, supported by their political advisors and associated stakeholders from the water coalition.

Negotiations in the Council: arriving at a Common Position

Consequent to the Parliament's position, the dossier has been discussed in the Council. Just like the Parliament, the internal decision-making within the Council is rather complex, and based on two sovereign interviews shortly summarized. Each Member State first hands instructions to the permanent representative in Brussels to negotiate with the permanent representatives from the other Member States. Depending on the technical expertise in ministries and governmental institutes of a Member State, this pre-work can be very solid for technical dossiers like EQS. Although all work in the Council is classified till the level of the Council of ministers, the common opinion is that *"the more technical knowledge you bring to the table in the negotiations with other Member States, the better your position is"* because Member States without that technical knowledge cannot add much to the

[49] In this case right-wing oriented affiliations like Christen-Democrats, Liberals and a significant part of the Independent Group.

discussion. As a result, the final position of the Council – for the largest part accomplished in the Council working groups – tends to be pulled in the directions of Member States who are backed by adequate technical knowledge from their ministries and institutes. However, in addition to the role of technical knowledge, the political game should not be underestimated. First of all, although the instructions handed to the permanent representatives are based on expertise, they are primarily political-oriented based on national interests and feasibility (often translated in implementation costs). For instance, agriculture plays a large role within the economy of more southern Member States, often resulting in a conservative position of these Member States with regard to stricter agricultural regulation. Secondly, regarding the political game, it appears that "*the real work and almost all decisions are made in the Council working groups among the permanent representatives*". As this select set of persons frequently and intensely negotiates with each other, exchanging one topic against the other is prone to happen in the corridors: before the formal negotiations at the table reach a final stage, deals are made between certain Member States. This sometimes results in disappointment by stakeholders, as *"it seemed this Member State made a last-minute move in another direction than we thought"*.

When the negotiations between the Member States have come to an end, the Council has reached political agreement and forms the Common Position, confidentially identifying winners and losers among the Member States[50] (Council of the European Union, 2008). It must be understood that the Council is not eager to accept amendments from the Parliament which are acceptable at best for the Parliament: such issues are used strategically as they are handed to the Parliament only during the negotiations, in return for something else. Among others, the Council Common Position reached in December 2007 expresses that the commonly agreed WFD should be followed and that a revision of the list of Priority Substances should be based only on scientific considerations. This is in line with the Commission Opinion in January 2007 regarding the Common Position and the Parliament's Position: the Commission disagrees with several of the Parliament's amendments, including the addition of Priority Substances at this stage (European Commission, 2008b). The justification for this is that the addition of new Priority Substances is not in line with the scope of the Commission Proposal nor with the relevant provisions stipulated in the WFD: Priority Substances must be identified using a risk assessment. Therefore, *glyphosate* and *carbamazepine* should not be added at this stage.

For the Council, the decisive persons seem to be the permanent representatives of the Member States. However, besides their negotiation skills, their work is mainly based on the instructions handed to them and on the support of the technical experts. The best way for stakeholders to influence the Council's position therefore appears to be the contact persons at the national levels who supply the necessary information to the permanent representatives. Delivering useful information to this national level, including a stakeholder's interests and technical information, could change the position of the Member State, or *"hand the Member State additional ammunition*" (if the interests and positions of Member State and stakeholder are aligned).

Position of ENVI-Committee in second reading

In second reading, the framework for reaching a compromise is very clear, as only moves between the Common Position and the amendments of the Parliament are allowed. For instance, the Parliament and ENVI-Committee cannot propose to add even more substances besides the 28 of the first reading.

The start of the second reading is by several respondents from coalitions described as "*it looked like the Rapporteur would keep the firm position from first reading and consequently clash severely with the Council, necessitating a conciliation procedure*". This feeling was based on the draft

[50] These winners and losers cannot be pinpointed here as all work, including the negotiations, are strictly confidential. What can be said, however, is that the Netherlands managed to obtain most of the issues that were important to them: no additional regulation at this point, follow the legal procedure that was agreed upon and no consequences for the already drafted river basin management plans

recommendation of March 2008 of the Rapporteur, to be discussed in the ENVI-Committee, in which the 28 substances were again proposed to be listed as Priority Substances (ENVI-Committee, 2008a). The Rapporteur's justification for this was that the amendments of the Parliament from first reading were not sufficiently taken into account in the Council Common Position. However, whereas both the ENVI-Committee and the plenary is rather reluctant to oppose in first reading to assure a firm negotiation position, the decision-making in second reading is more serious as agreement is ought to be reached. Under influence from permanent Council representatives, stakeholders from the agribusiness coalition and scientific information, several MEPs in the ENVI-Committee from especially the Christian Democrats, Independent Group and Liberal affiliations ultimately strongly opposed against the ideas of the Rapporteur. In addition, whereas the activities of the sovereigns up to the first reading are rather isolated, in the second reading communication between the Parliament and the Council takes place: *"it was obvious that the Council would never go along with the addition of new Priority Substances*". Third, and probably most importantly, it was clear that the plenary session would never accept the draft recommendations as Parliament's position, even if a majority could be found in the ENVI-Committee: *"the Committee is much greener, and politically more ambitious, than the plenary*"[51]. All these factors resulted in the necessity to find a compromise that would at least be acceptable to the ENVI-Committee and the Parliament's plenary. Following discussions and the voting in May 2008 "*in which the Rapporteur unfathomably voted against her own proposed amendments"*, the ENVI-Committee finally made 40 amendments to the Council Common Position, making a serious step in the direction of the Council (ENVI-Committee, 2008b). For instance, no substances would be added directly. Instead, half of the substances would be reviewed by the Commission within six months, including *glyphosate*. The other half would be reviewed in twelve months, including *carbamazepine* (see Appendix G, table G.4).

Agreement Parliament and Council in Trialogues facilitated by the Commission

In the short time between the vote in the ENVI-Committee and the vote in the plenary session, the *Trialogues* between a handful of people from Commission, Parliament and Council take place. Officially, these Trialogues "*are informal, but by everyone involved these are regarded as very formal: Both the Rapporteur* (for the Parliament) *and the presidency* (for the Council) *enter these negotiations with a strict mandate*". The Commission adopts the role of mediator/facilitator. The Trialogues are really aimed at reaching a compromise between the Parliament and Council in order to prevent a conciliation procedure.

These negotiations only involve a handful of key people and have a strong confidential nature. During these Trialogues, so before the plenary session in the Parliament, the Rapporteur ("*who was accompanied by shadow-rapporteurs to assure sufficient support for the compromises from all political affiliations in the plenary*") and the presidency of the Council reached agreement. Both sides have had to compromise on several issues, but as most of the respondents know, "*that's how the game works"*. Regarding Priority Substances, based on a suggestion from the Commission, it was agreed that 13 of the proposed substances would be reviewed by the Commission within *24* months (see appendix G, table G.5). These substances are the ones that were proposed by the ENVI-Committee to be reviewed within 6 months. Therefore, *glyphosate* is among the 13 selected substances, whereas *carbamazepine* is not. This list with 13 selected substances is *an invitation for*, or according to others it gives some kind of *political priority to*, "*the Commission to review these substances and demonstrate to the Council and Parliament on a case-by-case basis why a substance should or should not be listed as Priority Substance"*. But, playing down the "*success of the Parliament*" that is perceived by some, several respondents indicate that in 2010 – that is in 24 months – "*the Commission would already*

[51] European political affiliations do not work as national political affiliations: there are many different opinions within one affiliation, as issues like national interests and political accents play a role. There are no political '*blocks*': a conservative from the UK does not necessarily vote the same as a Dutch Christian-Democrat, although they are part of the same affiliation).

come forward with a Proposal for reviewing the list of Priority Substances anyway". In any case, the Commission will have to carefully consider *glyphosate* and explain why they will propose or not propose to add it as a Priority Substance in 2010. For *carbamazepine*, there is no such obligation for the Commission; but this does not necessarily imply that *carbamazepine* will not be reviewed with as much effort.

Based on these compromises in the Trialogues, compromise amendments were formulated which would serve as input for the plenary session. As a gentlemen's agreement[52], if the plenary adopts the text as has been agreed in the Trialogues, then the Council will adopt the text of the Parliament without any changes.

Formalizing the agreement and level of satisfaction of coalitions

The compromise amendments agreed between Rapporteur and Council Presidency were voted before the original amendments in the plenary session in June 2008 in an attempt to reach a second reading agreement, and have been accepted. Consequently, the Parliament's Position in second reading matches the agreement in the Trialogues (European Parliament, 2008).

In answer to this, in the Commission Opinion of July 2008 the Commission has agreed with the Parliament's Position as the proposed compromise amendments are in line with the original Commission Proposal (European Commission, 2008a).

Before the agreement is officially formalized, the Council needs to approve the by the Parliament amended Common Position at one of the regular Council meetings, after which it can be published in the Official Journal. So far this did not happen (October 2008), but Council approval can be expected within a month.

Among the substances to be reviewed within 24 months is *glyphosate*, whereas no pharmaceuticals (including *carbamazepine*) are among them. The latter explains the satisfaction of the pharmaceutical coalition with the decision-making outcome depicted in table 5.9. The average opinion in the water coalition can be summarized as: "*it is at least something, although much more is needed*". Even if certain stakeholders within the water coalition have a more extreme position varying between a good outcome ("*no more could be expected*") and a bad outcome ("*this will have almost no effect*"), obviously several respondents are "*not completely naïve. That's politics: once you enter negotiations you know that a compromise will be the result*". The agribusiness coalition more or less is also partly satisfied as they "*were able to stop the Parliament from illegalizing farming*", but they warn that *"the Parliament has managed a review for substances without any scientific justification or whatsoever, which is rather dangerous"*. The pharmaceutical coalition has indicated that *"we were already satisfied the moment it was clear that no pharmaceuticals would be listed without a scientific review"*. The fact that in the end none of their products will be reviewed with political priority can therefore be seen as a bonus, although *"we are rather convinced that these products would not be positively identified on scientific grounds anyway"*.

Table 5.9: Interview data regarding level of satisfaction with the final decision-making outcome

Level of satisfaction with outcome	***Water*** *(8 resp.)*	***Agribusiness*** *(4 resp.)*	***Pharmaceutical*** *(4 resp.)*	**Total** (16 resp.)
The outcome is good	II	I	IIII	~~IIII~~ II
The outcome is average	III	II		~~IIII~~
The outcome is bad	II			II

5.3.10 Recap of the third decision-making round: filling in the ACF

Figure 5.13 shortly recaps the specification of the Advocacy Coalition Framework components that would be analyzed in this round according to figure 5.1. Indeed, the EQS methodology from the first informal pre-decision making phase, but also the earlier agreed COMMPS methodology and of course the WFD, have served as constraints for the policy subsystem in the second phase of this decision-

[52] However, to this end, the Parliament protects itself with a letter signed by the negotiator for the Council.

making round as it clearly set the *rules of the game*. Nevertheless, it was attempted by the Parliament (supported especially by the water coalition) to break these rules: the addition of substances without scientific review via the COMMPS methodology. Given that no micropollutants have been added, nor that the EQS have been changed throughout the formal decision-making process, it is concluded that these rules of the games are *imperative* to the decision-making outcome. Note that the sovereigns in the visualization have been located in the direction of the coalitions. This indicates the general stance of the Council and Parliament, but it is not necessarily valid for each individual person within that sovereign.

The European Commission again was the *policy broker* in this round, since they initiated the decision-making and served as facilitator and mediator of the process with agreement as goal. The *formal decision* of the third round taken by the Parliament and Council during the second formal decision-making phase is the Directive on EQS in the field of water policy. The Environmental Quality Standards themselves, which provide the operational parameters for the Priority Substances, form the new *institutional rule*. The output of this is that the (river basins in all) Member States have to comply with these standards for PS, and that the Commission will review the list of PS in 2010. *Policy outputs* of the former ought to be better water status due to measures taken by Member States in case the current concentrations are higher than allowed; in addition, this may lead to, among others, reduced sales for the manufacturer.

The *crucial decision* of this round is input for the future fourth decision-making round, as this decision also provides new lobbying opportunities at 1. the implementation level (Member States / river basins) and 2. the revision of Priority Substances and Environmental Quality Standards at the level of the EU. Here, the latter is regarded as fourth round and is discussed in the next paragraph.

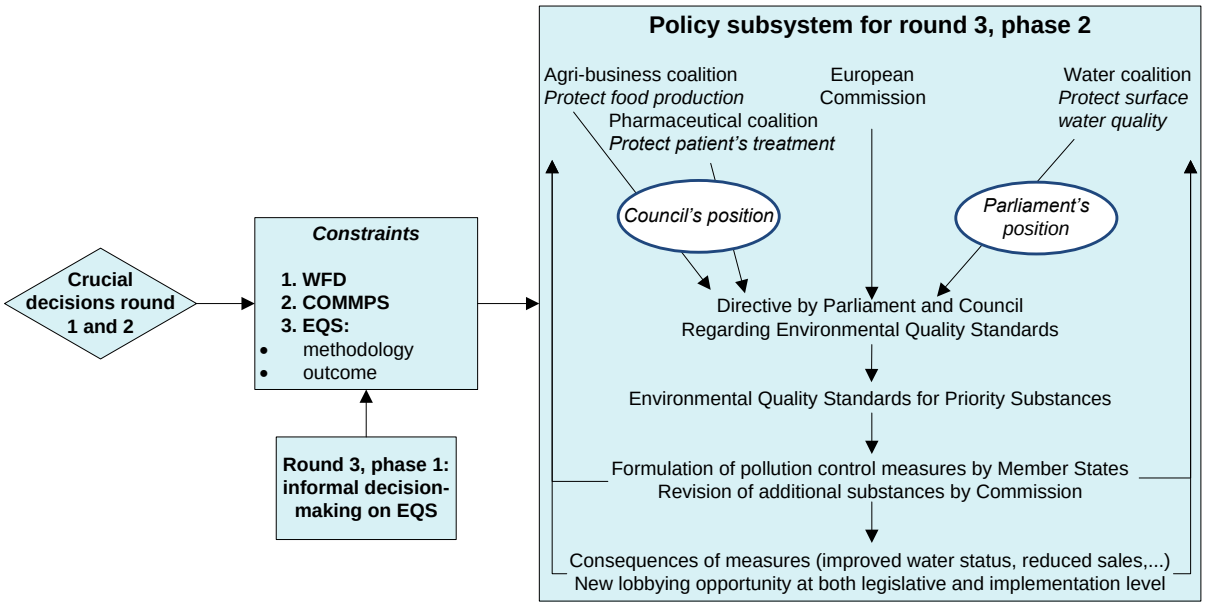


Figure 5.13: The main policy subsystem of the ACF filled in based on third round.

5.4 Fourth round: a look into the future (2008 - ongoing)

The crucial decision of the third round marks the end of the provisions required for the new integrated water approach within the European Union. The WFD (round 1), the list of Priority Substances (round 2) and the Environmental Quality Standards (round 3) together are the *legislative building blocks* presumably required to achieve the good water status. Now, it is down to implementation via the Member States and identified river basins. However, besides the implementation, the WFD stipulates a revision of the list of Priority Substances (and derivation of according EQS) every four years. Indeed, a fourth round has started and is ongoing at this moment. First, a short introduction to this round is

given (§5.4.1). Then, the development and future outcome of the fourth round is forecasted based on an extrapolation of the results from earlier rounds (§5.4.2). Note that this round, especially the forecast, strictly seen does not fit ideally in this chapter because it concerns a prediction and not facts. Therefore, it is not really part of the results. Nevertheless, since the following chapter purely focuses on the discussion of the results, the forecast of the fourth round is given in this chapter.

5.4.1 The revision of the methodologies

The Commission has acknowledged that they will come forward with a Commission Proposal in 2010 regarding the revision (probably an extension) of the list of Priority Substances; moreover, for each of the new Priority Substances, EQS will be proposed directly. As it is acknowledged that both the COMMPS-methodology and the EQS methodology are *dynamic* methodologies which should be based on *best available knowledge*, both methodologies are currently being revised before the 2010 Commission Proposal. The Commission hired another consultant, the French INERIS, for this task. They are leading the revision, supported by the Consumer Products Safety & Quality Unit (CPS&Q), formerly known as the European Chemicals Bureau. CPS&Q has much modeling expertise, and they have been involved in the development of the COMMPS-methodology too.

The Commission has made it clear that in the revision much attention will be on exposure via modeling, besides the monitoring part which is supported by a heavy database that already includes over three million data items. The exposure via modeling includes production and use volumes, potential effects (based on toxicity and ecotoxicity), biological degradation and more. Furthermore, the use of Quantitative Structure Activity Relation (QSAR) is recommended as most realistic tool for dealing with data gaps (INERIS, 2007). Ultimately, further development of QSARs could assist in reducing the deviation between monitoring and modeling data, thereby reducing uncertainty. The trend to develop and use more sophisticated and accurate tools in addition to monitoring data can be seen as a move from reaction towards prevention, which is of course welcomed, especially by the water coalition. Moreover, since uncertainty is causing the conflict, the decrease in uncertainty due to the application of QSARs may reduce the conflict between coalitions to some degree. Besides the tools that are readily available for toxicity and behavior in the environment, as discussed in §1.2.4 QSARs are also being developed for the prediction of the removal efficiency of pollutants in drinking water treatment. This type of QSAR is – obviously – of much interest to the water coalition, especially since QSARs are now recommended to be included in the future in the methodologies.

So, the revision of the COMMPS- and EQS methodologies are already in progress (European Commission, 2007). More stakeholder consultation sessions (technical expert groups) are *"hosted by the Commission 15 October 2008 and March 2009, in which the review of the methodology, and new substances as a result, are discussed"*. Stakeholders from the agribusiness coalition have already used the opportunity to deliver new information to INERIS via the Commission since *"direct communication is not allowed"*, in order to protect their interests as good as possible in the light of the revision and the potential listing of additional pesticides as Priority Substances.

5.4.2 A forecast based on extrapolation: developments and outcome (2009-2012)

As a great physicist once said, *"prediction is very difficult, especially about the future"* (Niels Bohr, 1885 – 1962). Nevertheless, this subparagraph will sketch how the round may continue and which consequences this may have. Note that this prediction is based on the results from the reconstruction of the three rounds presented in the previous paragraphs. Furthermore, there is no guarantee that a forecast based on extrapolating past results is accurate. Therefore, this paragraph should only be seen as a modest attempt to provide some indication of the current and future development in the ongoing round.

In 2010, the Commission will come forward with their Proposal based on the recommendations from application of the revised methodology for the identification of Priority Substances (COMMPS) and derivation of EQS. In this informal pre-decision making revision phase,

again Member States and stakeholders are involved. From the second and third round, and expressions by respondents, it seems like the (drinking) water interests have not been included in the methodologies as much as the water coalition would have liked. Although the current situation has not been the focus of this research, there are no strong indications of more – or better targeted – activity of the water coalition in the ongoing informal revision phase in the current fourth round. Therefore, it is expected that the methodologies will not significantly improve from the viewpoint of the water interests.

Based on the 13 substances that have political priority – including *glyphosate* – together with hundreds of additional substances, probably between 10 and 30 substances will be recommended by the revised COMMPS-procedure. The reason for this is that the methodology does not identify substances based on their *individual characteristics compared with cut-off values*, but instead substances are *ranked based on comparison with the others*. Using the obtained rankings as a result of this comparison, the priorities are then identified. The number of priorities really depends on (Commission) preference, largely based on the costs for the Member States: listing 200 substances as Priority Substance will have a too large financial burden, as *"there are 50.000 monitoring points in the EU. Each Priority Substance must be measured at these points".* The recommendations will be largely copied in the Commission Proposal, including the recommendations regarding the EQS values, since the Commission Proposal in the second and third round did not significantly differ from the recommendations. After the Commission Proposal is transmitted, the Parliament will vigorously check the justification of the Commission why several of the 13 substances to be reviewed with political priority are not proposed as Priority Substance. They will not simply take no for an answer, but may demand the listing of additional substances anyway[53]. Although many substances may be proposed by the Parliament – including *carbamazepine* – it is very likely that the Parliament will primarily focus on the 13 substances that have to be reviewed, as this was a concrete and formal agreement from the third decision-making round.

Countering this with a preemptive strike, it can be expected that the Commission will review the 13 selected substances from the Parliament with extra care compared to others. A more extensive review may easier be prone to a positive identification, since other substances can be easier neglected when they do not fulfill one of the requirements of the COMMPS methodology. Consequently, if the agribusiness coalition does not counter it with an intense and strong lobby, it seems likely that *glyphosate* may be proposed as Priority Substance in 2010. Besides the political priority for *glyphosate*, the only reason why *atrazine* is listed and *glyphosate* is not listed as PS at this moment is the lack of monitoring data in the past. Now this is not an issue anymore, since for *glyphosate* the Commission has "*monitoring data from nine Member States, over 3700 items of which 1500 samples were above the detection limit"*. In addition, it may be possible for pharmaceuticals that occur in relative high concentrations in surface water, like *carbamazepine*, to be identified. Pharmaceuticals were not included in the first COMMPS application, and therefore it is difficult to estimate how the pharmaceuticals will behave as they are processed. As the measured concentrations for *carbamazepine* in surface water are rather high compared to other pharmaceuticals, *carbamazepine* may have a significant chance to be positively identified, although this will also depend on the (eco-)toxicological information available for *carbamazepine*.

Nevertheless, even with a positive identification for *glyphosate* (likely) and *carbamazepine* (less likely), the derived EQS will be comparable to the EQS derived for current Priority Substances: in the range of 0.6 and 40 µg/l (see appendix G, table G.1). Therefore, a reasonable question is if these standards would really help in decreasing the current concentrations since current concentrations for these micropollutants are already below these values. Moreover, especially for the production of

[53] Stakeholders in the agribusiness coalition especially are to some extent afraid of the "*power the Parliament seems to have: one way or the other, the Council always has to compromise with the Parliament in order to reach agreement"*. As these are negotiations a compromise is acceptable, but only if this is based on science according to the agribusiness coalition.

drinking water, which is legally bound to a maximum concentration of 0.1 µg/l at the tap for pesticides, and potentially in the future for pharmaceuticals, these current EQS are too high. Consequently, if the water coalition does not intensely and strongly lobby for adapting the EQS methodology – or at least insist on expert judgment regarding removal efficiency in drinking water treatment – then it can be expected that a positive identification as PS of *glyphosate* and *carbamazepine* will not yield many benefits in the end.

Furthermore, it can be expected that the pharmaceutical coalition will become more involved than they were in the third round. The stakeholders will be better informed and additional stakeholders may become a member of the coalition, who were so far not active in this policy subsystem. Obvious reasons explaining such inactivity include ignorance of the threat, an attempt to free-ride on the investments of others, or setting priorities to other dossiers. Potential new members are the pharmacies, medical professionals and patient groups, who all have an interest in having an adequate range of pharmaceuticals available: *"multiple medicines are needed to treat one condition, because each patient reacts differently. Doctors need to have a choice, otherwise patient treatment is endangered*". Subsequent to the entrance to the coalition of this type of stakeholders, the coalition evolves from a pharmaceutical coalition into a *health care coalition* as their argumentation structure is developing: the merely technical approach ("*the scientific justification is lacking*") will be supplemented with more political-oriented arguments like the necessity of pharmaceuticals for adequate treatment, and the introduction of alternative solutions – like awareness and education of the user – instead of strict regulation and phase-out. This has been derived from the development over time of the agribusiness coalition from a reactive to a *more complete argumentation structure* (van Eeten, 1999) between the second to the third round due to *policy-oriented learning (Sabatier and Jenkins-Smith, 1999, p.123)*: "*relatively enduring alterations of thought or behavioral intentions that result from experience and/or new information and that are concerned with the attainment or revision of policy objectives*". This development may serve as an example for the development of the pharmaceutical coalition towards a health care coalition when more stakeholders become an active member. If there is a real possibility for pharmaceuticals to be listed as Priority Substance (i.e. the stakes are rising), it may be expected that this health care coalition will fully engage in the decision-making.

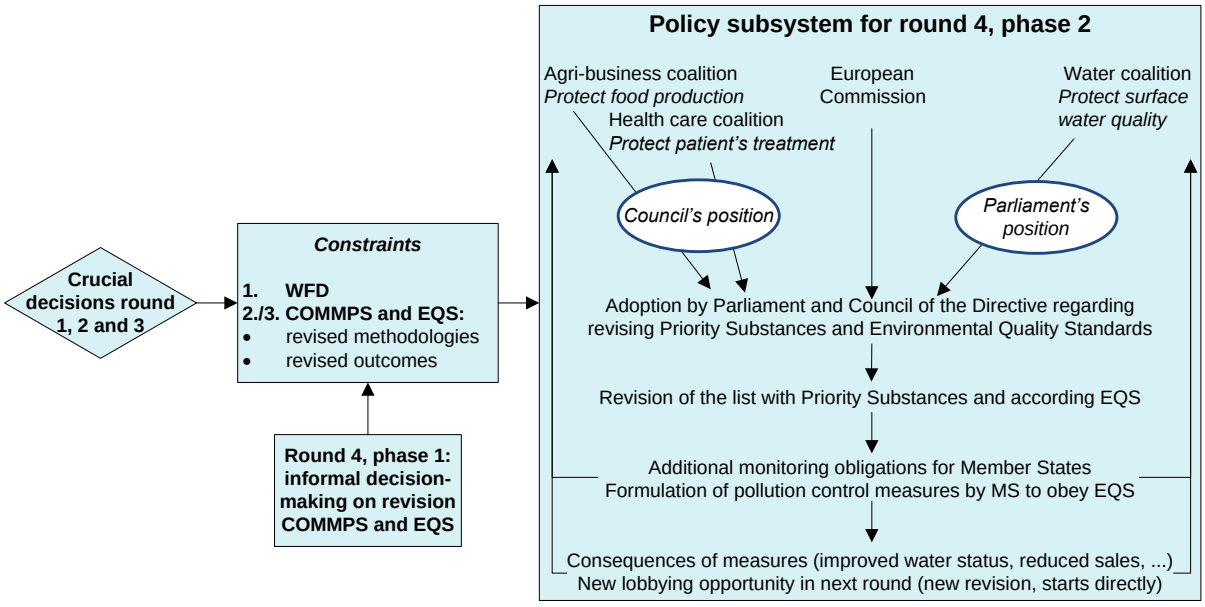


Figure 5.14: Specification of the main policy subsystem of the ACF based on a prediction for the fourth round.

Figure 5.14 visualizes the fourth round, based on the – partly known and partly predicted – developments in the fourth decision-making round as described and forecasted. The informal pre-

decision making phase (revising COMMPS and EQS methodology and apply them) started in 2008 and will be finalized in 2010 with the Commission Proposal. The formal decision-making phase – via the codecision procedure – in average takes 18 months, thus agreement between Parliament and Council can be expected in early 2012. Directly after this agreement on the revision of the PS-list and their EQS, the fifth decision-making round will start: another periodic revision of the list (2012 - 2018), as stipulated in the WFD. A new round brings – again – new chances for all participants.

5.5 Conclusion

This chapter has reconstructed three decision-making rounds and the start of the fourth, thereby describing the developments in the main policy subsystem. For reasons stated, there was a strong focus on the third decision-making round. Now that all components from the Advocacy Coalition Framework have been illustrated sufficiently in chapters 4 and 5 (see figure 5.15), the next chapter will discuss and interpret the results that have been presented.

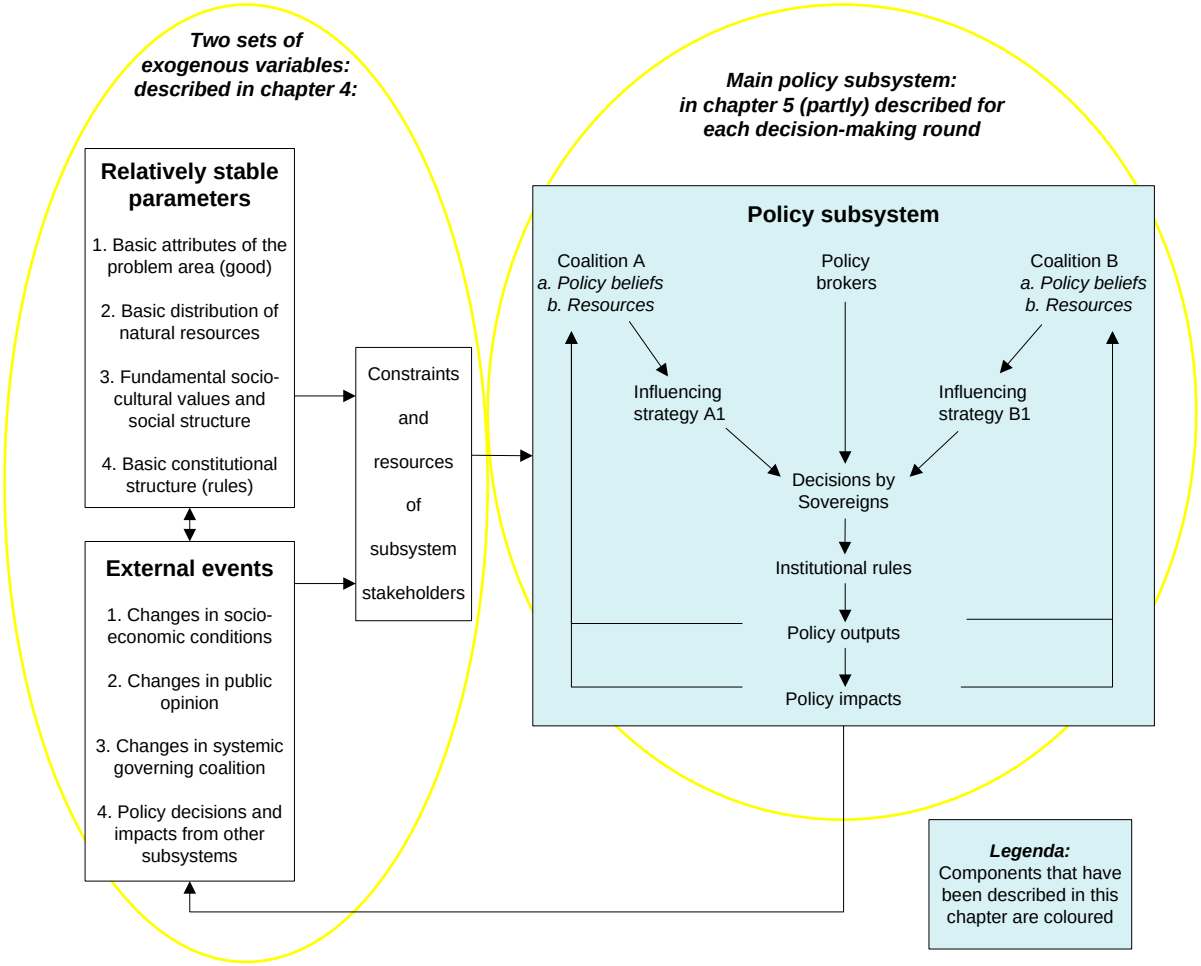


Figure 5.15: The policy subsystem from the Advocacy Coalition Framework has been described in chapter 5.

6. Discussion and interpretation

The previous chapter has presented the results from the information gathered via interviews and additional documentation regarding the main policy subsystem for the period 1990 - 2008. Three decision-making rounds have been reconstructed and one has been shortly forecasted, modeling the main policy subsystem in each round accordingly. This chapter will provide a synthesis by discussing the results. First, by offering an example this chapter will argue that there are limitations to influence of coalitions due to the context and its whimsical character (§6.1). Obviously, not everything is in the coalition's hands. However, after acknowledging such limitations, based on the author's interpretation of the results insight is provided in the mechanisms between coalition's lobby activities and the influence on the decision-making (§6.2). The remainder of the chapter will then discuss how these mechanisms can be used to a coalition's advantage. For this, a key factor that determines the decision-making outcome to a large degree is identified (§6.3). And afterwards, it is argued that individual resources can be exploited much more effective by coalitions if these coalitions are organized adequately (§6.4). The chapter is concluded in §6.5. Together with the previous chapter, this chapter's discussion will provide input for the conclusions and a conversion into recommendations in the next chapter.

6.1 The role of political gameplay: exchanging dossiers

In the reconstruction of the third round, some attention was paid to the political gameplay within the Council and the Parliament *during the formal decision-making phase* (for instance in §5.3.9). Within the Council, the lion's share of the work is done at the level of the permanent representatives. It has been indicated that, due to their frequent and close contact, "*deals are informally made in the corridors before the formal negotiations at the table are finalized*". These deals do not stay within the limits of one dossier (in this case EQS), but exchanging of (topics within) dossiers may happen: Member State X accepts the deal with Member State Y to support Y in the negotiations regarding EQS although X actually wants something else; in return, Y will support X in the negotiations regarding another dossier. This is only possible as a result of the *multi-issue agenda* of the Council: there are always multiple dossiers discussed, and winning on one of them implies accepting a loss on another: fundamental process management reasons that losers must be compensated elsewhere (de Bruijn and Ten Heuvelhof, 2002). This phenomenon has been identified both by sovereigns and by stakeholders.

But it does not only happen at the Council. Many respondents, both from coalitions and the sovereigns, have indicated that "*sometimes, in the end the information is only used as strategic ammunition by an MEP to obtain something else entirely*". For instance, an MEP in the ENVI-Committee who does not agree with proposing *carbamazepine* as a Priority Substance possesses information fed to him from the pharmaceutical coalition showing that *carbamazepine* does not meet the criteria. Then, this MEP can either use this information for the purpose intended by the pharmaceutical coalition, or *"he can go to the MEP who tabled the amendment and illustrates that he can make this MEP a large range of problems, but will not do so in return for a likewise favor in a different dossier"*.

Both examples confirm that the negotiations have *ad-hoc characteristics*: the success of lobbying activities, and the final decision-making outcome, is therefore very hard to predict. It depends to a large degree on the accidental clash of circumstances, which definitely includes the political gameplay. Two respondents have even indicated that "*drinks in the hallway or taking a phone call, and the subsequent abstention, can really swing the formal voting results*".

Figure 6.1 gives an *indication* of the possible moves within the political game during the formal decision-making phase (in codecision procedure): representatives from the Council and Parliament have the possibility to use information strategically, and consequently can exchange dossiers. The representatives of both the Council (permanent representatives) and the Parliament

(ENVI-Committee) are not technical experts but are both dedicated to a large range of environmental dossiers. Therefore, the political gameplay in figure 6.1 is constrained around environmental themes. For instance, the WFD, authorization procedures for chemicals, air quality and climate change – and the specific dossiers therein – may be prone for the political trading game.

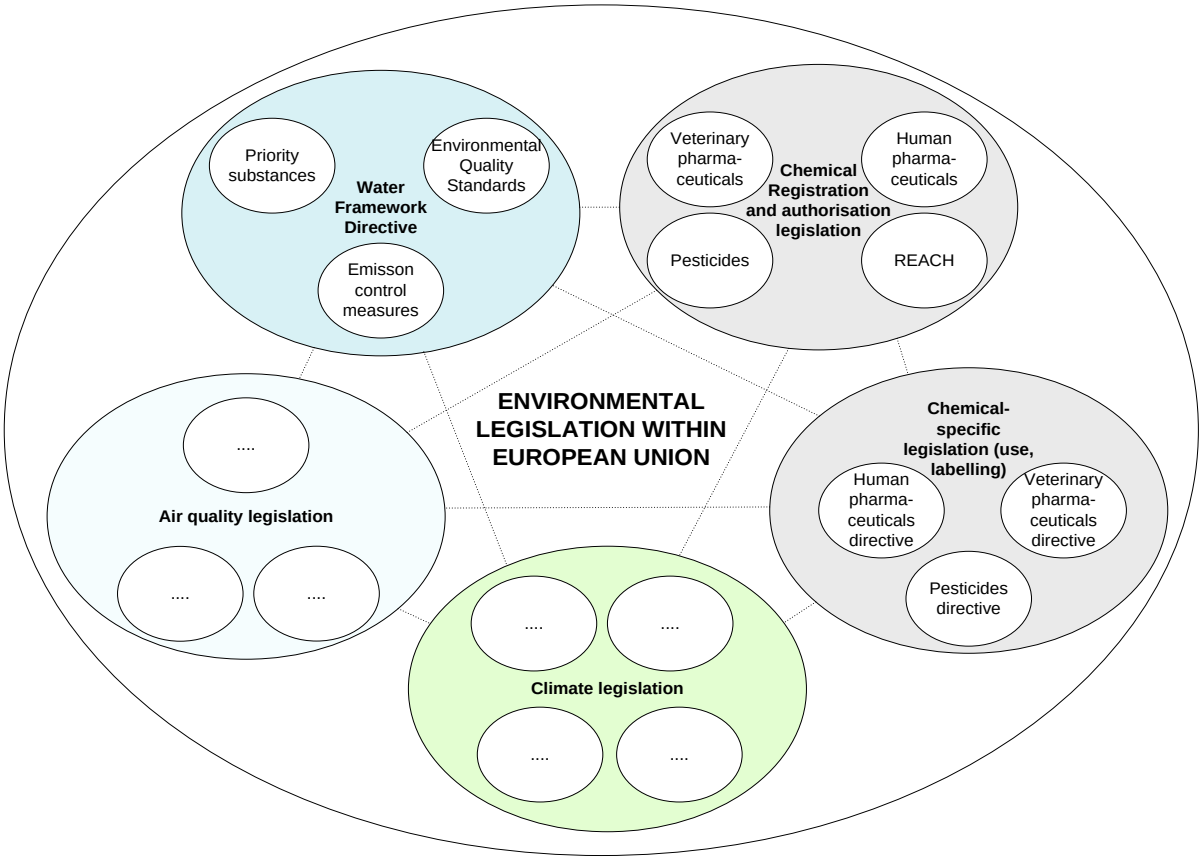


Figure 6.1: Exchanging of (elements within) environmental dossiers within European Union is a political game.

Obviously, for a coalition it is impossible to fully control a sovereign, and the exchanging of dossiers only supports this: there will always be unpredictable moves. However, after acknowledging that not *everything* is in the hands of coalitions, the question remains: what *can* coalitions influence with their lobbies and how do they currently achieve this?

6.2 The impact of lobbying: shifting sovereign positions

The Commission, the Parliament and the Council each have their own role within the decision-making process. The Commission's starting point is rather scientific as they are a well-developed technocracy with over 20,000 employees. All their work up to the formal decision-making phase seems to be based on scientific justification. Technical knowledge – including monitoring data but also scientific-based tools like QSARs (see §1.2.4) – from external experts is valued, which is also proved by the high number of expert working groups in which stakeholders are consulted. Comparing tables 5.6 and 5.7, in contrast with the Commission the Parliament is not able to process technical knowledge. This is not the Parliament's role (which is more political), nor do they have the required personnel for this task. The political role of the Parliament is also evident from the proposal to add *carbamazepine* as Priority Substance, whereas it was not proposed to list the synthetic hormone *17α-ethinylestradiol*. There is much more scientific evidence available of the adverse effects for the latter, both in theory and practice (Desbrow, Routledge et al., 1998; Länge, Hutchinson et al., 2001; Kidd, Blanchfield et al., 2007). But, as *17α-ethinylestradiol* is the active agent in the birth-control pill, a consequence of

proposing this substance as Priority Substance could eventually be an EU-wide ban on the birth-control pill. Obviously, the political appraisal of such an 'achievement' is doubtful. Concluding, based on their role, goal and personnel, the Commission seems to be science-oriented whereas the Parliament seems to be political-oriented. So, it is important to realize that *"in order to be persuasive, evidence and arguments must be chosen with a particular audience in mind: the same conclusions may have to be justified differently in different contexts"* (Majone, 1989, p.41). Consequently, to get the most out of lobby activities, a distinction must be made between arguments. Also based on the results presented in tables 5.6 till 5.8, the difference in lobbying approach is therefore labeled *scientific lobby* vs. *political lobby*. Thus, the Commission is prone to *scientific lobby* based on technical arguments whereas the Parliament is prone to *political lobby* based on principles and ambitions. Lastly, the Council has quite some technical knowledge, making them less prone to political lobbying only, as they must be convinced regarding the technical and financial consequences too: the Council has, besides a political role, also a significant scientific perspective. Hence, they are caught in the middle.

From the reconstruction, it appears that the positions of the sovereigns are influenced as they are lobbied by the coalitions. Interpreting the results of chapter 5 (see especially table 5.4 and 5.5), it can be concluded that the water coalition has the easiest entrance to and acceptance of the Parliament, whereas the agribusiness and pharmaceutical coalition are closer to the Council. This is because the Parliament is often more focused on an overall, ambitious goal, which is aligned with the arguments of the water coalition, whereas the Council is cautious due to feasibility and implementation, something that often coincides with the interests of the agribusiness and pharmaceutical coalition (keep the status quo). As a result of lobbying efforts, the Parliament is *pulled* in the direction of the water coalition, whereas the Council is *pulled* in the direction of the agribusiness and pharmaceutical coalition.

Figure 6.2 visualizes this line of reasoning together with an interpretation of the results presented in tables 5.2 and 5.4 till 5.8, in which the positions of coalitions and sovereigns *prior to the third decision-making round* are displayed using two axes. The vertical axis indicates the *type of arguments used in the decision-making process*, not the type of persons within a coalition. Therefore, the figure does *not* imply that the water coalition consists of only political-oriented persons, but instead it implies that the *arguments used to influence decision-making are mainly political-oriented*. The horizontal axis indicates the stance towards risk of the largest part of the coalition, with the *precautionary principle* and a *risk-benefit approach* as extremes. The position of the agribusiness and the pharmaceutical coalition along this axis can also be explained by realizing that the benefits of taking risks are received by these coalitions, while the risks themselves are distributed within the water coalition. This axis also reflects the *societal role* of each of the coalitions: the agribusiness and pharmaceutical coalitions provide economic growth by capitalizing on economic opportunities which is possible due to a risk-taking stance, whereas the water coalition's role is to protect society against health risks by discovering and reporting potential problems, even when not all scientific evidence is yet available. Obviously, the visualization is only a reflection of the collective position of a coalition: consequently, the position of specific individuals within a coalition may deviate from this.

If the water coalition's position would extend along the y-axis, then the Council and Commission would be more in reach, thereby enabling the water coalition to better counterbalance the efforts of the agribusiness coalition. Elaborating a little on this and recalling Quantitative Structure-Activity Relationship (QSAR) from §1.2.4 and §5.4.1 which can predict the removal efficiency of pollutants in drinking water treatment plants, such QSARs could extend the water coalition both along the y-axis (because this is a scientific tool introducing a strong scientific-based argument) and along the x-axis (it reduces the uncertainty and thus the polarization of the conflict, potentially bringing the coalition closer together and solve a part of the deadlock).

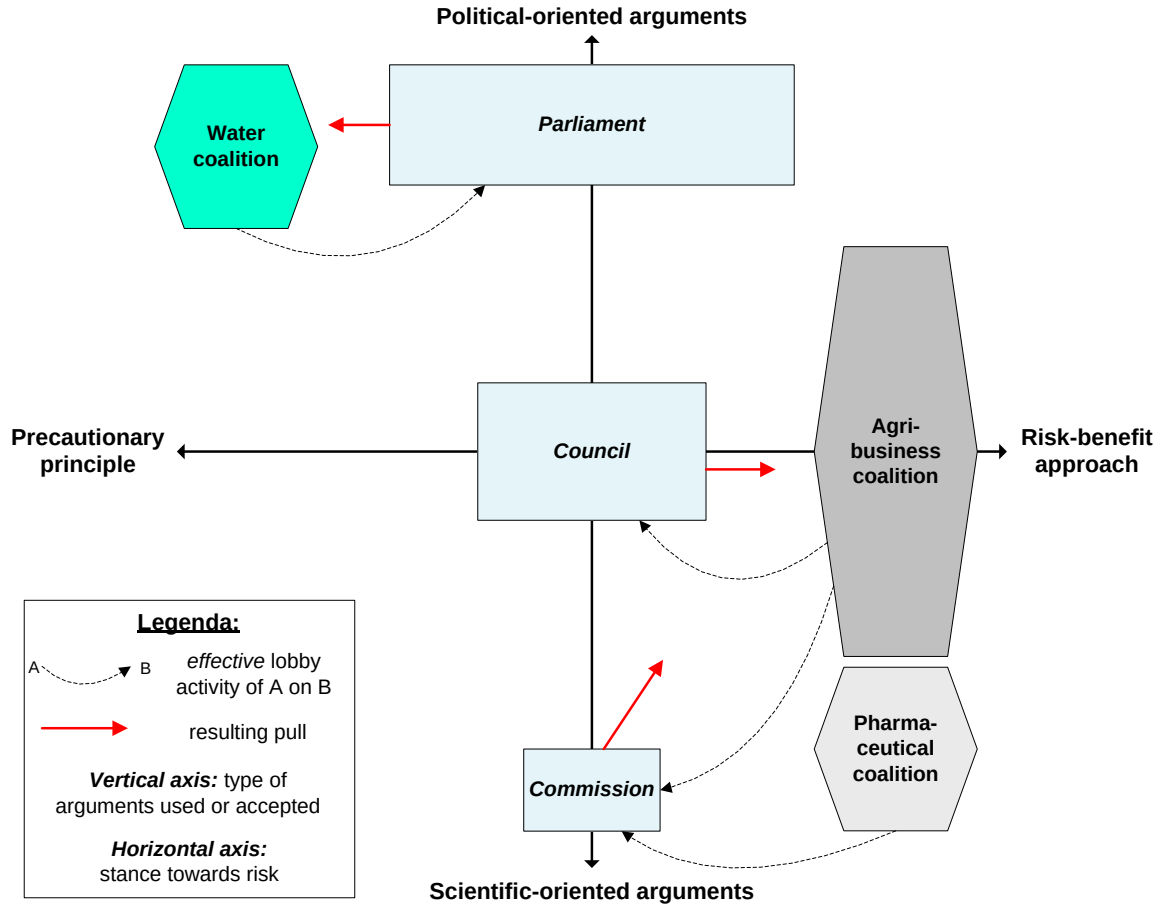


Figure 6.2: Coalitions introduce political-oriented and scientific-oriented arguments into the decision-making, resulting in a pull of sovereigns towards the coalitions' positions if the lobby activities are effective.

Note that the size of a block does not represent the amount of manpower; instead, it indicates the *diversity* among representatives from this block. For instance, the Parliament is rather diverse, ranging from the Greens to Liberals – with differing political philosophies. Also, the agribusiness coalition lobbied all three coalitions, has engaged in both the more scientific phase and the more political phase and introduced likewise types of arguments (i.e. both scientific- and political-oriented arguments). Note that the water coalition is depicted as rather political, since they mainly focused on the Parliament throughout the reconstructed rounds, and they did not engage so much in the more scientific-oriented informal pre-decision making phase. This is not only based on the interviews, but also on the identified missed opportunities regarding *glyphosate* and *atrazine* (§5.2.3 and §5.3.3).

The black bend arrows in figure 6.2 indicate the lobby activities that are *perceived effective* (table 5.5) from coalitions towards sovereigns. For transparency, not all lobby activities are shown. The red straight arrows indicate the consequent *pulling force*.

The result of the lobbying efforts by coalitions on the position of sovereigns due to the *pulling force* is presented in figure 6.3. The new Parliament's position nearly coincides with the water coalition, whereas the Council's position nearly coincides with the agribusiness coalition. Consequently, the Parliament adheres to the precautionary principle, whereas the Council propagates the risk-benefit approach due to lobby activities and (financial) interests of the agribusiness coalition. The Commission position has moved from merely scientific towards a tad political as a result of the informal pre-decision making phase, in which more political-oriented viewpoints and choices are balanced in the methodologies based on the stakeholder consultations (workshops). Moreover, since the agribusiness coalition seems to be more active in the workshops and – just like the pharmaceutical coalition – more

frequently in contact with the Commission than the water coalition, the Commission slightly moves in the direction of the risk-benefit approach.

Obviously, the gap between the positions of the Parliament and Council is much larger than before. Therefore, it is hypothesized here that without lobbying, the decision-making processes between Parliament and Council would be much smoother (i.e. faster and easier). Moreover, it is argued that the lobbies can only exert so much influence *because* of the codecision procedure set-up: the Parliament and Council are isolated from each other until after first reading. But at that moment, the lobby activities have had their influence already. Also note that the sizes of the sovereign-blocks have decreased as each sovereign has come to some kind of shared position as a result of a complex internal decision-making process.

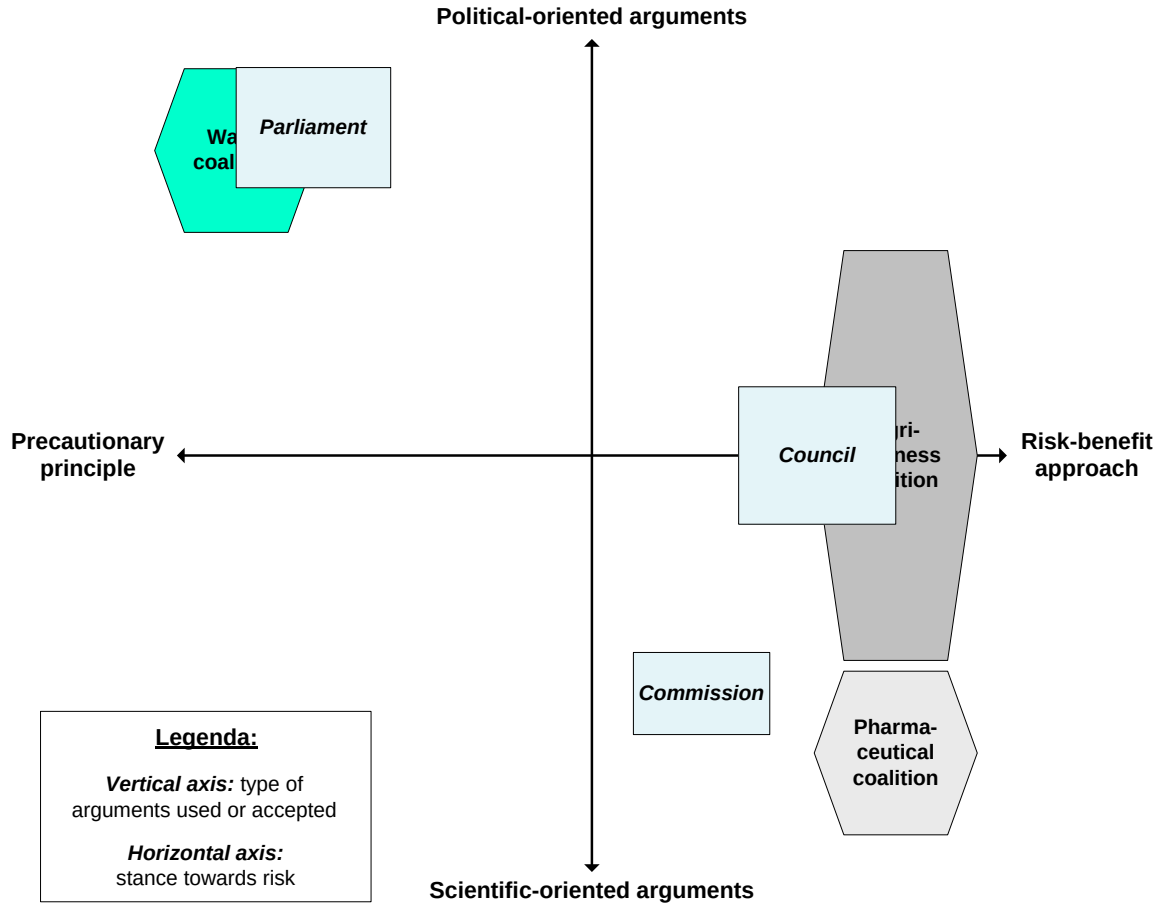


Figure 6.3: The result of effective lobby activities of coalitions by introducing political-oriented and scientific-oriented arguments into the decision-making, expressed by the positions during the codecision procedure.

From the provided figures, it seems like there is a careful equilibrium, given the equal formal power of the Parliament and Council in the codecision procedure: the water coalition effectively lobbies the Parliament and has their support, while the agribusiness coalition mainly lobbies the Council and has their backing. Nevertheless, next paragraph will argue that this apparent equilibrium in fact does not result in balanced decision-making outcomes by identifying a key factor that determines the decision-making outcome to a large degree.

6.3 A level playing field – but early involvement is the key

Every coalition can approach any sovereign with their arguments. In addition, every coalition can take part in both the informal pre-decision making phase (development and application of methodology)

and the formal decision-making phase (influencing the sovereigns during the codecision procedure). Clearly, there is a *level playing field*: the same rules apply to each coalition.

Figure 6.3 presents the positions during the codecision-procedure (i.e. in the formal decision-making phase). However, it is argued that the largest part of the outcome has already been formed *before* the codecision-procedure commences. This is based on the results from the second and third decision-making round (§5.2 and §5.3): as described, the Commission Proposals almost perfectly followed the recommendations from the application of the methodologies, and the final formal decision-making outcomes nearly matched these Commission Proposals. In the second round, only one substance was added during the codecision-procedure, while during the third round no substances were added although the Parliament fiercely attempted to achieve this – but failed as this was *not in line with the agreed methodological procedures* (see appendices F and G). Obviously, the methodologies are imperative to the outcome: to have a significant influence, coalitions must engage especially in the informal pre-decision making phase.

Thus, *timing* is strongly related with the effect of lobby activities. The earlier in the decision-making process, the more possibilities there are to change the course; the later in the decision-making process, the more concrete the legislation is, and only details can still be changed. Figure 6.4 indicates the consequential relation between timing of lobby and lobby effectiveness. Besides the most important fact that the methodology is imperative to the outcome as has just been discussed, several reasons may further explain this phenomenon. If you lobby really early, then you may be one of the fewer stakeholders involved and therefore your voice is worth more than when a hundred stakeholders are involved later on. Also, in the earlier stages, it is merely about ideas and concepts and not yet about actual substances or standards, making it perhaps vaguer but definitely also more flexible to bend. Furthermore, also within the formal decision-making phase the lobby effectiveness is higher earlier on, as the political pressure over time increases to reach a compromise. Consequently, many representatives of sovereigns do not want to endanger the outcome even further by proposing extreme changes. A good example is lobbying an MEP before the plenary vote, while agreement has been reached between the Council (presidency) and the Parliament (Rapporteur) in the Trialogues: no one will actually break open a hard-fought compromise, "*although many lobbyists seem not to understand how the game really works*".

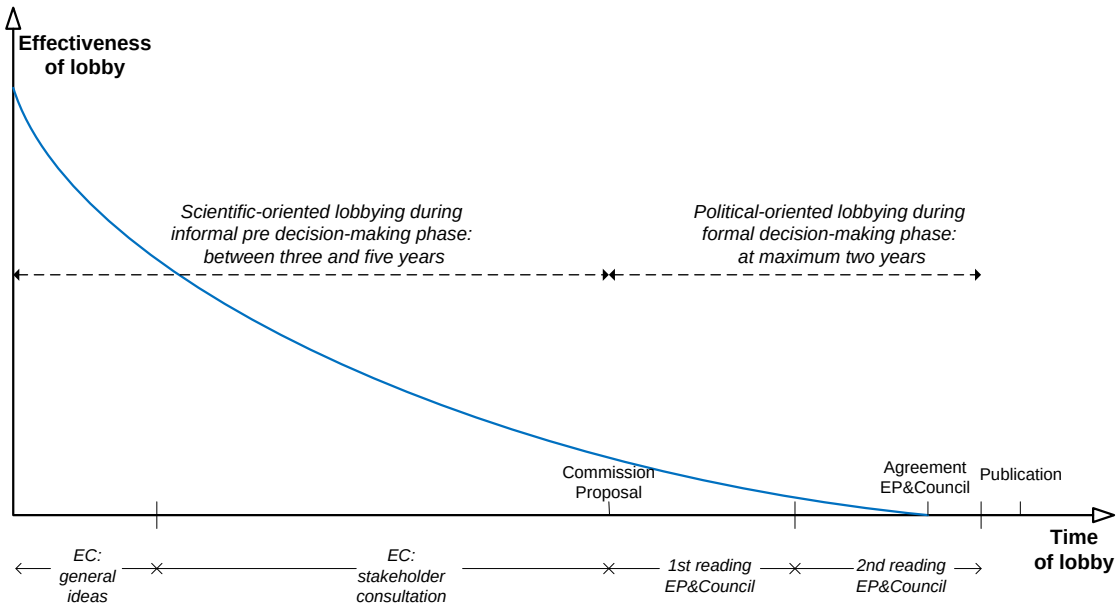


Figure 6.4: Indicative relation between timing of lobby and effectiveness (example for 2nd reading agreement).

Returning to the imperative informal pre-decision making phase, scientific-oriented arguments are required because the methodology is based on scientific justification and state-of-the-art (technical) knowledge. The Commission and the dedicated working groups (including the workshops) are only open to scientific input. But, as multiple times indicated in chapter 5, the water coalition is not so much involved in the informal pre-decision making phase: among others, the second decision-making round has illustrated the failure from the water coalition in delivering monitoring data for *glyphosate* (§5.2.3). For the third decision-making round, many respondents complain about the lack of considering the (drinking) water interests in the EQS methodology – although for *atrazine* they did not insist on expert judgment for establishing an equivalent standard for the drinking water objective. Clearly, the methodologies were not understood sufficiently or the water coalition was simply unaware, which reflects the absence of the water coalition in the informal pre-decision making phase. Instead, the water coalition focuses on political lobby activities, which is very usable to convince the Parliament. This is also reflected in figure 6.3: the water coalition is merely found at the top-half of the figure, which indicates that their current lobby activities are suitable for political lobbying in the codecision procedure. But by contrast, the agribusiness coalition can effectively lobby in both phases: they have a diverse range of arguments (both scientific- and political-oriented), making it possible to influence both the codecision-procedure but also preceding methodology-setting.

As a consequence of the insufficient (or ineffective) activity of the water coalition compared to the agribusiness coalition, the *normative* balance regarding risk-stance in both methodologies tends to be tipped towards a risk-benefit approach instead of the precautionary approach. The resulting Commission Proposals are therefore also more based on the risk-benefit approach, as these proposals are based on the *agreed* methodologies that were developed following the workshops in the stakeholder consultations[54]. Consequently, the water coalition interests are not so much considered in the methodologies and Commission Proposals as the water coalition would like. As a response, the water coalition has vigorously attempted to correct this throughout the formal decision-making phase via the Parliament; but as this phase does not influence the decision-making outcome to a large degree, the Parliament tends to have relatively little influence on the final decision-making outcome. Thus, not much can be gained from political lobby activities in the codecision phase. Reflecting on figure 6.3, although there is a level playing field, the equilibrium indeed does not necessarily result in a balanced outcome given the current coalition positions. Concluding, early involvement is the key to success since you can deliver input to the methodologies and thereby exert real influence on the outcome. For this, a coalition needs to contribute *technical information* since these methodologies – and the informal pre-decision making phase in itself – are very scientific-oriented. Furthermore, in addition to technical information, other resources may also support the influence of coalitions on the decision-making.

6.4 Synthesis coalition resources: organizational empowerment

The degree to which coalitions possess and actively employ resources to protect their interests has been described in §5.3.6 and §5.3.7. They are shortly recapped here, and the influence on decision-making that coalitions derive is discussed (§6.4.1). However, it is argued that these basic resources should not be regarded individually: glue is needed to connect them and make them more effective in influencing decision-making. It is proposed to call this glue *organizational empowerment*, which will be discussed in §6.4.2.

[54] This includes the expert working group on Priority Substances, and the former Expert Advisory Forum. The latter is nowadays labeled working group E on Priority Substances.

6.4.1 Re-cap and interpretation of resources

Technical information is a prerequisite for participation in the imperative informal pre-decision making phase. Scientific knowledge is overriding almost any other argument during the development and application of the methodology. Based on the results in chapter 5, partly due to the possession of technical information in external stakeholders and partly due to the lack of financial means, the water coalition is not represented by real experts or does not participate at all in this phase. Although there are exceptions to this, it explains the political-oriented position of the water coalition in figure 6.3 and the absence of the water coalition in the informal pre-decision making phase during the described decision-making rounds. Even when the water coalition participates, the asymmetry in scientific knowledge among the participants during this phase will promote the interests of the industrial coalitions during expert debates in the workshops: as non-expert it is rather difficult to debate scientific expertise. Consequently, in the methodologies, the technical arguments based on state-of-the-art knowledge (risk-benefit principle) are more taken into account than the *gaps in* technical knowledge (precautionary principle).

The power of mobilizable troops must not be underestimated. From the results provided in chapter 5 (including tables 5.4 and 5.5) it seems that the agribusiness coalition and pharmaceutical coalition have a very strong *decentralized network*, with many mobilizable troops that are often stimulated to undertake action via well-distributed *memoranda* and *lobbying notes*. It is argued that this also partly explains why the Council's position is closer to the agribusiness coalition than to the water coalition. How mobilizable troops are kept up to date, and how they are activated to carry out the same message as the European counterpart is part of a coalition's strategy; it seems that an umbrella organization like COPA-COGECA – who represents the farmers and cooperatives in the EU – employs their large decentralized network in an excellent way (see §5.3.7). Together with the activities of ECPA and others, the agribusiness coalition managed to convince sufficient Member States – and therefore the Council – of the adverse impact for their business of listing additional pesticides as Priority Substances, stimulating the Council's pull in the risk-benefit direction (figure 6.2). Thus, due to their common decentralized character, mobilizable troops have been successfully used for lobbying the Council.

The results in chapter 5 have confirmed that public opinion (and media as vehicle) can have a serious impact on decision-making. It seems wise to clearly incorporate public opinion in a coalition's strategy: obtaining public attention (i.e. activating) can make the politicians more susceptible to the coalition's arguments: thus, this paves the way for actively using the resource. In addition to direct influence on ongoing decision-making, media coverage will influence the political agenda (*agenda-setting*), the methodologies and ultimately European Union legislation. Note that in this way, public opinion can move the political debate along the risk-stance axis in figures 6.2 and 6.3. Seen from the water coalition perspective, the goal would be to move the risk-stance further in the direction of the precautionary principle: communicate via scientific publications and press statements that micropollutants sometimes do appear in low though harmless concentrations, but since not everything is known precaution should be taken. To *counter* such active use of the water coalition and to keep the weight on the risk-benefit approach, the other coalitions could communicate that very small amounts of pollutants will always be found as long as basic societal functions are desired (affordable food production and patient treatment), but do not present a threat to public health nor the environment based on extensive research.

Financial resources can support the other resources, by funding media campaigns and a strong and active decentralized network for instance. However, financial resources are even more important for technical information given the fact that technical information is a prerequisite for participating meaningfully in the imperative informal pre-decision making phase. Compared to the formal decision-making phase, technical information is more costly because much more preparation is needed as the discussions are much more sophisticated. Thus, to introduce scientific-oriented arguments to the workshops (and thereby influencing the methodology), technical information that is

possessed by experts in the coalition can only be used actively if there are sufficient financial resources. The fact that technical information in the water coalition is found *externally* (whereas the other coalitions have this *in-house*) requires even more financial resources for this coalition to use this information. Consequently, they position themselves in the political-oriented direction, as is displayed in figure 6.2. Thus, the precautionary principle is based on the water coalition's belief system, but their political orientation is mainly caused by a lack of technical information – which is partly explained by fewer financial resources.

6.5.2 Proposal for a new ACF resource: organizational empowerment

Although the discussed resources in §6.5.1 (technical information, mobilizable troops, public opinion and media and financial resources) together with Sabatier's formal power and skilful leadership explain to a large extent the ability of coalitions to employ their strategy to pursue their interests, one type of resource seems to be missing to the ACF in general: organizational empowerment.

As has been discussed in §6.5.1, financial resources are seen as stimulation of other resources (Sabatier and Weible, 2007, p.203). However, it is argued here that there is a resource that is maybe even more important, especially within European Union decision-making topics: **organizational empowerment**. It is proposed to define organizational empowerment as *the level of professionalism and structure with which a coalition exploits the combination of the available coalition's resources*: as such, organizational empowerment is the *glue* between the other resources. A visualization is presented in figure 6.5. To function properly, a coalition needs a powerful organization.

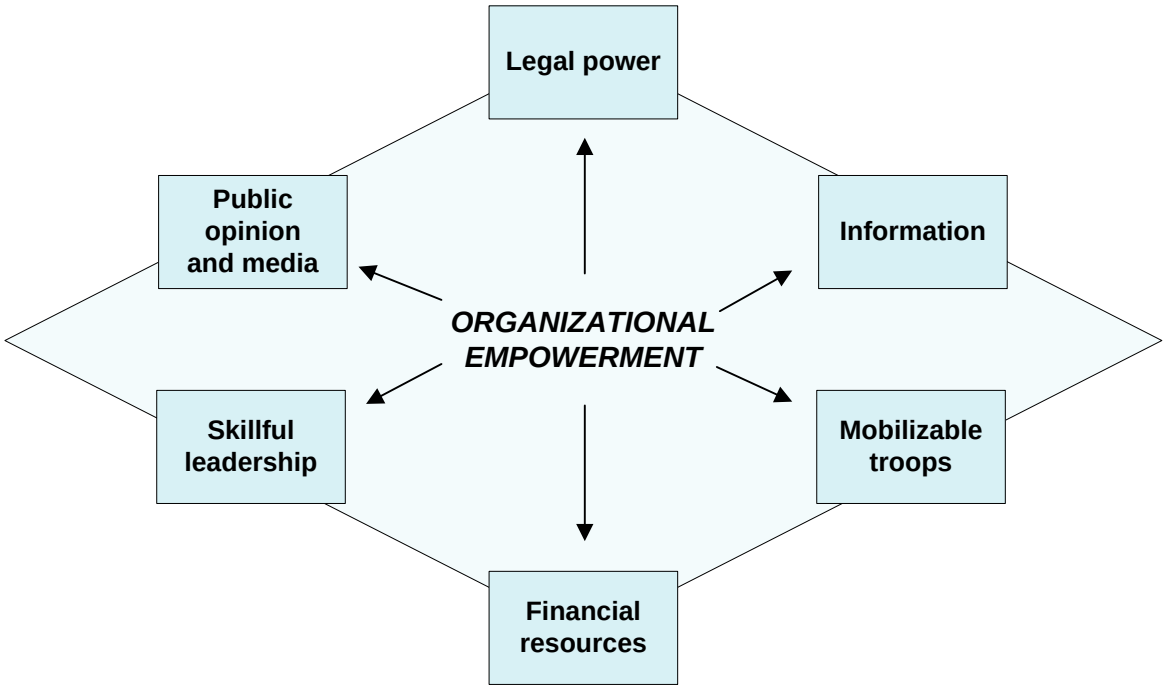


Figure 6.5: Organizational empowerment as vital glue between coalition's resources.

Narrowing it down to an umbrella organization within a coalition – like EUREAU – for here, key issues that must be decided upon at this scale appear to be:

- what organizational structure to be used (political coordinators, expert working groups, …)
- who should be a member (national associations vs. individual companies)
- how to extend the organization with new members (with nearly equal interests)
- how to streamline messages to an external audience (speak with one voice – specific)
- which common argumentation structure to use (speak with one voice – general)
- how to coordinate the available scientific expertise (utilization of technical knowledge)
- how and where to collect technical information (monitoring data, removal efficiency, …)
- which technical information to invest in (i.e. which scientific knowledge gaps to fill)

- strategy with regard to scientific lobby (how to use technical information)
- strategy with regard to political lobby (who to lobby, when to lobby, how to lobby)
- strategy with regard to public opinion and media (message and risk communication strategy)
- strategy with regard to mobilizable troops (how to activate them and maintain the network)
- how to reduce the problem of free-riding (receiving benefits without contributing)
- how to decide on whether or not to get involved in a dossier (picking the right battles)
- what internal decision-making rules to apply (experts vs. generalists, majority vs. consensus)

When an umbrella organization possesses organization empowerment, then this will directly result in enhanced influence on the decision-making processes and therefore more favorable decision-making outcomes. Regarding some of the above stated issues from the viewpoint of the drinking water sector, such direct result could for instance be:

- collecting technical information: the missed opportunity regarding the potential listing of *glyphosate* as a Priority Substance in the second round (see §5.2.2) would have been prevented if there would be a central collection point for monitoring data of the water companies; this would also result in more coordination and collective responsibility to monitor concentrations, deliver and distribute this information;
- investing in technical information: together, a large effort can be made to support a specific part of the argumentation structure. For instance, pooling investments together and improving the argumentation regarding the (lack of) removal efficiency via the development of QSARs (see §1.2.4) then the water sector would really be able to contribute to the scientific discussion;
- strategy with regard to scientific lobby: possessing technical information alone is a start, but how to convince others in the technical workshops is another issue
- one voice in external communication: with a more powerful organization, one message could be communicated:
    - Chapter 5 has already shown the inconsistency between parts of the water sector regarding which substances to be listed as PS in 2006 (many substances, some substances, no substances); a consistent message, coordinated within the water sector, would have probably resulted in more support from decision-makers;
    - a strong public affairs office would also streamline other parts of the argumentation structure and identify potential extensions of the organization with new members;
- strategy regarding public opinion: the active use of public opinion and media could be considered within the water sector, thereby agreeing on whether or not to proceed with it. And, at the very least, it could result in a shared (opposed to individual) risk communication strategy for a perhaps unexpected though unavoidable event in which the issue is covered by media attention.

Thus, although individual resources are important, especially the glue between them improves the influence of an umbrella organization on the decision-making processes. For organizational empowerment within a coalition (between two umbrella organizations, for instance ECPA and COPA COGECA), similar decisions must be made to increase influence. Increasing the communication (interaction) also enhances trust between parts of a coalition, and improves the possibility for coordinating argumentation structures and strategies, thereby further strengthening the coalition's position.

The question that now remains is how to assess the degree to which a coalition possesses *organizational empowerment* as resource. Just like the original ACF resources *("operationalizing them .. has proven extraordinarily difficult"*, Sabatier and Weible, 2007, p.204) it is not easy to objectively derive this. What could be done to estimate this is to ask respondents during interviews to describe the organization of the umbrella organization and/or cooperation with other stakeholder with similar interests. By asking in more detail how the strategy is decided upon regarding the issues mentioned, the interviewer will get an impression of the professionalism and structure with which a coalition tries to make optimal use of its resource. Consequently, just like the assessment of other resources, this unfortunately involves the subjective opinion of the scholar. But nevertheless, it at least provides an indication.

Finally, it must be noted that the line of reasoning that is behind the above proposal stems from the case that was studied throughout the last eight months. Consequently, questions may be raised regarding the general applicability of the proposed resource. For instance, at the EU-level, the use of *voluntary* umbrella organization may result in larger differences in organizational empowerment between coalitions: some umbrella organizations and coalitions have a more professional and extensive structure than others, making a difference in decision-making. On the other hand, at a national level for instance, it may be proved that the differences in organization empowerment are not so large, thereby making this resource less applicable. Nevertheless, for EU decision-making this resource is essential, and the hypothesis is that organizational empowerment will prove to be useful when the functioning of a coalition is studied, irrespective of the context.

6.6 Conclusion

This chapter has discussed the results of the decision-making reconstruction based on the author's interpretation. First, it has been argued that coalitions cannot influence everything. Nevertheless, the position of sovereigns is pulled in the direction of coalitions due to their effective lobby activities. Although there is a level playing field in which every coalition can approach every sovereign and take part in both the informal pre-decision making phase and the formal decision-making phase, it is claimed that early involvement is the key to exert significant influence on the final outcome: the methodologies are imperative. These methodologies are developed and applied in technical workshops, in which sovereigns and coalitions can participate. However, these workshops are very scientific-oriented; thus, technical information is a prerequisite for contributing meaningfully to the methodologies. After shortly reviewing the individual resources, a new resource has been introduced which binds the others together, thereby making them more effective in influencing decision-making: organizational empowerment. The next chapter will present the conclusions and recommendations.

7. Conclusions and recommendations

Organic micropollutants, like pesticides and pharmaceuticals, are frequently detected in surface waters. The presence of pesticides, which are widely applied in agriculture and enter surface water via run-off, has been known for decennia. Pharmaceuticals, on the other hand, are seen as an *emerging* problem: they are used by households, hospitals and nursing homes and enter the surface water due to limited metabolism in the human body, consequent excretion to the sewer system and limited removal in waste water treatment plants. Surface water serves as a source for the production of drinking water, but since micropollutants cannot be completely removed in drinking water treatment plants they periodically also occur in very low concentrations – below the precautionary standard of 0.1 µg/l – in drinking water. Although the concentrations are low (range of ng/l to µg/l), adverse effects to ecology (via surface water) and public health (drinking water) cannot be ruled out: little research is available regarding mixtures of pollutants and long-term intake, for instance.

At the level of the European Union, the Water Framework Directive (WFD) has been developed to achieve good chemical water status, which includes the restriction of polluting emissions to surface water. This is accomplished via the identification of Priority Substances (PS) and the derivation of Environmental Quality Standards (EQS). Many stakeholders – like Vewin – attempt to influence the according decision-making processes. Based on the problem exploration, this thesis has focused on the following research question (see §1.5):

"Which recommendations can be formulated for Vewin to counter drinking water quality threats from organic micropollutants, based on a decision-making reconstruction regarding Priority Substances and given the European multi-stakeholder setting?"

For structuring the complexity in the reconstruction regarding stakeholders, their perceptions, strategies and resources and the decision-making processes, a theoretical model (Advocacy Coalition Framework) has been used. Advocacy coalitions are formed by stakeholders with a comparable belief system who attempt to influence the decision-makers. To collect the data, desk research and thirty interviews with representatives from stakeholders and decision-makers have been conducted. Obviously, not everything can be analyzed. The focus of this research has been on two key decision-making processes (PS and EQS), from which factors that have a significant impact on the decision-making outcome can be identified. The results can be used to counter pesticides, but also pharmaceuticals because they are discussed in the same legislative context of the WFD. Based on the analysis and discussion that have been documented elaborately in the previous chapters, the main conclusions will be presented (§7.1). Using these conclusions, recommendations have been developed (§7.2), which form the final cornerstones of the answer to the above research question.

7.1 Conclusions

Given the focus of this research, the scientific debate has been reconstructed until 2005 and the political debate until 2008. Consequently, the reader should realize that the research scope eventuates in certain limitations: the conclusions are based on these past decision-making processes. It is possible that changes occurred compared to this overview. In addition, the conclusions below are – just like the analysis in this thesis – the author's viewpoint: thus, they do not necessarily reflect the viewpoint from Vewin or the water sector.

Uncertainty as cause of a polarized conflict between divergent interests

The discussion regarding Priority Substances and its decision-making is very polarized. Consequently, there are two opposing blocks of stakeholders. On the one hand, there are stakeholders who protect environmental and public health interests and are in favor of stricter European Union environmental legislation – like listing *glyphosate* and *carbamazepine* as a Priority Substance. These are labeled as

water coalition. They base their arguments on the precautionary principle: these pollutants are not wanted in drinking water nor in its sources because there are many gaps in knowledge which result in uncertainties with regard to concentrations, toxicity (regarding a 'cocktail' of micropollutants, long-term intake and effects on the fetus), behavior in the environment and removal efficiency in treatment. On the other hand, stakeholders who manufacture and use pesticides and pharmaceuticals are opposing stricter EU legislation since this would frustrate production and application of these products and endanger their economic growth. They are labeled as agribusiness- and pharmaceutical coalition. Their arguments are based on the risk-benefit approach: the advantages of these products for food production and patient treatment outweigh the limited adverse effects that are currently known. Obviously, the fundamental cause for the polarized conflict between interests is that the opposing coalitions value uncertainty differently: the water coalition has a risk-averse stance (precautionary principle) whereas the industrial coalitions are risk-taking (risk-benefit approach). This difference can also be explained by realizing that the benefits of taking risk are received by the industrial coalitions, while the risk itself is distributed within the water coalition. To protect their goals, many stakeholders attempt to influence EU decision-making processes by lobbying the formal decision-makers with their arguments: the Commission, the Parliament and the Council. Employing lobby activities can be regarded as a necessary evil: you have to engage to at least counterbalance your opponent's arguments.

Elements within a lobby strategy

Several parts of the decision-makers have been found to have a significant influence on the final decision-making outcome. Within the Parliament, the Rapporteur with shadow-rapporteurs, the political coordinators and active members within the ENVI-Committee are important. The Parliament can be approached with political, but not with scientific arguments. The Commission seems to be relatively easy to approach for every stakeholder that represents a sector, as long as sound technical information is supplied. Per dossier, there are a few key people in the Commission like in this case the designated team coordinator for the WFD. In the Council, the decisions are diffusely distributed over a large range of people in all Member States (national experts and political coordinators of ministries), thereby requiring a complementary strategy at national level. Whoever is lobbied, to have the most effect as a sector it has been observed that it is important to speak with one voice.

Environmental EU decision-making processes can be broken down into two phases. First, in the informal, pre-decision making phase a scientific methodology is developed and applied in consultation with stakeholders (like the COMMPS methodology for identification of PS, and the EQS methodology for deriving the environmental quality standards to these PS). Second, in the formal decision-making phase the Commission proposes new legislation and – via the codecision procedure – the Parliament and Council ultimately together adopt this. The first phase is very much focused on science resulting in an agreed methodology, whereas in the second phase the discussion is largely down to politics within the boundaries of this (scientific) methodology.

The influence of stakeholder lobbies on decision-makers

With their arguments, stakeholders alter the position of a decision-maker – if their lobby is effective. Indeed, stakeholders must know their audience: for the Parliament, a political lobby with political-oriented arguments is effective, like "the environment is a top priority; since *carbamazepine* is measured in surface waters throughout Europe, it should be listed as Priority Substance". By contrast, a scientific lobby with scientific-oriented arguments is effective for influencing the Commission: "given extensive research regarding toxicology, persistence and the bioaccumulation potential of *carbamazepine*, *carbamazepine* does not meet the criteria as stipulated in the scientific agreed methodology for identification of PS and therefore does not pose a significant risk to or via the aquatic environment". The analysis has shown that the water coalition was mainly using arguments of a political nature, was especially successfully targeting the Parliament and was very active in the second

phase (i.e. the formal decision-making phase). On the other hand, the agribusiness coalition has been actively involved in both phases and consequently also used arguments of both a scientific and a political nature. Especially the Council and the Commission were – successfully – targeted by the agribusiness coalition. Thus, due to the precautionary principle of the water coalition, over time the Parliament's initial position has moved in the direction of the water coalition; due to the risk-benefit approach of the agribusiness coalition, the Council's position – and the Commission's position to a lesser extent – has moved in the direction of the agribusiness coalition (see figures 6.3 and 6.4). It is this thesis' hypothesis that due to the pulling as a result of lobby efforts, the distance between the Parliament and Council gets larger, thereby increasing the length and difficulty of the decision-making. It must be noted that the pharmaceutical coalition has only entered the analyzed context during the formal decision-making phase for EQS (2008). This coalition had to anticipate a move from the Parliament – initiated by the water coalition – since they attempted to list several pharmaceuticals as PS. The pharmaceutical coalition is expected to be actively present from now on, given the emerging legislative attention to the presence of pharmaceuticals: the water coalition has via the Parliament succeeded in setting this issue on the agenda.

Factors that strongly impact the decision-making outcome

Based on the reconstruction of the decision-making processes for PS (1997 – 2001) and EQS (2002 – 2008), the following factors that strongly impact the decision-making have been identified: timing, technical information, organizational empowerment and public opinion.

Early involvement is the key: the methodology that is developed in the first phase of the decision-making is imperative to the final decision-making outcome. The Commission Proposal for both PS and EQS has been almost completely based on the recommendations which followed from application of the according methodology. Moreover, the Commission Proposal in both cases nearly equaled the final decision-making outcome. For instance, although the Parliament fiercely attempted to add new PS in the codecision-procedure for deriving EQS, no substance has been added. Thus, timing is essential: to exert real influence, stakeholders must participate in the technical workshops that are part of the informal pre-decision making phase. However, missed opportunities from the past show that the water coalition did not always engage appropriately in this phase:

- *glyphosate* would have been listed as PS already in 2001 if one more stakeholder had delivered available monitoring information between 1997 and 2000: COMMPS requires monitoring data from two Member States for further consideration as a PS, but only Germany supplied such data
- *atrazine*'s EQS that has been set in 2008 at 2.0 µg/l could have been below 0.2 µg/l if someone in the workshops between 2002 and 2005 would have insisted on expert judgment for the removal efficiency in drinking water treatment: the methodology stipulates that drinking water is one of the objectives that must be taken into account in deriving the EQS, but this did not happen for *atrazine*

Clearly, the development and application of the methodologies must be influenced, especially given the imperative character of the first phase. However, a prerequisite to participate in this phase is technical information: in the technical workshops, stakeholders are discussing scientific issues with Member States and the Commission based on state-of-the-art-knowledge. Comparing the water coalition with the agribusiness coalition, the latter has an advantage since they have this technical information *in-house*, whereas relevant information in the water coalition is largely distributed over many stakeholders, including research institutes and universities.

As support for technical information – and lobby activities in general – a coalition must have a strong organization. Organizational empowerment has been introduced in this thesis and is defined as the level of professionalism and structure with which a coalition exploits the combination of available coalition resources (figure 6.5). For instance, monitoring data must be collected, delivered and distributed, argumentation structures of stakeholders must be streamlined to speak with one voice, technical knowledge must be coordinated and partnerships with potential new members that would

strengthen each other must be identified. Thus, an adequate degree of organizational empowerment within a coalition directly results in enhanced influence on the decision-making processes and therefore more favorable decision-making outcomes. This task excellently fits with the role of umbrella organizations: as they represent a large sector, they can bring the members in line, coordinate research and lobby activities and effectively exploit the available resources. Naturally, sufficient financial means are required to fulfill this difficult but important task.

Although it has not been actively used by the water coalition in the reconstructed decision-making, public opinion – and media as its vehicle – can have a large impact. It can be used for agenda-setting prior to decision-making, and during the decision-making it may influence the position of especially the Parliament. Media coverage may shift the debate further in the direction of the precautionary principle (figure 6.3), thereby impacting the (discussions regarding the) development of the methodology and ultimately the decision-making outcomes. The agribusiness coalition, on the other hand, is required to counter the claims of the water coalition by defending their risk-benefit approach – for instance via media statements.

Current inclusion of drinking water interests in methodologies and looking ahead

The drinking water sector primarily adheres to the precautionary principle: a clean source is essential for the production of drinking water. Hence, organic micropollutants do not belong in surface water: the concentrations must be minimized and the behavior in the environment is important (biological degradation and persistence). In addition, the toxicological character of the micropollutant is relevant as this indicates the risk to public health. And thirdly, the removal efficiency in drinking water treatment plants is important: it provides the final barrier in the multi-barrier approach and one of the aims of the WFD is a reduction in purification techniques (article 7). Large parts of the drinking water sector think that the removal efficiency in treatment is not included in the current methodologies. Partly, this is right: the COMMPS-methodology for identification of PS is focused on monitoring data, ecotoxicity, toxicity and behavior in the environment. However, in the EQS methodology the removal efficiency in treatment for a PS must be assessed based on *simple treatment* and combined with maximum concentrations stipulated in the Drinking Water Directive (1998). Therefore, although in the past it has not been used appropriately by the water coalition like the example of *atrazine* has shown, the drinking water sector has a point to connect to in the EQS methodology. Thus, there are possibilities to include parts of the drinking water interests (removal efficiency) better in methodologies (COMMPS), while it must be acknowledged that participation in the application of methodologies in technical workshops is important too since otherwise useful provisions related to drinking water interests are not appropriately used (EQS).

Looking ahead, each four years the list of PS and their EQS must be reviewed by the Commission, followed by according Commission Proposals if deemed necessary. Currently, the COMMPS and EQS methodologies are revised, led by the French consultant INERIS. Thus, the first informal pre-decision making phase is underway already (partly outside research scope). Following the revision and application of the methodologies, in 2010 a new Commission Proposal will be presented. Concluding, new opportunities for all stakeholders have arisen and will arise every four years. The following recommendations may assist the drinking water sector in countering threats from organic micropollutants, and thereby be beneficial in exploiting these new opportunities.

7.2 Recommendations

This paragraph will provide recommendations based on the conclusions following from the conducted research[55]. First, as Vewin is the client of this research, strategic recommendations are given for

[55] Whereas this thesis has attempted to be as objective as possible in reporting the decision-making and its context, this chapter will give recommendations based on the subjective view of the author. In this light, the

enhanced protection of drinking water interest in European Union decision-making (§7.2.1). Then, one main research recommendation is given to the department of sanitary engineering from Delft University of Technology (§7.2.2) as they have academically supported this research[56]. It is presented here since this research recommendation is closely connected to the recommendations for Vewin. Thus, the sanitary engineering department is not necessarily regarded as client of this research; but it simply connects very well because the department is also part of the water coalition.

7.2.1 Recommendations for enhanced protection of drinking water interests

Two main recommendations have been developed based on the research. The first one is related to the organization of lobby activities within the drinking water sector. The second is more in-depth, focusing on scientifically enhancing an important part of the drinking water sector's argumentation structure. Finally, relevant further research in two areas is proposed.

Although the recommendations are primarily focused on Vewin, they are to a large extent also targeted at the umbrella organization EUREAU (and its members) as that is the main organization where the drinking water interests are protected at the level of the European Union. Vewin alone cannot achieve everything at this level, but definitely needs an umbrella organization like EUREAU. Since Vewin is part of EUREAU, the following two strategic recommendations – which are partly operationalized – can be forwarded and Vewin can motivate their consideration and implementation. Just like the conclusions, it must be noted that these recommendations are based on the analysis within the research scope. Thus, it is possible that due to recent developments parts of the drinking water sector are already moving in a recommended direction: seen in this light, the thesis would support those developments and encourages their continuation.

(1) Managing lobby activities: empowered organization of the water coalition

Obviously, from the conclusions it follows that the drinking water sector should concentrate more of its efforts on the imperative informal pre-decision making phase, i.e. during development and application of the methodologies. Thus, a first step is to always be present in technical workshops hosted by the Commission and INERIS (the next one is in March 2009). However, technical information is required for this. From the observations in the decision-making processes regarding PS and EQS, technical knowledge that was available in the broad network of experts within the water coalition has not been effectively utilized: this knowledge should be coordinated and streamlined within the water coalition for the benefit of contribution to the informal pre-decision making phase. The balance between experts and other representatives of the water coalition, and their correct attribution to technical workshops, should be more adequate.

Besides purely scientific debates regarding the development of the methodologies, the application of the methodology in itself is to a large degree straightforward. For instance, in the COMMPS methodology monitoring data plays a crucial role. For such information you do not need water experts. This is something for instance EUREAU can do without much effort: collect all monitoring data from the members on a periodic basis to make the drinking water sector independent: deliver the information to the Commission and INERIS yourself and do not lean on others like Member States. This will prevent missed opportunities like with *glyphosate* in the first PS identification. Moreover, this monitoring data can be used strategically: focus the lobby activities on

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chapter can be seen as the subjective contribution of the author in addition to the subjective positions that each of the stakeholders take in the decision-making and the way they perceive the problem context. Hence, although the intention is to translate the findings to recommendations in an objective way, the philosophy behind the applied theory states that this is impossible; therefore, in accordance with theory, it is acknowledged that these recommendations are at least to some degree influenced by the glasses through which the author sees the context during the finishing stages of the graduation research project.

[56] Obviously, the department of policy analysis from Delft University of Technology has also academically supported this research. Research recommendations for this department are developed based on a theoretical reflection in chapter 8, and can therefore be found in §8.3.4.

those micropollutants for which you can make a strong case based on relatively high concentrations and occurrence in multiple surface waters throughout the EU. Examples of pesticides could be *glyphosate*, mecoprop and bentazone, examples of pharmaceuticals are iopamidol and sulphamethoxazole. Thus, supply only monitoring data to the workshops of the substances you are actively going to pursue; and ensure that you pursue the same substances in your political lobby activities of the formal phase.

Another very concrete and easy to implement measure is to determine the EQS for all current PS based on simple treatment[57] and a maximum concentration of 0.1 µg/l in drinking water (or even 0.01 µg/l for a potential carcinogenic micropollutant). Like the simple calculation for *atrazine* has shown (§5.3.3), the EQS that is obtained like this would be between 0.1 and 0.2 µg/l for many micropollutants. Consult drinking water experts for these estimations. Then, insist during the technical workshops on execution of the drinking water provision included in the EQS methodology (i.e. expert judgment). This will significantly reduce the EQS for many micropollutants currently listed as PS, but it also paves the way for further PS as you can point to previous cases. Thus, the water sector should also prepare such an EQS for micropollutants that are potentially added to the list of PS, like *glyphosate*, mecoprop, *carbamazepine* and MTBE. Indeed, although the Drinking Water Directive currently stipulates a maximum concentration of 0.1 µg/l in drinking water only for pesticides, the same line of reasoning should be used for pharmaceuticals and other micropollutants: legislation can change, and besides that, it fits with the precautionary principle and the main argumentation structure (see recommendation 2). Of course Vewin can (partly) take care of the above, but EUREAU should take the lead in this and assure that sufficient expert knowledge is collected to use as input: it is their role as main representative of the sector.

Furthermore, speaking with one voice as a drinking water sector is important. The messages of EUREAU, its member associations and other water stakeholders should be as similar as possible. Thus, it is better to focus all efforts on specific micropollutants than to individually suggest different ones like until now. For instance, all messages brought forward to the decision-makers should propose the addition of both *glyphosate* and *carbamazepine*, or either *glyphosate* or *carbamazepine*, or neither *glyphosate* nor *carbamazepine* as a PS. Of course it is difficult for EUREAU to get consensus between all water stakeholders, but umbrella organizations from the other coalitions – including COPA COGECA who has even more members – succeed in this too. To assist in this challenge, the differences in opinion due to philosophy but also due to geography (other pollutants in other river basins) among members should be thoroughly identified and compromises must be found in order to agree on a uniform message. Of course, speaking with one voice is not only related to selecting pollutants, but instead the basic argumentation structure should be similar. This seems to be the case for the drinking water sector (see recommendation 2), but there is also a large degree of overlap with environmental stakeholders which could be exploited more intensively to realize a stronger position for the water coalition (see further recommended research).

Concluding, the above are some concrete examples of how the lobby activities of the drinking water sector can be managed more effectively. Many more can be identified, for instance by coupling this thesis' information with experience from workshop participants. Indeed, increasing the organizational empowerment of the drinking water sector directly results in concrete improvements regarding the influence on the methodologies and the final decision-making outcome. Hopefully this thesis has also assisted in emphasizing the relevance of a strong umbrella organization for the drinking water sector and a strong water coalition in itself: thus, if more financial means are necessary to empower the organization, maybe more members are convinced of the benefits.

[57] The EQS methodology at the start mentions simple treatment. However, later on in this methodology (i.e. at the specification on how to derive the drinking water objective), simple treatment is not mentioned anymore. So there may be some discussion regarding this issue in the workshops in which the methodologies are revised.

(2) Argumentation structure: support removal efficiency claim with QSARs

Toxicology, surface water concentrations and behavior in the environment are elements of the argumentation structure of the drinking water sector. The fact that these elements are already strongly included in the methodologies indicates that that part of the argumentation structure – and according lobby activities – functions very well. However, removal efficiency in drinking water treatment plants is not included in COMMPS and to some extent in EQS. Thus, this part of the argumentation structure can be strengthened; obviously this should be done without abandoning the other elements, although these elements are not further discussed here.

Even if the removal efficiency in drinking water treatment plants is only one element in the argumentation structure, it is a very important one: a large amount of information is readily available, it provides the last barrier before public health is at risk and the link with drinking water interests is crystal clear to everyone involved. It is a very strong argument in itself: with simple treatment only, hardly any organic micropollutant is removed. Moreover, although representatives from the opposing coalitions believed that pesticides and pharmaceuticals *can* be removed for nearly 100% by application of more advanced purification techniques Granular Activated Carbon, this prejudice should be countered strongly: micropollutants are only removed to a limited extent by GAC, and in addition the WFD aims for a reduction in purification techniques (i.e. without GAC). A focus on the limited removal efficiency will provide a better basis for further inclusion of drinking water interests in the methodologies, as others start to better understand the problem of pesticides and pharmaceuticals for the drinking water production. And it will be treated accordingly, especially in the technical workshops as the debates are settled based on science and less on politics. To this end, a scientific tool would be very helpful to support the claim that the removal efficiency in treatment is limited, as it provides scientific proof for which the Commission and these technical workshops – and therefore the methodology and the ultimate decision-making outcomes – are very susceptible. Therefore, such a tool – in addition to the verbal argumentation – could *really* make a difference in the debates and counterbalance some of the opposing coalitions' power in the workshops.

A promising example of such a tool is Quantitative Structure-Activity Relation, which is aimed at the prediction of the removal efficiency of pollutants in drinking water treatment (QSAR; see §1.2.4, §5.4 and §7.2.2). Much effort is currently spend to develop this concept. This is also reflected by the recent hire of Vewin of a PhD candidate in this field and the research efforts of Delft University of Technology (see also §7.2.2). Potentially, there is a direct use of QSAR in both the COMMPS and the EQS methodologies, and the tool could be updated based on technological progress at every periodic revision because the methodologies themselves are supposed to be based on "state-of-the-art-knowledge". Ultimately, for QSARs there could even be a large future role in authorization procedures for new pesticides, pharmaceuticals and others (see §8.2.2). Besides the development of the tool itself, throughout this process there should be cooperation between the developers and the users of QSAR: developing the tool right is something else than developing the right tool: i.e. include the aspects that can be understood by the audience and which convince them, based on experience from workshop participants. Furthermore, of course the tool must be introduced correctly: again, the support of water experts is required to demonstrate the functioning and further convince opponents, and the timing – again – is important: the technical workshops prior to the formal decision-making phase, otherwise the next decision-making round must be awaited.

To begin with, QSAR should predict the removal efficiency based on *simple treatment* because this is the principle adhered to by the water coalition. QSAR will show that hardly any organic micropollutant can be removed for more than 10%. In addition, a QSAR based on GAC is imperative: it approaches the current situation in practice as almost all treatment plants include this technique if they use surface water as source, and still it will show that many micropollutants are not removed. Even when GAC is regarded as "more than simple treatment", such QSAR perfectly illustrates the problem for drinking water production with regard to a specific micropollutant, and will really assist in tackling the real problems: those substances that are difficult to remove. Allowing GAC in QSAR does

not mean that the water coalition distances itself from adhering simple treatment; on the contrary, it shows that even with current treatment facilities, many micropollutants present a problem for drinking water production, while the Water Framework Directive even stipulates that the surface water quality must eventually be improved to allow for less strict purification regime. Just like the first recommendation, strengthening the drinking water sector's argumentation structure is a joint effort among stakeholders requiring organization: the scientific work should be divided and coordinated.

Further recommended research

Now, two ideas for further research are shortly outlined based on the conducted research. Both seem interesting to explore as their influence on decision-making looks promising, but development into a real recommendation has been impossible due to the limited evidence as a result of research scope.

I. The argumentation structure of the drinking water sector seems to overlap to a large extent with the argumentation structure of environmental NGOs, which is also supported by the fact that they are part of the same coalition. Both focus on (eco-)toxicity, surface water concentrations and behavior in the environment (persistence and bioaccumulation). In addition, the removal efficiency is important for the drinking water sector whereas the concentrations in sediment and biota are important to the environmental NGOs. Clearly, there are many opportunities for a partnership in several dossiers, just like the agribusiness coalition frequently uses: get the interests from the water coalition around the table on a frequent basis and explore overlap in the interpretation of general principles (precautionary principle, clean sources) together. Especially with new dossiers, there are chances to strengthen each other by exchanging each other's key arguments and identify possibilities for compromises as the positions are still relatively flexible. For instance, it seems that the emerging threat of pharmaceuticals – and subsequent struggle – is a common denominator: what should the viewpoint be, and what is the current state of scientific research?

II. Public opinion is a large asset that the drinking water sector possesses and it is the only asset that has not been actively used until now. Both theory and practice attribute a large impact to public opinion – and media as its vehicle – as it may set the political agenda. However, the whimsical character of public opinion must be acknowledged: active use may backfire as it may impact consumer confidence, especially without adequate communication. Furthermore, media coverage normally lasts for a limited period; and once it is not covered intensively anymore, its impact on decision-making may diminish rapidly as well. Nevertheless, it seems only a matter of time until media reports about it: initiation can happen from outside. Vewin is prepared with an adequate risk communication strategy for such events, but the drinking water side of the story can be activated via scientific journalists. More study may be considered regarding the potential effect and the involved risks of a large role of public opinion.

7.2.2 Research recommendation for section of Sanitary Engineering, DUT

One core research recommendation has been developed for the department of sanitary engineering, Delft University of Technology, and is presented below.

Develop QSAR as a scientific convincing tool and assist in EU decision-making

In the ongoing and future revision of COMMPS, QSAR is already mentioned to bridge the gap between monitoring data and modeling output for toxicity and biodegradation. Furthermore, it is acknowledged by the Commission that both the EQS and COMMPS methodology are dynamic methodologies which should always be based on the best available techniques. Therefore, it is strongly recommended to further develop the concept of using QSARs for the prediction of removal efficiencies for surface water treatment: it could be included in both the EQS and the COMMPS methodology. It seems both procedures, and the Commission, are on the lookout for such a tool. The Commission and the Consultant (previously Fraunhofer Institute, now INERIS) are always listening to scientific arguing and are eager to use state-of-the-art knowledge. Given the goodness of fit with the scientific orientation of

both the Commission and the Consultant, QSAR is very welcome since it eventually *reduces uncertainty* and can *replace the subjective expert judgment*, which are two current obstacles.

As the difference in risk-stance is the polarizing factor of the conflict between the interests, a reduction in uncertainty itself serves as a *crosswalk* as it would diminish the current *argumentation asymmetry* between the water coalition and the opposing coalitions, thereby offering assistance in solving the current deadlock (van Eeten, 1999). With the use of QSARs, the uncertainty in the conflict is reduced because it diminishes the possible deviation between monitoring and modeling data in the COMMPS methodology and because it may replace the subjective expert judgment which is currently included in the EQS methodology. Of course, some uncertainty will always remain; besides, QSARs are only an example of how to reduce the uncertainty. QSARs are also in line with the move from monitoring (reactive) towards expected exposure (i.e. pro-active), initiated by the Commission and supported by the water coalition. In any event, besides the academic challenge, well-developed and well-introduced QSARs could have a very significant impact on the inclusion of drinking water interests in methodologies within the context of Priority Substances as they support the claim of limited removal efficiency, thereby really having *practical value as it assists in actually solving the problem for drinking water production*.

As there is much ground to cover within QSAR, it is recommended to solely focus on QSAR for predicting the removal efficiencies in drinking water treatment (i.e., not on toxicology nor biodegradation), since that is the core research area of the department. However, at a later stage, the QSAR models could be adapted and extended for predicting waste water treatment efficiencies. Although maybe less feasible, another possibility is to exploit current QSAR knowledge in other fields (toxicology, behavior in the environment) by hiring such an expert and initiating intensive collaboration between this expert and the drinking water QSAR developers. Nevertheless, the remainder of this paragraph will purely focus on drinking water QSAR.

Drinking water treatment QSARs are fairly new. A model is developed for each treatment step in a drinking water treatment plant; the concept is that by combining models the behavior of a pollutant through a complete treatment plant can be simulated. Pollutants to be used as input for the development can be pesticides (much known) and pharmaceuticals (*emerging* pollutants). As there are about ten treatment steps imaginable for the production of drinking water from surface water, and as each of them has to be built separately to find the specific factors that impact the removal of a certain treatment step, a structured approach is needed and priorities must be set. Connecting with the precautionary principle and the argumentation structure of the water coalition, it is recommended to focus on the *simple treatment* steps first which is claimed[58] by the majority of the water coalition to be stipulated in the WFD. Therefore, a model for the prediction of pollutant removal via rapid sand filtration should be developed first. Once this model seems to be sufficiently accurate, a model for Granular Activated Carbon seems a logical second step, as also discussed in §7.2.1 (recommendation 2). By combining these two models, a decent QSAR is build that can be used for the prediction of removing pollutants from surface water via current treatment. This can already be introduced to the Commission and Consultant, and it will sufficiently show that certain pollutants are hardly removed at this moment: for instance, the problem regarding *glyphosate* and *carbamazepine* for drinking water production will be evident. Later on, models can be developed for more advanced treatment steps like ozonation/H_2O_2, advanced oxidation processes and, of course, membrane filtration, although this may strengthen opposing coalitions' arguments that drinking water treatment plant can remove almost everything: they should simply be equipped with the most advanced techniques and the problem is solved.

[58] But this is not the case. The WFD only stipulates that eventually, surface water quality must improve in such a way that less purification steps are required to produce drinking water. It does not specify which, or how many, purification steps.

Concluding, besides the research value in QSAR, QSAR could really make a difference on the decision-making outcomes and thereby assist in solving – and even preventing, see §8.2.2 – the problem of Priority Substances for the European drinking water production. In its development, the audience must be regarded: QSAR should not only convince drinking water experts but all participants in the technical workshops, including many chemical experts. As the QSARs are to a large extent based on chemical and physical properties of the pollutants, this is possible but should be eyed anyway. Finally, as support for the generalists, lobbyists and other representatives of the water coalition, it is recommended that the water experts actively participate in the scientific debates at the level of the EU (technical workshops), since opponents can be easier convinced by them.

8. Reflection

The chapter will provide a reflection on the conducted research that has been documented in this thesis. First, the validity of the data and findings will be discussed (§8.1). Then, in §8.2, the scope of the study will be revisited, followed by a discussion on generalization of the findings to other pollutants and dossiers. The theoretical reflection (§8.3) will evaluate the application of Advocacy Coalition Framework in this study, discuss possible limitations that emerge from a strict application of theory and provide research recommendations. This chapter is completed by a practical reflection, which discusses practical lessons and revelations of this research followed by the added value of the combined graduation work for two academic degrees within this project (§8.4).

8.1 Validation of the data and findings

In the methodology (§3.4), the initial validation that has been applied is described. Representativeness of the interviews (and subsequent raw data) has been pursued via standardized interviews and multiple respondents per coalition and sovereign. In addition, the obtained data from interviews has been cross-validated: parts of the coalition interviews have served as validation of sovereign data on the decision-making progression, whereas parts of the sovereign interviews have been used to validate the coalition data regarding components like argumentation structure and strategy. Furthermore, together with the conducted interviews, much document analysis has been undertaken to guarantee a thesis story that approximates reality sufficiently.

In addition, each respondent has received the draft interview summary with the request to read it and make changes wherever desired. Ninety percent of the respondents have replied to this request: the majority approved the summary without changes whereas the others made minor changes. From this, it can be concluded that the *raw data* obtained during interviews is valid.

Furthermore, to validate the *findings* (i.e. results, discussion, conclusions and recommendations), this thesis could be send to respondents from all coalitions and sovereigns. Although it is assumed that all findings can be shared with everyone, this additional validation step has not been pursued yet due to the pending author's request regarding the client's assessment of confidentiality of parts of this thesis. Using this validation step, concise feedback of the respondents with regard to the following questions can be requested:

- Do you agree with the structure of the decision-making reconstruction?
- Does the provided text regarding your position and decision-making sufficiently approach reality?
- Do you think the provided discussion and interpretation is valid?
- Do you think the conclusions and recommendations are useful to your organization?

The undertaken validation steps seem to indicate that the raw data (literature and interview summaries) and its conversion into results (chapter 5), discussion (chapter 6) and conclusions and recommendations (chapter 7) are sound. Nevertheless, a *quantified* validation, which is possible with a hydraulic model for instance, is not possible here. Besides the *qualitative* characteristic of the studied problem – resulting in a softer validation – the data gathering is relatively time-intensive. Conducting interviews simply takes much time. Consequently, the data available for validation is limited, resulting in a limited validation too. This is acceptable since it is only a first study, which structures the decision-making, identifies the most important factors that impact the outcome and uses this as input for strategy formulation. Further studies could, among others, validate the most critical assumptions and relations on which the findings were based.

8.2 Scope, generalization and hypothesis of the study

8.2.1 Research scope: chosen subsystem and period

In §1.4, the choice to focus on the European Union level has been explained. Consequently, less attention has been paid to the levels of implementation. Although the author still strongly supports this choice, it must be noted that the influence of regional and national level to the EU decision-making processes have not been intensely studied. However, it is acknowledged that it exists and it may have an influence. But throughout the study, although several respondents from the Rhine river basin were interviewed, no indications were obtained which point in a very strong influence. It seems such stakeholders are simply part of the same coalitions and do not provide a significant joint impact as an external event on the policy subsystem (see ACF); since all coalitions receive regional and national stakeholders within their coalitions, it is assumed that they counterbalance each other. Nevertheless, this is a limitation of the study following from the chosen research scope.

Another observation with regard to territory is that specific subnetworks seem to exist within the main policy subsystem. For instance, MEPs from a specific Member State cluster together with stakeholders from the same Member State. This has been derived from the interviews with Dutch respondents, but can also be seen in appendix H: a German-speaking cluster is formed by MEPs together with German stakeholders. This observation is not expected to have significant influence on presented findings, but by further research several of them may be refined.

Furthermore, the focus of the research has been on the second and third decision-making round (identification of PS and derivation of EQS). Consequently, the scientific debate has been reconstructed until 2006 and the political debate until 2008. The scientific debate that is currently ongoing (fourth round, revision of PS and EQS) did not receive much attention. Thus, since this research has been based on learning from the past, it is possible that changes compared to the research findings have recently occurred. If these changes are part of the conclusions and recommendations provided in this thesis, then on the one hand this thesis is a confirmation of the 'right' developments of lobby activities and on the other it indicates that the observations and interpretation of this thesis reflect reality fairly well.

8.2.2 Generalization: other pollutants and other dossiers

In this thesis, only one context has been studied: Priority Substances within the Water Framework Directive with a focus on pesticides and pharmaceuticals. Moreover, to increase the specificity of the reconstruction and make the results more convincing, certain pollutants were discussed in more detail than others (*atrazine, glyphosate, carbamazepine, 17α-ethinylestradiol*). Pesticides and pharmaceuticals are comparable from a decision-making point of view, as they are discussed in the same subsystem with equal conditions: one dossier, the same sovereigns, the same rounds, the same methodology and the same polarization (precautionary vs. risk-benefit) have been found. Even from a general technical point of view, these substances are fairly comparable: the key characteristic is that it is difficult to remove micropollutants which are highly soluble in water.

Based on the specific pollutants, it has been possible to derive a general picture for pesticides and pharmaceuticals as has been done in chapter 6. Besides the generalization to other pesticides (like mecoprop and bentazone) and pharmaceuticals (iopamidol, sulfamethoxazole and aspirin), the findings can also be generalized to other types of Priority Substances. For instance, late throughout the study it was found that two more coalitions are involved in the Priority Substances subsystem: a *metals coalition* and a *gasoline coalition*. These coalitions are responsible for the presence of metals, MTBE and ETBE[59] in surface water (see §1.4). Representatives from these coalitions were sometimes already present in the decision-making rounds. However, this does not have an implication on the validity of the results since these coalitions tend to operate independently. On the contrary: the

[59] Methyl tert-butyl ether and Ethyl tert-butyl ether.

identification of these coalitions has triggered a (concise) analysis of their involvement in the subsystem. From this, it is concluded that the same conditions apply (same decision-making rounds and dossier, same sovereigns, same methodology, same type of arguments – precautionary principle vs. risk-benefit – and the same lobbying). Thus, based on the same conditions, with a decent level of confidence it is argued that the same findings apply to metals and gasoline additives – and even to all Priority Substances since they are all part of the same subsystem. Thus, the recommendations can be generally used to counter micropollutants that are threatening European drinking water quality.

In addition to substances in the Priority Substances context, it seems that the findings can also be applied to related dossiers like the authorization procedure for new pesticides or new pharmaceuticals. This is because – once again – the same conditions hold: the dossier is discussed in the same subsystem as Priority Substances. Currently, certain tools can be used for EU risk assessment of new substances (RIVM, 2006b). QSAR would make an excellent contribution to these tools, since it could further assist in advancing parts of the drinking water argumentation structure (i.e. predicted removal efficiency) for new substances. This would also stimulate the transition from a reactive towards a pro-active strategy: protect the drinking water interests before the problem occurs instead of "*running behind individual pollutants like we are doing now*". Therefore, besides the use of QSAR in ex-post regulation (i.e. list with Priority Substances), QSAR can be used as ex-ante evaluation for possible authorization of new substances. However, pharmaceutical regulation currently prohibits the incorporation of drinking water interests – and any environmental effect – in the assessment for new pharmaceuticals. Thus, *at this moment* QSAR would be useful for pesticides and other substances, but not for pharmaceuticals – but of course regulation periodically changes.

All in all, further generalization to contexts in which the conditions may be different cannot be guaranteed, as evidence is lacking. Nevertheless, since it seems possible to use the findings in other areas too, a hypothesis is used to cover this. Additional research is needed to test this hypothesis.

8.2.3 Hypothesis: application to other environmental dossiers

The findings (chapter 6 and 7) cannot be doubtless generalized to other EU decision-making areas since it is possible that other conditions apply there. For instance, it could be that other coalitions operate and have a much stronger voice than the water coalition. Or it could be that the codecision procedure is not used, thereby significantly altering the power distribution among the sovereigns. Or it could turn out that there is no large informal pre-decision making phase in which the methodology is developed and applied like in the WFD, thereby making only the second political-oriented decision-making phase relevant. Such different conditions obviously impact the applicability of the findings. Since other areas were outside direct research focus, the following is phrased as a hypothesis:

"The general findings presented in chapters 6 and 7 can be applied to all environmental dossiers in the European Union"

This is based on the following observations:

- For all environmental dossiers, the codecision procedure must be used
- In all environmental themes, there is a conflict between the principles of precautionary and risk-benefit; in each of these conflicts, there is always at least one coalition protecting precautionary (a water/environmental coalition) and risk-benefit (an industrial coalition)
- For all environmental dossiers, the Parliament's committee is the ENVI-Committee; consequently, the water coalition lobbies the EP, whereas the industry lobbies the Council
- All environmental dossiers are rather technical in nature, necessitating the involvement of science; a pre-decision making phase is used to develop and apply a methodology
- Examples of dossiers are the groundwater directive, air quality and climate change (see figure 6.1)

Nevertheless, as there is no evidence in other areas, this extrapolation cannot be guaranteed. More research would be required in this area to test if the findings can be generalized to a larger extent.

8.3 Theoretical reflection

First, the application of Advocacy Coalition Framework (ACF) in this study will be evaluated (§8.3.1): what was the purpose of using ACF in this study, was it useful, which unique characteristics does the application in this study have compared to classic applications and in which consequences does this result? Then, it will be acknowledged that the selection of a main theory – and a strict application of it – inherently introduces limitations to the study. Some examples will be given in §8.3.2. This paragraph is completed by research recommendations for the department of Policy Analysis (§8.3.3).

8.3.1 Evaluation of the application of Advocacy Coalition Framework theory

Ex-ante: purpose and usefulness of ACF theory for this study

Within this study, the requirements for the selection of a theoretical model that focuses on *stakeholder's perception* have been (see §2.2):

- To provide a means for structuring the complexity of the problem context
- Consequently offer a means for identifying the factors that are of importance in EU decision-making
- This would then be used as input for strategic recommendations

In the end, ACF was selected since it met these requirements. Although there were other possibilities, ACF seemed to fit the research objective and problem context. This indeed proved to be the case: the framework has truly been a framework that has been filled in throughout chapters 4 and 5. Using these components and the relations between them, the context could be analyzed in a structured way – step by step. Furthermore, the ACF theory offers much flexibility in terms of component specification: ACF could be applied in the way that would serve the context – and the research goal, in this case the formulation of strategic recommendations – best. This has been exploited for instance by using Toulmin's argumentation structures as operationalization of the belief systems. However, use has also been made of real changes compared to 'classic' ACF applications.

Unique characteristics compared to classic ACF applications

The presented application is rather unique compared to classic examples of ACF – as far as the author is aware – due to three characteristics:

1. Due to the application of Teisman's rounds model, the subsystem has been reconstructed for each decision-making round. As a result, the studied rounds are much shorter than common in ACF studies: normally, only one round is studied in which a period of *at least* a decennium is analyzed;
2. The focus has been on one specific identified round (3rd round). Consequently, the exogenous variables in ACF are less applicable since changes in them are not prone to occur in such a short period (five years);
3. Moreover, under influence of the research objective – to assist in countering threats to drinking water quality – the focus of the study has strongly been on the policy subsystem.

Now what have been the consequences of these rather unique characteristics?

Ex-post: advantages and disadvantages of alternative ACF application

Obviously, the unique characteristics – mentioned above – have resulted in several advantages and disadvantages. These are discussed here.

Advantages:

- More structure due to the identified *crucial decisions*, marking the begin and end of rounds;
- The entrance of coalitions and developments in argumentation structure can be identified easier;
- This study has attempted to 'predict' the course of the next decision-making round by identifying trends within and in between the rounds and extrapolating this information. Such a – humble – prediction is easier if multiple rounds are used;
- Focusing on the subsystem results in a thorough understanding of the 'internal' factors that are of importance to decision-making outcome (see chapter 6);
- One of Sabatier and Weible's unanswered questions regarding ACF is "*to what extent can the ACF be used as a practical tool for policy makers?*" (Weible, 2006; Sabatier and Weible, 2007). This application – partly stimulated by a focus on the subsystem, partly stimulated by the pragmatic research objective – hopefully contributes in answering this question: it shows that ACF as a framework is suitable for deriving lessons from the past, which can be used as input for strategy formulation. Thus, besides a descriptive nature the theory it enables a rather straightforward translation to prescriptive output.

Disadvantages:

- The study may have less theoretical value than a standard application since some theoretical concepts do not seem to apply and can therefore not be reflected upon:
  - No significant changes in the impact of exogenous variables (including the external events) on the policy subsystem have been identified, although these often are a source for major policy change;
  - According to the latest ACF revisions (Sabatier and Weible, 2007), major policy change can also result from policy-oriented learning (from experience or new information) in the subsystem. The developments in argumentation structure that have been identified qualify as policy-oriented learning, but the major policy changes that occurred as a result of this – for instance the benefit for the agribusiness coalition of pointing to other solutions like education of users – have not been studied in-depth. Thus, this thesis cannot make theoretical contributions to such notions.

It is argued that the disadvantages have not negatively impacted the findings of the study. This is because it is assumed that the usefulness – and impact of alternative ACF application – depends on the research objective: the unique characteristics seem to be very useful if the goal is more practical-oriented, i.e. you want to develop pragmatic recommendations for assisting in the problem context of a client. Such an application results in a more detailed study and may derive concrete issues – like the failure in delivering monitoring data. On the other hand, the classical application of ACF is probably more suitable for identifying changes at a more abstract level and when a longer period of time is studied – like the impact of increased environmental awareness on the political EU-agenda as a whole. Since the objective of this study was more practical-oriented instead of explaining abstract phenomena, probably the right choice has been made.

8.3.2 Selection of a theoretical model: the impact on thesis' findings

The provided discussion and conclusions have been developed without drawing significantly on theory. However, to arrive at that point, an analysis has been conducted which strongly held onto a theoretical model for structure and guidance. A theoretical model attempts to explain the context in a specific way; consequently, a choice for a theoretical model will inherently result in a focus on specific aspects and less attention for others. It can be assumed that such a focus will influence which evidence is found and analyzed, and subsequently the way in which identified mechanisms are

explained. In this thesis Advocacy Coalition Framework has been used as primary theoretical model, which has a focus on stakeholder perceptions, the exchange of arguments and the role of technical knowledge. By using ACF, there has been much attention on (technical) information in relation to the strategy used by coalitions. This has served as a vehicle for identifying the distinction between political- and scientific-oriented coalitions, thereby explaining the interaction with decision-makers and the subsequent 'pull' (see figures 6.2 and 6.3). In addition, due to ACF there has been a focus on coalition's arguments. The pulling-mechanism and the argumentation structures have been two very important mechanisms in the thesis, as they have been the basis for the two recommendations to Vewin. However, given the unavoidable impact of the theoretical model choice on the research findings, it is interesting to reflect on this choice: what would be the consequence if a different theoretical approach would have been used? Examples are institutional rational choice which focuses on the relation between stakeholders and the institutional setting, or game theory which focuses on the power of stakeholders and their games of strategic behavior in interactions (Ostrom, 1990; Scharpf, 1997). Here, there is no room for an in-depth comparison between current findings and possible findings in case a different theory would have been used, but as illustration three limitations due to the use of ACF as main theory will be outlined.

- ACF does not have a strong focus on economic power of coalitions. Consequently, this element is also lacking in figures 6.2 and 6.3. It is likely that the Council is rather sensitive to economic power as this has an impact on competition and national economy; consequently, the Council is probably more open to the position of industrial coalitions than to the greener approach of the water coalition. With an approach like institutional analysis, this pulling element could have been deepened;
- ACF does not have a focus on the interactions and distribution of power within a coalition. It has been observed that technical knowledge in the water coalition is rather distributed over many stakeholders, which makes it difficult to streamline knowledge and to speak with one voice. On the other hand, although the industrial coalitions may also consist of many stakeholders, there are a few economic giants. It is likely that they play a dominating role within these coalitions, and use their power to decide the coalition's direction and its strategy (what information is used, what message is sent to workshops, etc.). In this thesis, with the resource 'organizational empowerment' an attempt has been made to cover this deficit found in ACF's resources. Nevertheless, if more of a game theoretical approach would have been used, the 'problem' of the water coalition would not only have been related to a lack of scientific orientation, but it would also have deepened its cause, and possibly handed additional recommendations in this area;
- The 'rules of the game' which are set in the informal pre-decision making phase are imperative for the decision-making outcome. However, *how* these rules have been set (that is, how the process to come to an agreed methodology is managed) has not received much attention – partly due to the ACF approach, partly due to a confidential nature. With process management concepts that are available in literature, the rules of the game could have been analyzed and potentially be used to identify possibilities to influence these with as goal a better balance of stakeholder interest.

Thus, there are limitations to the application of a theory (in this case ACF), which have consequences for especially the discussion and recommendations. Nevertheless, it is assumed that the choice for a theoretical model merely influences the *focus* of the discussion and recommendations, and not so much the *correctness* of the provided text.

8.3.3 Research recommendations for section of Policy Analysis, DUT

Finally, based on the theoretical approach and findings in this thesis, the following two research recommendations – via a number of unanswered questions – are given for possible further research:

- 1. Organizational empowerment: this resource appears to be a good addition to the six resources that are currently distinguished in ACF theory, and seems to be essential in analyzing EU decision-making:
  - Is it also applicable in other contexts, for instance in Dutch politics?
  - How can a scholar assess to what degree a coalition possesses this resource?
  - The author feels that the definition and properties can be sharpened (this thesis has only given an introduction to the resource), which would improve its theoretical contribution. In this light, what elements from organizational theory can be included?
  - More testing is required to better understand the possibilities of this resource and its relation with the original resources. An easy start could be made by using existing case studies by ex-post application; besides, it could be included in new studies, especially studies that are focused on practical output.
- 2. Focus on the policy subsystem itself:
  - The policy subsystem itself seem to be very useful for structuring a round which is shorter than a decennium; moreover, solely the ACF subsystem in combination with Teisman's rounds logic can be used for structuring sequential rounds – including the entrance and exit of new coalitions. Would such a combination present a theoretical contribution to literature?
  - As a follow up, it seems the exogenous variables are not applicable as the periods studied are much shorter. Are they really needed (i.e. is their impact over multiple rounds crucial for the analysis), or can they be ignored without repercussions when the research objective is of a practical nature (for instance strategy formulation via a reconstruction of sequential decision-making rounds)?

Further academic research – partly theoretical, partly empirical – may be able to answer some of the questions posed above.

8.4 Practical reflection

8.4.1: The process of research: lessons and revelations

A significant amount of effort has been spent on the set-up and execution of the research. Many parts were carefully planned. Below, from a personal point of view, specific lessons (what could have been done better?) and revelations (what is the key to a successful research process?) are outlined.

Lessons with regard to research process:

- Two months were dedicated to problem exploration. Many elements (both theoretical and empiric) have been studied thoroughly during this time, resulting in many summarizations. However, later on this output could not all be included in the thesis as it proved to be too detailed information. Although a good exploration is beneficial to really understand the problem, it should be taken to far: with such a large and complex context, the focus should always be on the *red line*: understanding the essential elements and the relations between them
- At the end of the research, more dedication could have been on the *contents* of the current situation (i.e. the revision of the methodologies). This would have potentially resulted in even more translation from research findings to concrete recommendations for Vewin. Nevertheless, it is argued that this translation can also (and possibly even better due to *inside information*) be made by the participants of this revision after studying this thesis. Nevertheless, a lesson is to earlier switch the research from descriptive to prescriptive.

Revelations with regard to the research process:

- Good organization and a structured approach are highly valued by the author. Not only are you more *in control* of time, but definitely also of the results: half of the interviews were possible via useful contact persons, but the other half were really an outcome of persistent though structured contacting via e-mail and phone. Except one person, everyone that has been contacted give his or her cooperation – even from 'opposing' coalitions. It is argued that this good score was only possible because the offered arguments were tailor-made (describe research based on their position) and convincing (stress their benefit of cooperation: receiving a copy). Without a good organization and structured approach, many of the key people would not have cooperated: pro-activity pays off. It goes without saying that the interviews have improved the result of the research.
- Although the document analysis has been rather tough in the beginning due to a flood of relevant material, when you get used to this *fact* and once you start to get an overview of the essential elements it is essential to directly write down an idea when you get it. This way, a clear goal is emerging which really accelerates the research: all that is left is selecting the dots, filling them in, connecting them and putting them in the right order. This may sound rather simplistic, but in a sense this puzzling is what research is all about: you explore the problem with literature and some consultations (the dots), you formulate your research and choose a theory (selecting the dots you use), you find empiric evidence (filling these dots), you interpret and discuss your empiric data (connecting the dots) and you conclude the research with written documentation in a thesis or article (putting the dots in the right order). Maybe obvious to scholars and others, only now this is a real eye-opener for me.

8.4.2 Added value of combining SEPAM and CE in one graduation research project

This paragraph will shortly describe how the author has experienced the integrative character of this graduation research, as it combined policy analysis (SEPAM) and sanitary engineering (CE) in one project. First a disadvantage will be addressed, after which the added value will be discussed.

A disadvantage of this integration has been that it was impossible to go everywhere as deep as you would like: the thesis would be even larger. Given the nature of the research topic (decision-making), in the end less attention has been given to the sanitary engineering side. This is because the story has to be formed and completed from the policy analysis side, while the sanitary engineering side (and the technical information) supported this policy analysis side. A significant amount of technical information that has been obtained could not be reported here, which is perhaps a pity – although, overall, several technical elements could be deepened to quite some extent.

Below, the merits (advantages) of the integrative character are listed:

- Readily applicable knowledge of *two worlds*
- Gaps in knowledge in either world can be solved easier since the basic knowledge is present (i.e.: understanding technical factors and relations between them is easier due to training in sanitary engineering; idem ditto for policy analysis)
- Improved output of literature and document analysis: both the technical and the decision-making literature could be studied relatively easy
- Improved output of expert interviews: both the more technical and the more political-oriented interviews could be followed and adapted to
- A nice integrative overview can be given in the thesis: a more complete picture due to the combination of technical knowledge and decision-making – although there was even more potency for this

However, it must be noted that the integration of the graduation research for two MSc degrees was only possible because of the flexibility offered by the supporting departments. On the other hand, hopefully everyone involved has experienced the journey as an academic merit (it may potentially have enlarged the horizon of the departments) or at least as interesting – I for sure did!

Postscript: personal experience

This part is dedicated to rather personal experiences in relation to the conducted project. They are summarized below.

- Using this project, I have been able to obtain considerable academic training in research: I have combined theory with an empiric context. Especially in the beginning stages it proved to be hard as there were many questions, few answers, little interaction with others and many elements involved. In addition, especially chapter 8 has identified limitations to the study, like the demarcation to Priority Substances, a focus on the third decision-making round and strictly applying the chosen theoretical model. Nevertheless, in the end, I am satisfied with the final result which has been documented in this thesis;
- I think I can obtain insight into a complex topic rather quickly. However, when I acquired this insight, I tend to dive too far into the details because I would like to understand everything; although this provides a solid basis and supports the research during later stages, this is time-consuming and sometimes not necessary;
- Via this graduation research, I have gained improved insight in a possible desirability of pursuing an academic career (PhD): I have decided not to pursue a PhD at this moment. Over the last years my personal stance towards a PhD has fluctuated from time to time, but in the end I think I do not possess the required dose of patience nor interest to work on a single topic for four years at this moment. In that light, I think I am less of a researcher and more of a consultant, bridging the gap in practice between technology on the one hand and (strategic) management on the other;
- One of the maybe less important personal goals of this research was to obtain contacts in professional fields that may be of interest to me for future purposes. Although I will not work directly in this field in the near future, I have had the pleasure of meeting many international respondents – who seemed to be frankly interested in the study, in my structured approach, and even in my plans after graduation. Furthermore, many respondents were interested in hearing my side of the story after the interview; thus, the interviews resulted in an exchange of information and insights. This is also expressed in the fact that nearly all respondents requested a copy of this thesis. All in all, a very nice experience!
- Pure politics only plays a minor role in the development of EU environmental legislation, while technical information is much more important. The EU functions as a well-developed technocracy with a fair amount of stakeholder input for environmental dossiers. Although even the technical input can be regarded as lobbying, there is a true level playing field; in addition, although the political EU-arena is massive, only a few key persons seem to decide on the course in the political decision-making phase which perhaps is a worrisome discovery;
- Finally, but very importantly, the topic has been interesting! Not only because it had a challenging complexity and I could really dive in, but also because it involved the European Union: prior to the research, I had real motivation to acquire a decent understanding of the EU – since it was one gigantic *black box* to me at the time. However, using this project, I think I succeeded in obtaining insight in the formal decision-making processes but also in the informal lobbying mechanisms – much more than I can report here. But, besides what I (think I) know, there is still so much more to it! I think more attention should be paid during education to the European Union and how things are arranged – for instance at secondary schools. Over time, the European Union will only increase in importance. Thus – whether you like it or not – it **is** the future!

References

Andrzejewski, P., B. Kasprzyk-Hordam and J. Nawrocki (2005). "The hazard of N-nitrosodimethylamine (NDMA) formation during water disinfection with strong oxidants". Desalination **176** (1-3): 37-45.

Bellona, C., J. Drewes, P. Xu and G. Amy (2004). "Factors affecting the rejection of organic solutes during NF/RO treatment - a literature review". Water Research **38** (12): 2795-2809.

Birnbaum, L. S. and S. E. Fenton (2003). "Cancer and developmental exposure to endocrine disruptors". Environmental Health Perspectives **111** (4): 389-394.

Braeken, L., R. Ramaekers, Y. Zhang, G. Maes, B. Van der Bruggen and C. Vandecasteele (2005). "Influence of hydrophobicity on retention in nanofiltration of aqueous solutions containing organic compounds". Journal of Membrane Science **252** (1-2): 195-203

Bryson, J. M. (2004). "What to do when stakeholders matter: stakeholder identification and analysis techniques". Public Management Review **6** (1): 21-53.

Carson, R. (1962). Silent spring. Boston, Houghton Mifflin.

CBS (2005). "Steeds meer mensen gebruiken medicijnen". Persbericht PB05-048 of April 21st, Centraal Bureau voor de Statistiek, the Netherlands.

Cohen, M. D., J. G. March and J. P. Olsen (1972). "A garbage can model of organizational choice". Administrative Science Quarterly **17** (1): 1-25.

COPA-COGECA (2006). "COPA and COGECA position paper on the water framework directive (WFD) and good ecological status/good ecological potential". Position paper, Committee of Professional Agricultural Organisations and General Committee for Agricultural Cooperation in the European Union.

Council of the European Communities (1975). "Council Directive of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (75/440/EEC)". Official Journal **L 194** (25 July): 26 - 35.

Council of the European Communities (1976). "Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community". Official Journal **L 129** (18 May): 23 - 29.

Council of the European Union (1996). "Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control". Official Journal **L 257** (10 October): 26 - 40.

Council of the European Union (1998). "Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption". Official Journal of the European Communities **L 330** (5 December): 32-54.

Council of the European Union (2000). "Guide for the Council: co-decision guide". Bureau for official publications of the European Community: 1-32.

Council of the European Union (2001). "2355th Council meeting - Environment". **PRES/2001/345** (7 June): 1 - 29.

Council of the European Union (2008). "Council Common Position adopted by the Council on 20 December 2007 with a view to the adopting Directive 2008/…/EC of the European Parliament and of the Council of … on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC". Official Journal of the European Union **C 71E** (18 March): 1 - 15.

Cramer, J. (2007). Richtlijn Prioritaire stoffen en drinkwater. Official response of the Minister of VROM on December 18th 2007 to a letter from the Vereniging van Waterbedrijven in Nederland of October 5th 2007.

de Bruijn, J. A. and A. L. Porter (2004). "The education of a technology policy analyst - to process management". Technology Analysis & Strategic Management **16** (2): 261-274.

de Bruijn, J. A. and E. F. Ten Heuvelhof (2002). Procesmanagement: over procesontwerp en besluitvorming. Schoonhoven, Academic services.

de Bruijn, J. A. and E. F. ten Heuvelhof (2003). "Policy analysis and decision making in a network: how to improve the quality of analysis and the impact on decision making". Impact Assessment and Project Appraisal **20** (4): 232-242.

de Bruijn, J. A., E. F. ten Heuvelhof and R. in 't Veld (2002). Process management: why project management fails in complex decision making processes. Dordrecht, Kluwer Academic Publishers.

de Neufville, R. (1998). "Thesis definition and preparation: some general guidelines (unpublished work)". Massachusetts Institute of Technology, Cambridge.

Desbrow, C., E. J. Routledge, G. C. Brighty, J. P. Sumpter and M. Waldock (1998). "Identification of estrogenic chemicals in STW effluent. 1. chemical fractionation and in vitro biological screening ". Environment Science and Technology **32** (11): 1549-1558.

Dieperink, C. (1997). Tussen zout en zalm - Lessen uit de ontwikkeling van het regime inzake de Rijnvervuiling. Amsterdam, Thesis Publishers.

Douma, S. and H. Schreuder (1992). Economic approaches to organizations - chapter 7: Agency theory. London, Prentice Hall.

Dunn, W. N. (1994). Public policy analysis: an introduction. Upper Saddle River, New Jersey, Prentice Hall.

ECPA, CEFIC and Euro Chlor (2008). "Chemical industry comments in preparation for the European Parliament's 2nd reading Water Framework Directive, environmental quality standards proposal". Position paper of European Crop Protection Agency, the European Chemical Industry Council and the Federation of European Chlor-alkali Industry.

Ejaz, S., W. Akram, C. W. Lim, J. J. Lee and I. Husain (2004). "Endocrine disrupting pesticides: a leading cause of cancer among rural people in Pakistan". Experimental Oncology **26** (2): 98-105.

Enserink, B., J. F. M. Koppenjan, W. A. H. Thissen, D. P. Kamps and G. Bekebrede (2003). Analyse van complexe omgevingen. Delft, Delft University of Technology.

ENVI-Committee (2006). "Draft Report sur la proposition de directive du Parlement européen et du Conseil établissant des normes de qualité environnementale dans le domaine de l'eau et modifiant la directive 2000/60/CE". European Parliament: Committee on the Environment, Public Health and Food Safety.

ENVI-Committee (2007a). "Amendments 20-218 - Draft report - Proposal for a Directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directive 2000/60/EC". European Parliament: Committee on the Environment, Public Health and Food Safety.

ENVI-Committee (2007b). "Report on the proposal for a directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directive 2000/60/EC". European Parliament: Committee for the Environment, Public Health and Food Safety.

ENVI-Committee (2008a). "Draft recommendation for second reading on the Council common position for adopting a directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC". European Parliament: Committee on the Environment, Public Health and Food Safety.

ENVI-Committee (2008b). "Recommendation for second reading on the Council common position for adopting a directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC". European Parliament: Committee on the Environment, Public Health and Food Safety.

EUREAU (2006). "Commission-Proposal for environmental quality standards in the field of water policy and amending Directive 2000/60/EC - Position paper".

European Commission (1997a). "Amendment to the proposal for a Council Directive establishing a framework for Community action in the field of water policy". Official Journal **C 16** (20 January 1998): 14-18.

European Commission (1997b). "Proposal for a Council Directive establishing a framework for Community action in the field of water policy ". Official Journal **C 184** (17 June).

European Commission (2000a). "Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy". Official Journal of the European Communities **L 327** (22 December): 1-72.

European Commission (2000b). "Proposal for a European Parliament and Council decision establishing the list of priority substances in the field of water policy". Official Journal **C177** (27 June): 74-76.

European Commission (2001a). "Amended proposal for a decision of the European Parliament and of the Council establishing the list of priority substances in the field of water policy". Official Journal **C 154 E** (29 May 2001): 117-122.

European Commission (2001b). "Decision no. 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC". Official Journal of the European Communities **L 331** (15 December): 1-5.

European Commission (2003). "Achievements and obstacles in the implementation of Council Directive 76/464/EEC on aquatic pollution control of dangerous substances (1976-2002)". Unit B.1, Directorate-General Environment, European Commission, Brussels.

European Commission (2006). "Proposal for a Directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directive 2000/60/EC". COM(2006)397 final, Brussels.

European Commission (2007). "Expert group on environmental quality standards - 2nd meeting - draft minutes". Toxicology and Chemical Substances Unit / European Chemicals Bureau, Institute for Health and Consumer Protection, Joint Research Centre, European Commission.

European Commission (2008a). "Commission Opinion pursuant to Article 251(2), third subparagraph, point (c) of the EC Treaty, concerning the 2nd Reading of the European Parliament with a view to the adoption of a proposal for a Directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC".

European Commission (2008b). "Communication from the Commission to the European Parliament pursuant to the second subparagraph of Article 251 (2) of the EC Treaty concerning the Common Position adopted by the Council with a view to the adoption of a Directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC".

European Commission et al. (2005). "Environmental Quality Standards - substance data sheet for Atrazine".

European Communities (2005). "Official directory of the European Union". Office for Official Publications of the European Communities.

European Council (1967). "Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances". Official Journal **L 196** (16 August): 1-98.

European Economic Community (1957). "Treaty establishing the European Economic Community and connected documents". Publishing Services of the European Communities (25 March 1957): 5-183.

European Medicines Agency (2006). "Guideline on the environmental risk assessment of medicinal products for human use". EMEA: Pre-authorisation evaluation of medicines for human use - Committee on the environmental risk assessment of medicinal products for human use.

European Parliament (2001). "Report on the proposal for a European Parliament and Council decision establishing the list of priority substances in the field of water policy". **A5-0135/2001** (25 April): 1-32.

European Parliament (2007a). "Conciliations and codecision: a guide to how the Parliament co-legislates". 1-38.

European Parliament (2007b). "Position of the European Parliament adopted at first reading on 22 May 2007 with a view to the adoption of Directive 2007/.../EC of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directive 2000/60/EC".

European Parliament (2008). "Position of the European Parliament adopted on 17 June 2008 on the Council common position with a view to the adoption of a directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and 2000/60/EC".

European Parliament and the Council of the European Union (2000). "Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2000 establishing a framework for Community action in the field of water policy". Official Journal of the European Communities **L 327** (22 December): 1-72.

European Parliament and the Council of the European Union (2001a). "Decision no. 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC". Official Journal of the European Communities **L 331** (15 December): 1-5.

European Parliament and the Council of the European Union (2001b). "Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use". Official Journal of the European Communities **L 311** (28 November 2001): 67 - 128.

European Union (1992). "Treaty on European Union". Official Journal **C 191** (29 July).

European Union (1997). "The Treaty of Amsterdam: amending the Treaty on European Union, the Treaties establishing the European Communities and certain related Acts".

European Union (2006). "Consolidated versions of the treaty on European Union and of the treaty establishing the European Community". Official Journal of the European Union **C 321** (29 December 2006): 1-331.

European Union (2007). "Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community". Official Journal of the European Union **C 306** (17 December 2007): 1-271.

European Union (2008). "Consolidated version of the Treaty on European Union". Official Journal of the European Union **C 115** (9 May 2008): 13-45.

Fraunhofer-Institute (1999). "Revised Proposal for a list of Priority Substances in the context of the Water Framework Directive (COMMPS procedure)". Fraunhofer-Institute Molecular Biology and Applied Ecology, Schmallenberg, Germany.

Fraunhofer-Institute (2005). "Manual on the methodological framework to derive Environmental Quality Standards for Priority Substances in accordance with Article 16 of the Water Framework Directive (2000/60/EC)". Fraunhofer-Institute Molecular Biology and Applied Ecology, Schmallenberg, Germany.

Fraunhofer-Institute Molecular Biology and Applied Ecology (2002). "Identification of quality standards for priority substances in the field of water policy: towards the derivation of Quality Standards for Priority Substances in the context of the Water Framework Directive".

Fraunhofer-Institute Molecular Biology and Applied Ecology (2005). "Manual on the Methodological Framework to Derive Environmental Quality Standards for Priority Substances in accordance with Article 16 of the Water Framework Directive (2000/60/EC)". Schmallenberg, Germany.

Heintz, H. T. and H. C. Jenkins-Smith (1988). "Advocacy coalitions and the practice of policy analysis". Policy Sciences **21** (2-3): 262-277.

Hermans, L. M. (2005). Actor analysis for water resources management. Delft, Eburon.

Hoogerwerf, A. (1987). "De levensloop van problemen: definiëring, precisering, oplossing". Beleidswetenschap **1** (1): 159 - 181.

IAWD, RIWA-Meuse and IAWR (2008). "Danube, Meuse and Rhine Memorandum 2008".

IAWR (2005). "Position statement of the International Association of Waterworks in the Rhine catchment areas concerning the proposal for a Directive of the European Parliament and of the Council on environmental quality standards and pollution control in the field of water policy and amending Directive 2000/60/EC". Position paper of the International Association of Waterworks in the Rhine catchment area.

INERIS (2007). "Workshop on prioritisation (6/7 November) - Minutes".

Jenkins-Smith, H. C. (1990). Democratic politics and policy analysis. Pacific Grove, Brooks/Cole.

Kaika, M. and B. Page (2003a). "The EU Water Framework Directive: Part 1. European policy-making and the changing topography of lobbying". European Environment **13** (6): 314-327.

Kaika, M. and B. Page (2003b). "The EU Water Framework Directive: Part 2. Policy innovation and the shifting choreography of governance". European Environment **13** (6): 328-343.

Kidd, K. A., P. J. Blanchfield, K. H. Mills, V. P. Palace, R. E. Evans, J. M. Lazorchak and R. W. Flick (2007). "Collapse of a fish population after exposure to a synthetic estrogen". Proceedings of the National Academy of Sciences of the United States of America **104** (21): 8897 - 8901.

Kingdon, J. W. (1984). Agendas, alternatives, and public policies. New York, Harper Collins.

Kiwa Water Research (1996). "Verwijdering glyfosaat en AMPA door adsorptie: onderzoek met actieve kool en alternatieven". Nieuwegein, the Netherlands, KIWA Water Research, W. Siegers, C. de Kok and R. Hopman.

Kiwa Water Research (2004). "Verwijdering van NDMA in de drinkwaterzuivering". Nieuwegein, the Netherlands, BTO, Kiwa Water Research, W. Siegers.

Klaassen, C. D. (2001). Casarett & Doull's Toxicology - the basic science of poisons. New York, McGraw-Hill.

Klijn, E., E. M. van Bueren and J. F. M. Koppenjan (2000). Spelen met onzekerheid. Over diffuse besluitvorming in beleidsnetwerken en mogelijkheden voor management. Delft, Eburon.

Koppenjan, J. F. M. and E. Klijn (2004). Managing uncertainties in networks. London, Routledge.

Länge, R., T. H. Hutchinson, C. P. Croudace, F. Siegmund, H. Schweinfurth, P. Hampe, G. H. Panter and J. P. Sumpter (2001). "Effects of the synthetic estrogen 17α-ethinylestradiol on the life-cycle of the fathead minnow". Environmental Toxicology and Chemistry **20** (6): 1216–1227.

Majone, G. (1989). Evidence, argument, and persuasion in the policy process. New Haven, CT, Yale University Press.

Mitroff, I. (1983). Stakeholder of the organizational mind. Toward a new view of organizational policy making. San Fransisco, Jossey-Bass Publishers.

Netherlands Ministry of housing spatial planning and the environment (2007a). Tolyfluanide; beleid voor carcinogenen uit bestrijdingsmiddelen in drinkwater. Official reply to the letter from the association of Dutch drinking water companies of November 6th 2007.

Netherlands Ministry of housing spatial planning and the environment (2007b). Uitvoeringsprogramma diffuse bronnen waterverontreiniging. Ministry of VROM, the Hague.

Nielsen, G. D. and S. Øvrebø (2008). "Background, approaches and recent trends for setting health-based occupational exposure limits: a minireview". Regulatory Toxicology and Pharmacology **51** (3): 253-269.

Novartis (2006). "Pharmaceuticals in the environment - Novartis position".

Ostrom, E. (1990). Governing the commons: the evolution of institutions for collective action. Cambridge, Cambridge University Press.

Ostrom, E., R. Gardner and J. Walker (1994). Rules, games, and common-pool resources. Ann Arbor, Michigan, University of Michigan Press.

Petrovic, M. and D. Barcelo (2007). Analysis, fate and removal of pharmaceuticals in the water cycle, Elsevier Science.

Reemtsma, T. and M. Jekel (2006). Organic pollutants in the water cycle - properties, occurence, analysis and environmental relevance of polar compounds. Weinheim, Wiley-VCH.

Richardson, J. (2000). "Government, interest Groups and policy change". Political studies **48** (5): 1006-1025.

Rittel, H. and M. Webber (1973). "Dilemmas in a general theory of planning". Policy Sciences **4** (2): 155-169.

RIVM (2006a). "Handreiking voor de afleiding van indicatieve milieukwaliteitsnormen". Dutch institute for public health and the environment.

RIVM (2006b). "Probleemstoffen bij de drinkwaterbereiding". Dutch institute for public health and the environment, report 601024001/2008 for RIWA.

RIWA-Maas (2007). "Glyfosaat en AMPA in het stroomgebied van de Maas". Dutch river water works Meuse.

Sabatier, P. A. (1988). "An advocacy coalition framework of policy change and the role of policy-oriented learning therein". Policy Sciences **21** (2-3): 129-168.

Sabatier, P. A. (1998). "The advocacy coalition framework: revisions and relevance for Europe". Journal of European Public Policy **5** (1): 98-130.

Sabatier, P. A. and H. C. Jenkins-Smith (1988). "Symposium editors' introduction". Policy Sciences **21** (2-3): 123-127.

Sabatier, P. A. and H. C. Jenkins-Smith (1999). The Advocacy Coalition Framework: an assessment (p. 117 - 166). In: Theories of the Policy Process. Boulder, CO, Westview Press.

Sabatier, P. A. and C. M. Weible (2007). The Advocacy Coalition Framework: innovations and clarifications. Theories of the Policy Process. Boulder, Colorado, Westview Press**:** 189-220.

Sacher, F., M. Ehmann, S. Gabriel, C. Graf and H. Brauch (2008). "Pharmaceutical residues in the river Rhine - results of a one-decade monitoring programme". Journal of Environmental Monitoring **10** (5): 664-670.

Sacher, F., F. Lange, H. Brauch and I. Blankenhorn (2001). "Pharmaceuticals in groundwaters: analytical methods and results of a monitoring program in Baden-Württemberg, Germany". Journal of Chromatography A **938** (1-2): 199-210.

Sacher, F. and P. G. Stoks (2003). "Pharmaceutical residues in waters in the Netherlands: results of a monitoring programma for RIWA". RIWA.

Scharpf, F. (1997). Games real actors play: actor-centered institutionalism and policy research. Boulder, CO, Westview Press.

Shellenberger, M. and T. Nordhaus (2004). The death of environmentalism: global warming politics in a post-environmental world. New York, The Breakthrough Institute.

Technologiezentrum Wasser Karlsruhe (2006). Organische Spurenstoffe in der Wasserversorgung. Karlsruhe, DVGW-Technologiezentrum Wasser (TZW).

Teisman, G. R. (2000). "Models for research into decision-making processes: on phases, streams and decision-making rounds". Public Administration **78** (4): 937-956.

Termeer, C. J. A. M. (1993). Dynamiek en inertie rondom mestbeleid. The Hague, VUGA.

Toulmin, S. E. (1958). The uses of argument. Cambridge, University Press.

Toulmin, S. E., R. D. Rieke and A. Janik (1979). An introduction to reasoning. New York, Macmillan Publishing Co.

van Bueren, E. M., E. Klijn and J. F. M. Koppenjan (2001). "Spelen met weerbarstige problemen: het beleidsspel rond emissies van ink uit bouwmaterialen". Beleidswetenschap **15** (2): 169-191.

van Bueren, E. M., E. Klijn and J. F. M. Koppenjan (2003). "Dealing with wicked problems in networks: analyzing an environmental debate from a network perspective". Journal of Public Administration Research and Theory **13** (2): 193-212.

van de Graaf, H. and R. Hoppe (1996). Beleid en politiek: een inleiding tot de beleidswetenschap en de beleidskunde. Muiderberg, Coutinho.

van der Bruggen, B. and C. Vandecasteele (2003). "Removal of pollutants from surface water and groundwater by nanofiltration: overview of possible applications in the drinking water industry". Environmental Pollution **122**: 435 - 445.

Van der Bruggen, B., A. R. D. Verliefde, L. Braeken, E. R. Cornelissen, K. Moons, J. Q. J. C. Verberk, J. C. van Dijk and G. Amy (2006). "Assesment of a semi-quantitative method for estimation of the rejection of organic compounds in aqueous solution in nanofiltration". Journal of Chemical Technology and Biotechnology **81** (7): 1166-1176.

van der Hoek, J., P. Stoks, M. Mons and D. van der Kooij (2008). "Visie op en streefwaarden voor milieuvreemde stoffen in drinkwater". H2O **41** (4): 33-35.

van Dijk, J. C., P. J. de Moel and J. Q. J. C. Verberk (2005). Drinkwater - principes en praktijk. Den Haag, SDU Uitgevers.

van Eeten, M. (1999). Dialogues of the deaf: deifining new agendas for environmental deadlocks. Delft, Eburon.

Verliefde, A., E. Cornelissen, G. Amy, B. Van der Bruggen and J. C. van Dijk (2007). "Priority organic micro pollutants in water sources in Flanders and The Netherlands, and assessment of removal possibilities with nanofiltration". Environmental Pollution **146** (1): 281-289.

Verliefde, A. R. D. (2008). Rejection of organic micropollutants by high pressure membranes (NF/RO). Delft, Water Management Academic Press. PhD dissertation at Delft University of Technology.

Verliefde, A. R. D., S. G. J. Heijman, E. R. Cornelissen, G. Amy, B. Van der Bruggen and J. C. van Dijk (2007). "Influence of electrostatic interactions on the rejection with NF and assessment of the removal efficiency during NF/GAC treatment of pharmaceutically active compounds in surface water". Water Research **41** (15): 3227-3240.

Vewin and Unie van Waterschappen (2008). "Tweede lezing Richtlijnvoorstel milieukwaliteitsnormen waterbeleid en wijziging Richtlijn 2000/60/EG".

Weible, C. M. (2006). "An Advocacy Coalition Framework approach to stakeholder analysis: understanding the political context of california marine protected area policy". Journal of Public Administration Research and Theory **17** (1): 95-117.

Weinberg, A. M. (1972). "Science and trans-science". Minerva **10** (2): 209-222.

World Health Organization (2002). International programme on chemical safety: global assessment of the state-of-the-science of endocrine disruptors. Chapter 5: human health.

World Health Organization (2006). Guidelines for drinking-water quality: Recommendations. Geneva, WHO Press.

WWF and EEB (2007). "Positionpaper on the proposal for a Directive on environmental quality standards and pollution control in the field of water policy amending the Water Framework Directive". World Wide Funds for Nature and European Environmental Bureau.

Zafonte, M. and P. A. Sabatier (1998). "Shared beliefs and imposed interdependencies as determinants of ally networks in overlapping subsystems". Journal of Theoretical Politics **10** (4): 473-505.

Zhang, Y., B. Van der Bruggen, G. Chen, L. Braeken and C. Vandecasteele (2004). "Removal of pesticides by nanofiltration: effect of the water matrix". Separation and Purification Technology **38** (2): 163-172.

Appendices

Appendix A: Abstract visualization of Vewin's objectives

This appendix clarifies the main objective and sub-objectives of the drinking water sector. It is primarily based on information from Vewin, including its website[60], but is in accordance with the goals of the associations of drinking water companies in other countries. Consequently, it is also in accordance with the goals of EUREAU, and can be used as such.

Figure A.1 gives an abstract visualization of the drinking water sector objectives.

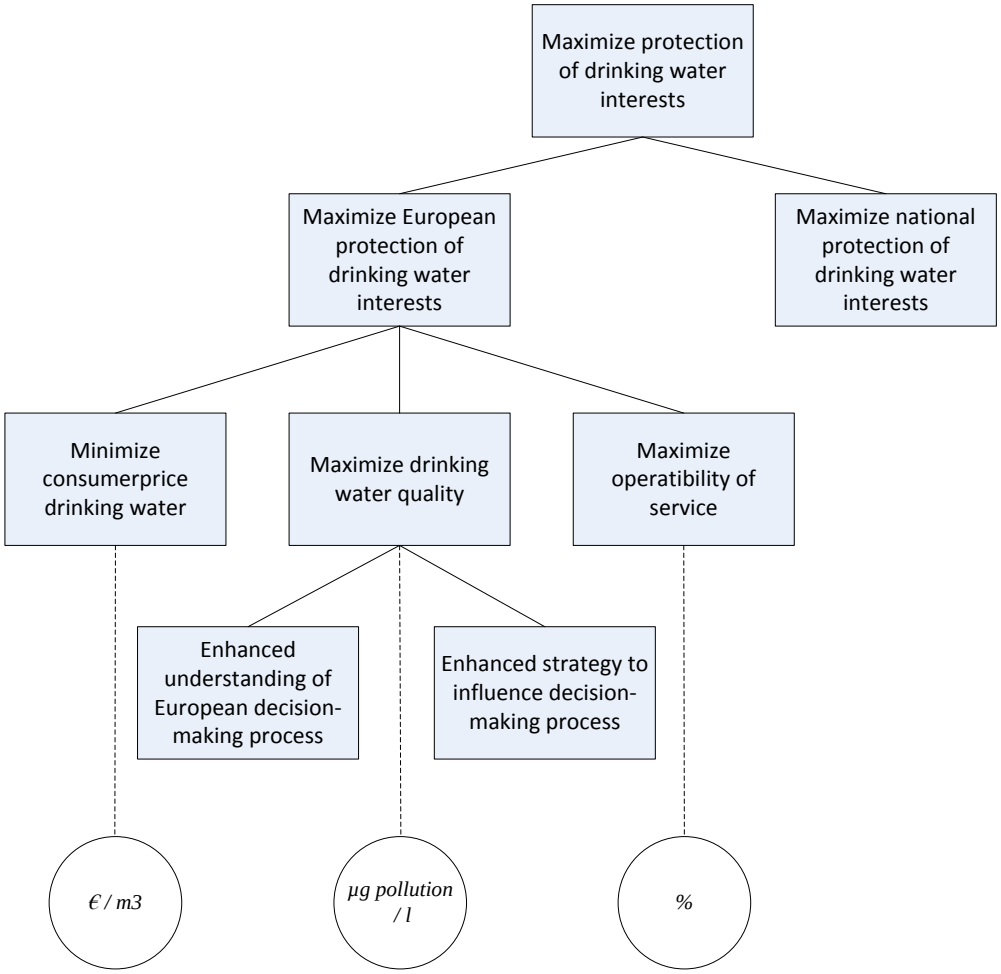


Figure A.1: 'Objective-tree', an abstract visualization of the drinking water sector objectives.

[60] See Vewin, '*Profiel*', accessible online via www.vewin.nl. Date of last consultation: April 17th, 2008.

Appendix B: Original chapter 3 – Vewin's extensive perspective

The text below was intended to serve as chapter 3, after the technical overview and theoretical background. Due to new insights, it was judged that this material was too detailed to be included in the main thesis. Nevertheless, since there are relevant and informative issues outlined, the original chapter 3 is presented in this appendix. If interested, the reader is advised to read this appendix after finishing chapters 1 and 2 of the main thesis due to certain inconsistency issues that emerged from the change in thesis set-up. In addition, please note that this appendix lacks several references and may contain a few inconsistent links. Furthermore, the course for this chapter 3 changed twice: both the use of an argumentation framework (§3.3 and §3.4) and a detailed belief system (§3.5 and §3.6) has been discussed in the graduation committee, but ultimately the author has decided to include neither in the final thesis. These two may not connect as they have been merged into one appendix here.

First, the policy analysis perspective is presented by an outline of factors that are thought to be of relevance in the overall decision-making process (§3.1). Comparing this with the technical overview given in chapter 1, §3.2 will compare the policy analysis approach with the technical perspective of civil engineering. Based on the identified factors, an argumentation framework is constructed which may be used to estimate the likelihood of a substance to get listed as a Priority Substance (§3.3). In addition, this framework can be used as a structured checklist to see if all usable arguments have been included in a position paper or lobby message. In §3.4 this framework is applied to a pesticide (atrazine). Afterwards, the belief system of Vewin is specified using Toulmin's argumentation structure (§3.5). This belief system is applied to both atrazine and glyphosate in §3.6. This chapter is finalized by a conclusion (§3.7).

B.3.1 Outline of relevant factors

Vewin would like to better understand the mechanisms of the decision-making processes within and around the European Union[61]. To Vewin, it is often unclear why certain pollutants are added to the Priority Substances list, whereas others are not, even when much of Vewin's efforts are focused on these. In addition, Vewin would like to exert more influence on these decision-making processes[62]. To this end, the interests of the drinking water sector should be introduced in the decision-making process in a clear and structured way, with analytical, fact-based evidence. Therefore, this paragraph outlines the factors of which Vewin think they play a role in the Priority Substances discussion and decision-making. Thus, not only are factors included that may serve the interests of the drinking water sector, but conflicting interests are included as well: it depicts the world that Vewin sees.

Several sources have been used to discover these factors: meetings with employees, document analysis, scanning of the legal framework and causal relation analysis (see appendix C). To improve transparency and clarity, the factors have been clustered into categories below. Figure 3.1 (page 34) gives an abstract overview of the most important factors and the relations between categories, according to the *current* perspective of Vewin: the way that the problem context is observed *at this moment*.

B.3.1.1 Characterization of the substance

One obvious requirement to influence the decision-making is familiarity with the characteristics of the substance to at least some degree. It is imperative that the coalitions' representatives have some basic information of the substance: what is the purpose of the substance, how does it work, in which sectors is it applied, on what scale is it used? Without such basic information, it is impossible to

[61] See Appendix A: Abstract visualization of drinking water sector goals.
[62] This goal is also reflected in the 'goal tree': Appendix A, Abstract visualization of drinking water sector goals.

estimate which stakeholders will be active (if their interests are at stake) or inactive (if it does not concern them), and what their preferred decision-making outcome is. Therefore, it also becomes very hard to communicate with other stakeholders within the coalition and outside, not to mention influence European Union decision-making. Furthermore, it is also assumed that a general characterization of the substance is an important aspect for the final decision regarding legislation: if a substance is only used on small scale it will be an easy target, whereas large industrial companies will be able to protect their substance more fiercely. Often, this is in line with the characteristic diffuse source (large-scale) vs. point source (small-scale), although this does not have to be the case: therefore, total consumption probably better reflects what is at stake.

B.3.1.2 European Union legislation and procedures

Legislation and regulation plays a large role in the European Union. Of course, the subsidiarity principle[63] is applied, but once an issue is governed at the Community level, EU legislation and regulation is the result. To guarantee (and improve) surface water and drinking water quality, quite some European Union legislation has been established regarding goals and standards on concentrations. Two basic legislative documents in which points of departure regarding water quality are given, are the Water Framework Directive (European Commission, 2000a) and the Drinking Water Directive (Council of the European Union, 1998). In chapter 4 an overview of relevant procedures is included, especially with regard to Priority Substances.

For surface water, the Water Framework Directive's purpose is to *"protect and enhance the status of the aquatic environment"* (European Commission, 2000a, p. 5). The environmental objective is to reach 'good water status' in all river basins in the European Union, which consists of good ecological status and good chemical status. The latter is primarily pursued via the identification of Priority Substances, for which Member States have to adopt measures to progressively reduce pollution of surface water. As stipulated in the Water Framework Directive (WFD), the so-called COMMPS procedure[64] (Fraunhofer-Institute, 1999) identifies potential Priority Substances and gives recommendations to the European Union. Among others, this is based on physical-chemical properties of the pollutant and the measured concentrations (see chapter 4/5). After the formal decision-making process within the European Union, a decision is made[65] by the sovereigns regarding which pollutants are labeled as Priority Substances (European Commission, 2001b). The set of Priority Substances together forms Annex X of the Water Framework Directive (European Commission, 2000a, p. 18). In addition to the required reduction in discharges, an Environmental Quality Standard (EQS) is established for Priority Substances, based on the EQS-procedure[66] (Fraunhofer-Institute, 2005). These standards are surface water limits: the concentration of a pollutant in any given river basin in the European Union is not allowed to exceed this standard.

For drinking water, the European Union has established a Drinking Water Directive. The objective of this Directive is *"to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean" (Council of the European Union, 1998, p. 34)*. To pursue this objective, a list with drinking water standards for several pollutants is included in Annex I of this directive. For each specific pollutant, the concentration in drinking water is not allowed to exceed its drinking water standard. For each individual pesticide, including atrazine, glyphosate and mecoprop, the standard is 0,1 µg/l.

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[63] To govern topics at the lowest level of aggregation as possible [find reference]. This implied that only issues that cannot be arrange on a national or regional (river basin) level, will be governed on a Community level.
[64] Combined Monitoring-based and Modelling-based Priority Setting scheme procedure; see chapter 4.
[65] This decision does not strictly have to follow the recommendations from the COMMPS-procedure. 'Alternative considerations' are taken into account; see the European Union, *"Preparation of the first list of priority substance"*, accessible via http://ec.europa.eu/environment/water/water-framework/preparation_priority_list.htm. Date of last consultation: April 22nd, 2008.
[66] Environmental Quality Standard procedure. See chapter 4, 'procedure review'.

B.3.1.3 World Health Organization guidelines and national legislation

Besides European Union legislation, there are also other 'values' for surface and drinking water. These may serve as useful arguments to plea for equal standards at Community level, for three reasons:

- national surface water standards, like the MTR-standard in the Netherlands, have also been derived on a scientific basis. It may be desired, or even necessary, to have EU-standards for these substances as well, for instance to cope with the problem of upstream pollution. There simply are no EU surface water standards yet for pollutants that are not a Priority Substance;
- the drinking water guidelines of the World Health Organization (WHO) are regarded as relatively authoritative. If these are stricter than the EU-standards in the Drinking Water Directive, then the level of strictness of the latter could be questioned. Furthermore, for a large number of substances (for instance pharmaceuticals), no standards are included in the Drinking Water Directive so far; as a result of scientific and technical progress, maybe they should be derived and be included;
- one of the European Union's "alternative considerations" to differ from the COMMPS recommendations, is the degree to which non-EU standards and legislation are already in place elsewhere. This is because the economic costs of potential EU-legislation will be significantly lower in that case

Note that the World Health Organization guidelines for drinking water, and the national standards regarding surface water, are based on an elaborate scientific review. For calculating the WHO-guidelines for drinking water, this includes determining several forms and degrees of toxicity, establishing the No Observable Adverse Effect Level (NOAEL) using multiple species, plus a large uncertainty factor to derive the Total Daily Intake (TDI) that is allowed. This is converted to a specific WHO drinking water guideline, indicating the maximum concentration without endangering public health.

As several types of toxicity (the degree to which a chemical is able to produce damage to an exposed organism) can be identified, toxicity cannot be expressed in one simple parameter. Types of toxicity include acute vs. chronic toxicity, ecotoxicity, carcinogenesis and genotoxicity. Each of these types is tested using several kinds of animals, all resulting in different toxic doses per kg weight. These are then converted into maximum concentrations in surface water and drinking water; however, often different organizations come to different conclusions, as 'toxicity' is surrounded by large uncertainties. For more information, Casarett & Doull's handbook on toxicology provides an extensive scientific overview (Klaassen, 2001). For this research, the "No Observable Adverse Effect Level" (NOEAL) derived by WHO is used to provide at least some insight in levels of toxicity of various pollutants.

B.3.1.4 Measured concentrations and removal rate

The concentration of a large amount of pollutants in surface water and drinking water is extensively measured and monitored in the European Union, mainly by Member States and drinking water companies. Using the two previous aspects ('EU-legislation' and 'WHO-guidelines and national legislation'), these measurements can be compared with the standards and guidelines. This is also depicted in the causal relation diagram (Appendix B).

For instance, if concentrations in drinking water exceed the standards stipulated in the Drinking Water Directive, then this results in strong backing evidence for Vewin: the concentration in the drinking water source (i.e. surface water) is too high to fulfill the Drinking Water Directive, and therefore, surface water legislation is required as stipulated in the Water Framework Directive: *"Member States should (…) ensure compliance with Council Directive (...) relating to the quality of water intended for human consumption"* (European Commission, 2000a, p. 4).

Furthermore, as noted before, the Water Framework Directive specifies that Member States avoid deterioration of surface water quality; moreover, the quality should be such that the level of

purification treatment required for the production of drinking water can be reduced. An analysis of the trend in surface water concentrations can therefore be made, and compared with this specification. [zelfs nog sterker in de ogen van Vewin: towards simple treatment]

The removal rate in drinking water treatment plants can be derived by dividing the drinking water concentration by the surface water concentration. However, because this largely depends on the data that is used (and the data used for the surface water is not the same as the drinking water), it is more transparent and direct to use a separate indicator for the removal rate. An often used indicator, especially for (polar) micro-pollutants is the log KOW (log Octanol-water partitioning Coefficient; the lower, the more bioaccumulation takes place and the harder removal is in drinking water treatment plants; explanation and reference). Although nowadays new indicators for the removal rate in drinking water plants are developed, for instance [Arne's parameter, 2008, reference], the log KOW is used here because it is well-known. However, in the future, the drinking water companies may use for instance [Arne's parameter] since this may reflect the removal rate more correctly.

B.3.1.5 Current and future effects

Furthermore, when the effects of higher concentrations in surface water or drinking water can be observed in reality or in literature, then this may serve as 'evidence'. It should be noted that effects on public health will mainly be demonstrated in literature as a result of the required period of daily intake (70 years) on which the calculations are based. The ecological effects, on the other hand, are often observable in reality already.

In addition, accidents often create a 'window of opportunity', or a sense of urgency. Although this specifically relates to that specific moment right after the accident, it is assumed that a recollection of such events can be used retroactive, even if they may not be as powerful.

Finally, potential measures by the European Union (i.e. labeling a pollutant as Priority Substance) results in economic effects for the producer of the pollutant (lower revenue). As European Union measures should be 'cost-efficient' based on a 'socio-economic analysis' [reference], the economic effects for the producer are taken into account. Moreover, the more revenues the producer yields from this specific pollutant, the fiercer their position will be to keep the status quo. The economic effects are also dependent on the availability of a substitute product; but since these are extremely hard to estimate and not even pursued by experts [see PHS socio-economic study, 2000; "an analysis of advantages and drawbacks of the substance and of the availability of replacement substances" (Council reg. No. 793/93)], the indicator that is used here is an estimation of the revenues in the European Union for a specific substance, based on production.

B.3.1.6 Public opinion

The European Union stimulates, and often even demands, "public involvement" during decision-making processes [EU-reference; WFD reference, article XX public participation; reference to Renn -> stakeholder participation]. Thus, the public opinion can have quite some influence on the decision-making, and therefore on the final decision. Also, the European Parliament represents the interests of the European Union citizens, and is therefore receptive to the public opinion. Thus, the public opinion regarding pollutants in surface water and drinking water may prove to be a powerful argument. Since the public opinion cannot be measured directly[67], a proxy-indicator is used: media attention. It is worth noting that Vewin thinks that public opinion is not only based on facts, but merely on incomplete facts or facts out of context that trigger emotions [reference]. A recent survey has again indicated that customers know very little about drinking water, which may partially explain this [survey reference, Vewin, 2004].

[67] There is no research in that area available at the moment. Undertaking a questionnaire to determine the public opinion would be time-consuming, and therefore necessarily falls out of scope of this research project.

B.3.1.7 Political climate and dogma's

Finally, several dogma's and principles are used in legislation, debates and decision-making. These include the polluter-pays-principle, sustainability, the principle of prevention, the use of best practices and best available techniques, the importance of economic growth, the principle of simple treatment, and more. All of these play a role in this context, and based on the political climate, they are expected to be of more or less importance in the discussions. However, it is not possible to discriminate between pollutants based on these dogma's: each of the pollutants is affected by them equally. Although these dogma's are out of this research scope, Vewin thinks that the political climate has played a role over the last decennium; this will be taken into account in structuring the main policy arguments of coalitions.

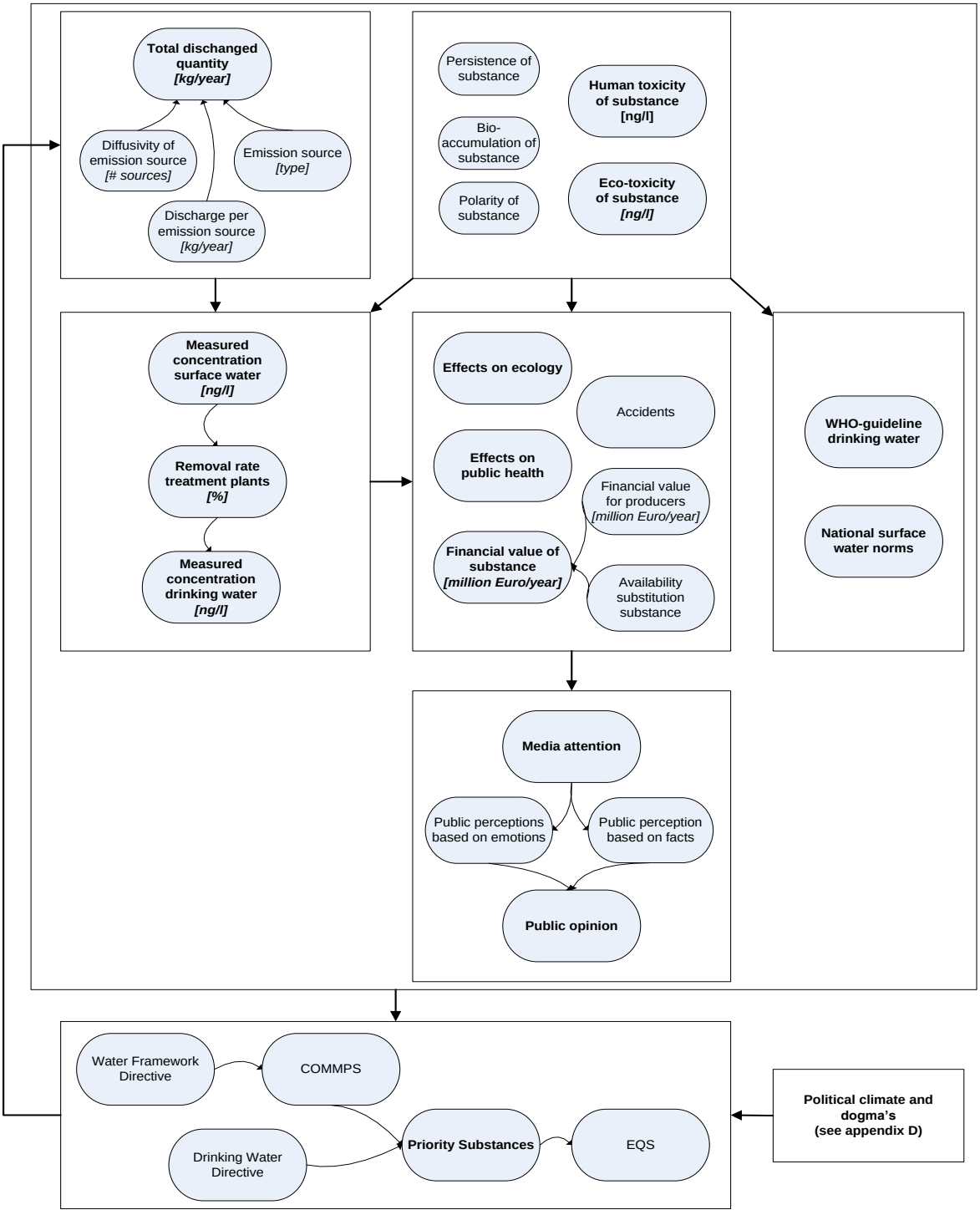


Figure B.3.1: Overview of main factors and relations between categories of factors based on Vewin's perspective.

B.3.2 Civil Engineering vs. Policy Analysis: overview

Figure 3.2 presents an abstract visualization that compares the technical, civil engineering approach (factors indicated in dark blue) with the policy approach (all shown factors). Obviously, the policy approach studies a much broader context than the technical approach, whereas the technical approach is focused on depth. For each individual task, the most suitable approach should be chosen. For studying the decision-making processes, the policy approach clearly is the most suitable approach. Needless to say, the technical approach (and all the accompanying knowledge within the civil engineering department) itself is indispensable for having healthy drinking water; and it is also an element that plays a role within the wider policy context. It will be used as such in the remainder of the study.

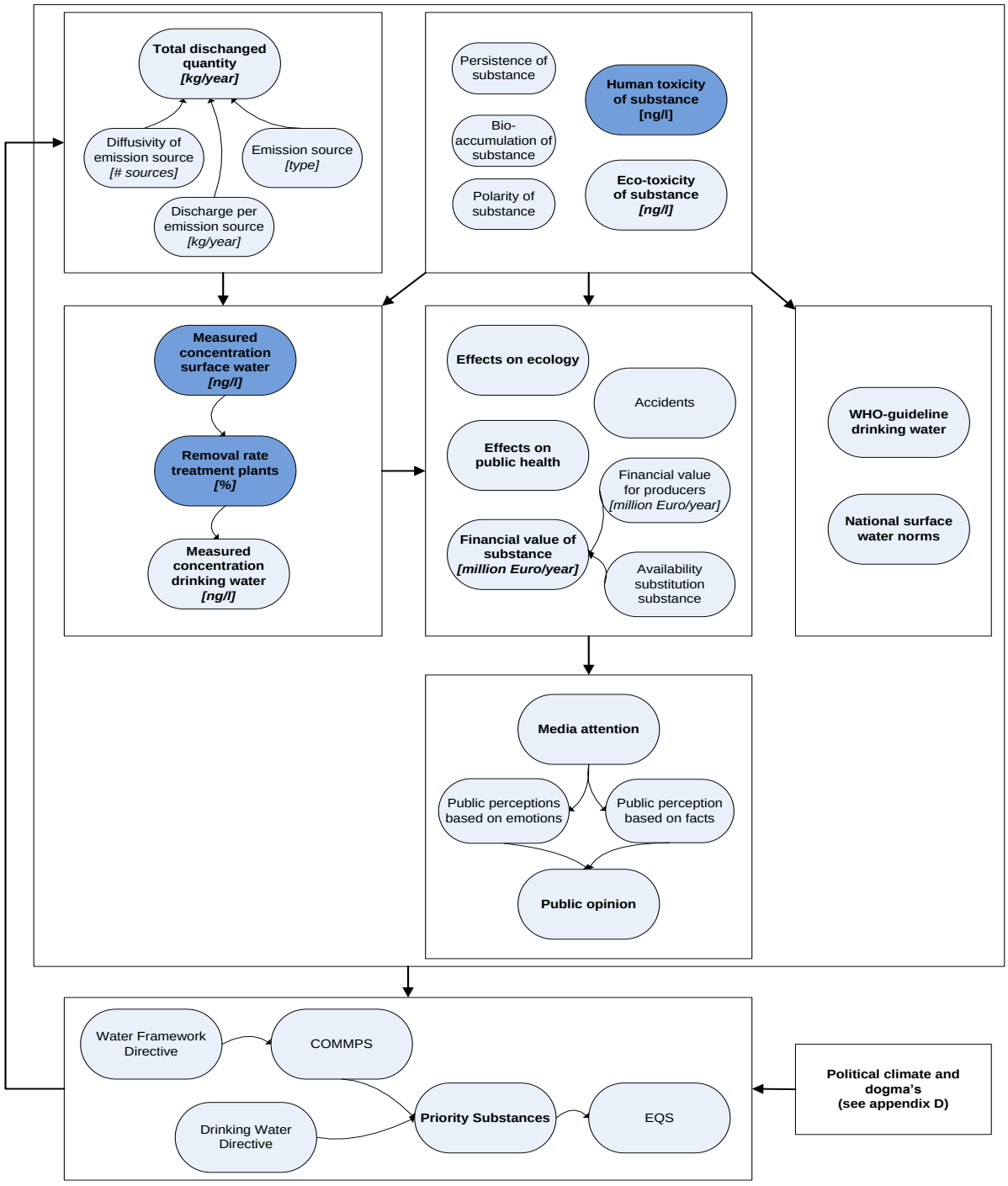


Figure B.3.2: Overview of factors included in the technical approach vs. policy approach.

Although this is only one specific case in which a technical approach (and consequent technical factors) is not decisive for the outcome of a decision-making process, many other examples can be found in literature (de Bruijn and ten Heuvelhof, 2003): as environmentalists have figured by now, sound science alone is insufficient to overcome industry interests (Shellenberger and Nordhaus, 2004). Often, technical knowledge carefully documented in reports is disregarded by policy- and decision-makers: different options than the ones suggested are chosen. This has often resulted in agitated researchers and other technical experts, for instance when they saw *"how inches of their 'high quality' reports and analysis were pulverized in the grindings of the policy-making process"* (van Eeten, 1999, p. 2). From the viewpoint of water experts, policy- and decision-makers have little understanding of water interests (Hermans, 2005). There appears to be a gap between research and technical knowledge on the one hand, and policy- and decision-making on the other. Sometimes this is because of the quality of these analyses, although often even sound analyses prove to have only little influence on stakeholders and their decision-making (de Bruijn and Porter, 2004). De Bruijn and Porter give several potential explanations for this, including the unstructured nature of these kind of problem, a lack of consensus regarding the trade-offs that have to be made between specific criteria[68], and the presence of a sense of urgency when the technical knowledge is presented[69]. In addition, an alternative explanation that can be thought of is the failure of stakeholders to introduce existing technical knowledge into the decision-making, who would otherwise benefit from it. Finally, the principle of 'dialogue of the deaf' may explain why technical information, although introduced, does not yield expected results: as a result of conflicts between the belief systems of two coalitions of stakeholders (Sabatier, 1988, p. 155), stakeholders talk past each other by using arguments that differ significantly from each other (van Eeten, 1999, p. 2). Therefore, the *utilization of technical knowledge* as such is not always as efficient as possible. In the remainder of this research, the role of technical knowledge will be investigated, and opportunities for *using* such technical knowledge to a larger degree will be identified (i.e. preventing the presented explanations from becoming true). As will be seen, enhanced utilization of technical knowledge would have yield more favorable decision-making outcomes for the drinking water coalition in the past (chapter 5); so for the future, it may be possible to use technical knowledge in a more effective way.

B.3.3 General argumentation framework

This paragraph presents the Argumentation Framework. It consists of two steps:

1. Collecting the required 'fact-based' information regarding the components
2. Converting the information into arguments, and thereby determining the applicability of each argument for the decision-making process

Only the final version of the Argumentation Framework is presented here. For each substance that may be threatening the drinking water quality, an individual evaluation can be made using this argumentation framework, determining which fact-based arguments can be used to strengthen the drinking water interests in the decision-making. Note that in §3.4, examples are given of how to apply the argumentation framework.

[68] With regard to the occurrence of pharmaceuticals in water, for instance, two competing criteria are public health and ecology: pharmaceuticals primarily serve public health, but may endanger ecology (and public health). Stakeholders may differ in the way they value the importance of each criteria.

[69] Sense of urgency: at least some stakeholders experience the problem as significant and call for an immediate solution. Without such a sense of urgency, new technical knowledge is not directly embraced as stakeholders are busy with other problems (i.e. the technical knowledge at that moment lacks importance).

B.3.3.1 Step 1: Collection of information

Table 3.1 presents the first step of the argumentation framework. In this step, the cells in blue have to be filled in based on information that has to be collected. This information will be used for table 3.2.

Table B.3.1: Step 1 of the argumentation framework, collection of information

A. Characterization of the substance			
A.1 General description of the application purposes	*[enter short description here]*		
A.2 Diffusivity of the substance	*[list the emission sources here]*		
B. Legislation and guidelines regarding concentrations			
B.1 Strict EU legislation			
B.1.1 Drinking water norm in DWD	*[enter value]*	µg/l	
B.1.2 Surface water trend in WFD	*[enter trend graph]*	µg/l	
B.2 Other values and guidelines (non-EU-wide)			
B.2.1 Drinking water guideline WHO	*[enter value]*	µg/l	
B.2.2 Surface water norm Member State (f.i. MTR)	*[enter value]*	µg/l	
C. Measurements of concentrations			
C.1 Measuring methods are available	*[enter yes or no]*		
C.2 Measuring methods are cost-efficient/affordable	*[enter yes or no]*		
C.3 Sufficient measurements have been undertaken	*[enter yes or no]*		
C.4 Measured concentrations*	Average conc. [µg/l]	Max. conc. [µg/l]	
C.4.1 Measured concentrations drinking water	*[fill in value]*	*[fill in value]*	
C.4.2 Measured concentrations surface water	*[fill in value]*	*[fill in value]*	
C.5 Log-KOW (removal rate)			
D. Current effects and effects of measures			
D.1 Hazardous properties of substance			
D.1.1 NOAEL according to WHO	*[fill in value]*	mg/kg body weight	
D.1.2 Persistence according to WHO	*[fill in value]*	***?!***	
D.1.3 Bio-accumulation according to WHO	*[fill in value]*	***?!***	
D.2 Adverse effects of substance			
D.2.1 Adverse effect on public health	*[description based on theoretical long/run effects in literature]*		
D.2.2 Adverse effect on ecology	*[description based on current observable effects in literature and expert interviews]*		
D.3 Financial effects of measures for industry**	*[enter value]*	million EUR	
E. Accidents and public opinion			
E.1 Accidents with this substance have occurred	*[enter yes/no based on history]*		
E.2 Public opinion: in favor of measures	*[enter yes/no based on media attention]*		

* regarding concentrations: find values in reports of KIWA, RIVM, RIWA, individual drinking water companies, etc. Collect sufficient data in order to have reliable values. Furthermore, the removal rate in the drinking water treatment plant can be derived by comparing the values of C.4.1 and C.4.2.

** based on socio-economic study executed on behalf of the European Union ("an analysis of advantages and drawbacks of the substance and of the availability of replacement substances" (Council reg. No. 793/93)). For instance, see (example atrazine). These financial effects of potential measures (D.3) should be compared with the adverse effects on public health and ecology (D.1 and D.2) to determine if measures can be implemented cost-efficient (cost-efficiency is a requirement for a substance to become a Priority Substance, stipulated in the WFD -> reference). It is assumed that measures are more likely to be cost-effective when other legislation (of member states or river basins) already stipulates the phase out of the substance; see identification of PHS, 2000

B.3.3.2 Step 2: Conversion into arguments

Table 3.2 presents the second step of the argumentation framework, in which the information from table 3.1 is converted into arguments. Based on the conditions that are stipulated, the red cells can be "checked". The following paragraph will illustrate this with two examples.

Table B.3.2: Step 2 of the argumentation framework, conversion of information into arguments

Argument			***Argument can be used by...***		
			Drinking water coal.	**Neutral**	**Industry coalition**
A.2	Diffusivity of the substance		*[if point source]*		*[if diffuse source]*
B/C*	*Drinking water*	norm EU**	*[if C.4.1 > B.1.1]*	*[if C.4.1 < B.1.1]*	
		guideline WHO	*[if C.4.1 > B.2.1]*	*[if C.4.1 < B.2.1]*	
	Surface water	trend in surface concentr. **	*[if B.1.2 upward]*		*[if B.1.2 downward] *****
		Member State	*[if C.4.2 > B.2.2]*	*[if C.4.2 < B.2.2]*	
	Removal rate drink. water		*[if C.5 is rel. low]*	*[if C.5 rel. high]*	
D.1	NOAEL		*[if rel. low]*		*[if rel. high]*
	Persistence		*[if rel. high]*		*[if rel. low]*
	Bio-accumulation		*[if rel. high]*		*[if rel. low]*
D.2	Adverse effects on PH		*[if present]*		*[if not present]*
	Adverse effects on ecology		*[if present]*		*[if not present]*
D.3	Financial effects measures****			*[if small]*	*[if large]*
E	Accidents and pub. opinion		*[if yes yes]*		*[if no no]*

* This box is only applicable if C.1, C.2 and C.3 have been answered with 'yes'

** These arguments are expected to have much influence, as they are directly related to existing European Union legislation

*** Industry coalition can argue that they are only responsible for the surface water concentration; drinking water concentration is the responsibility of drinking water companies. Therefore, if the surface water concentration does not exceed EU-norms, the industry may exploit this

**** This argument is expected to have much influence; if potential measures would have a large financial impact, then the industry coalition will engage vigorously, basing their arguments on the cost-inefficiency of the measures (WFD).

B.3.4 Testing the framework with atrazine

This paragraph will illustrate, and test, the argumentation framework with an example: atrazine. During the collection of information for these examples (i.e. collection of information), slight changes have been made to the argumentation framework. Therefore, 'testing' proved directly beneficial. For instance, in an earlier version several types of toxicity were included, since toxicity (the degree to which a chemical is able to produce damage to an exposed organism) cannot be expressed in one simple parameter. Types of toxicity include acute vs. chronic toxicity, ecotoxicity, carcinogenesis and genotoxicity. Each of these types is tested using several kinds of animals, all resulting in different toxic doses per kg weight. For more information, Casarett & Doull's handbook on toxicology provides an

extensive overview (Klaassen, 2001). The previous included toxicity has now been replaced by "NOAEL", as that is a more general expression which better reflects the hazardous property of a substance.

B.3.4.1 Argumentation framework for atrazine

Table 3.3 presents the first step of the argumentation framework applied to the pesticide atrazine. Information has been collected from a number of sources, which are indicated as footnote to maximize readability. Table 3.4 converts the information from table 3.3 to arguments that can be used, or not used, in the decision-making.

Table B.3.3: Step 1 of the argumentation framework for atrazine, collection of information[70]

A. Characterization of the substance			
A.1 General description of the application purposes	*Atrazine belongs to the group of herbicides. It is used for a variety of uses, including the control in weeds in production of maize, asparagus, sugar-cane and pineapple. Several countries have restricted its use. With Granular Activated Carbon as treatment step, atrazine can be removed sufficiently to produce drinking water.*		
A.2 Diffusivity of the substance	*Agricultural sector: widely applied where permitted.*		
B. Legislation and guidelines regarding concentrations			
B.1 Strict EU legislation			
B.1.1 Drinking water norm in DWD	*0,1*	µg/l	
B.1.2 Surface water trend in WFD	*[enter trend graph]*	µg/l	
B.2 Other values and guidelines (non-EU-wide)			
B.2.1 Drinking water guideline WHO	*2,0*	µg/l	
B.2.3 Surface water norm Member State: MTR	*2,4*	µg/l	
C. Measurements of concentrations			
C.1 Measuring methods are available	*yes*		
C.2 Measuring methods are cost-efficient/affordable	*yes*		
C.3 Sufficient measurements have been undertaken	*yes*		
C.4 Measured concentrations*	Average conc. [µg/l]	Max. conc. [µg/l]	
C.4.1 Measured concentrations drinking water	*0,01 - 5*	*5*	
C.4.2 Measured concentrations surface water	*[fill in value]*	*[fill in value]*	
D. Current effects and effects of measures			
D.1 Hazardous properties of substance			
D.1.1 NOAEL according to WHO	*0,5*	mg/kg body weight	
D.1.2 Persistence according to WHO	*[fill in value]*	***?!***	
D.1.3 Bio-accumulation according to WHO	*[fill in value]*	***?!***	
D.2 Adverse effects of substance			
D.2.1 Adverse effect on public health	*increased risk on ovarian neoplasia*		
D.2.2 Adverse effect on ecology	*sexual development of frogs*		
D.3 Financial effects of measures for industry**	*[enter value]*	million EUR	
E. Accidents and public opinion			
E.1 Accidents with this substance have occurred	*Atrazine was one of the chemicals that was released as result of the Sandoz-disaster*		
E.2 Public opinion: in favor of measures	*[enter yes/no based on media attention]*		

[70] The information has been based on: Drinking Water Directive, WHO-guideline for atrazine [reference], RIVM MTR-norms biocides, and others.

Table B.3.4: Step 2 of the argumentation framework for atrazine, conversion of information into arguments

Argument			***Argument can be used by...***		
			Drinking water coal.	**Neutral**	**Industry coalition**
A.2	Diffusivity of the substance				*X*
B/C*	*Drinking water*	norm EU	*[if C.4.1 > B.1.1]*	*[if C.4.1 < B.1.1]*	
		guideline WHO	*[if C.4.1 > B.2.1]*	*[if C.4.1 < B.2.1]*	
	Surface water	trend in surface concentr.	*[if B.1.2 upward]*		*[if B.1.2 downward]*
		Member State	*[if C.4.2 > B.2.2]*	*[if C.4.2 < B.2.2]*	
D.1	NOAEL				*X*
	Persistence		*[if rel. high]*		*[if rel. low]*
	Bio-accumulation		*[if rel. high]*		*[if rel. low]*
D.2	Adverse effects on PH		*X*		
	Adverse effects on ecology		*X*		
D.3	Financial effects measures****			*[if small]*	*[if large]*
E	Accidents and pub. opinion		*X*		

B.3.5 Vewin's belief system

The perspective of Vewin on the problem context will now be used as input for the illustration of their belief system. As discussed in chapter 2, a belief system is defined as a combination of the 'as is' view and the 'should be' view.

B.3.5.1 'As is' viewpoint

Vewin's 'as is' viewpoint identifies those factors that Vewin thinks are of importance in the decision-making process regarding Priority Substances. They are presented as a short list (table 3.1), and have been (subjectively) derived from the perspective presented in the last paragraph. After the decision-making reconstruction in chapters 4 and 5, using derived lessons (chapter 6), recommendations for enlarging Vewin's belief system will be developed in order to better protect the drinking water interests.

Table B.3.5: Vewin's current 'as is' viewpoint

Factor	***Specification***	***Argument important if...***	***Argument used by...***
EU WFD	'surface water quality must improve'; 'simple treatment is goal'	no downward trend in concentrations	Vewin
Non-EU legislation	WHO and Member States	stricter legislation exist	Vewin
Toxicity	human and eco-toxicity	relatively high	Vewin
Removal potential	in drinking water treatment plants	low removal possibilities	Vewin
Effects	on humans and ecology	relatively many effects	Vewin
Value	financial value to industry	relatively high value	Industry
Public opinion	difference between pesticides (accepted) and pharmaceuticals (not accepted)	pharmaceuticals are found	Vewin

Note that the column 'specification' is given additional information regarding underlying reasons why a factor may be of importance. For instance, Vewin interprets the EU Water Framework in such a way that 'surface water quality must be improved', and that the long-term goal is 'to reach a situation in which drinking water can be produced by only applying simple treatment'. Simple treatment refers to the absence of more advanced treatment techniques that are currently often applied, like granular

activated carbon filtration, disinfection, membrane filtration, etc. However, this goal cannot be found in those terms in the Water Framework Directive itself.

B.3.5.2 'Should be' viewpoint

The 'should be' view identifies the main policy argument that is brought forward in the discussion. It is the principal viewpoint which is the basis for the involvement in the discussion in the first place; the reasoning process is build around it, and the identified factors that are of importance to decision-making may be used to support Vewin's principal viewpoint. This all can be used in the principal policy argument, which is unraveled using argumentative analysis: Dunn's six elements of a policy argument (Dunn, 1994). Figure 3.2 shows the structure of Vewin's principal policy argument, based on the following elements (compare with figure 2.1):

Policy relevant Information:	'Clean sources are required for the delivery of drinking water of undisputed quality'
Policy Claim:	'List synthetic micro-pollutants as Priority Substances'
Since Warrant:	'Simple treatment cannot remove synthetic micro-pollutants'
Because Backing:	'Simple treatment is the goal of WFD'
Because Backing 2:	'Even advanced treatment cannot fully remove the synthetic micro-pollutants'
Qualifier:	is not required here (100% deterministic)
Rebuttal:	not applicable, it is generally known that simple treatment cannot remove synthetic micro-pollutants

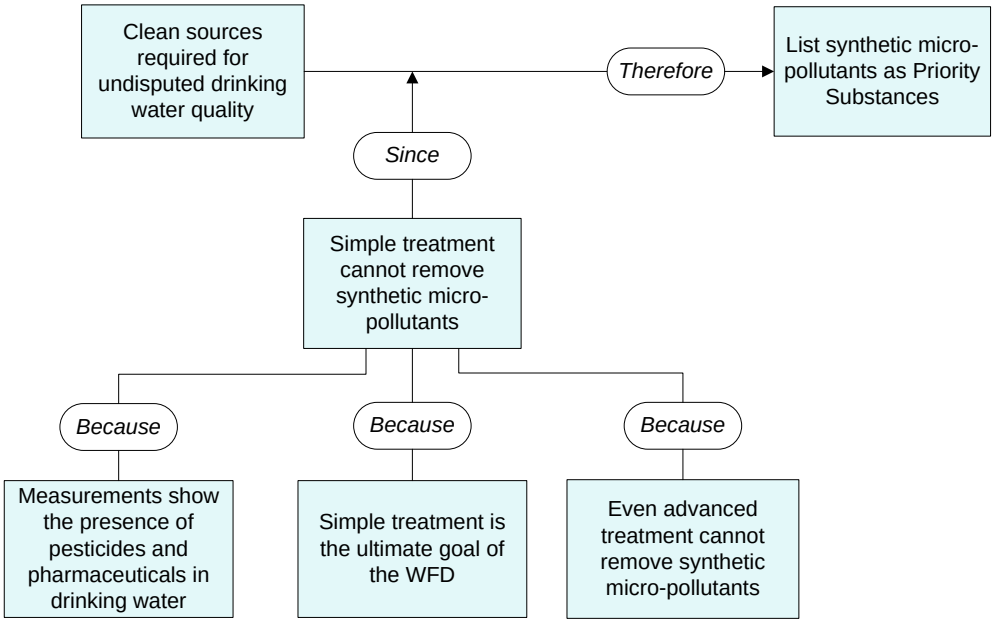


Figure B.3.3: Vewin's principal policy argument, displaying their 'should be' view.

B.3.6 Pesticides as specified illustration

This paragraph will specify the belief system for two specific pesticides, which receive special attention during the decision-making reconstruction in the following chapters. These two pesticides are atrazine (a Priority Substance) and glyphosate (not a Priority Substance), for reasons discussed in §1.3.2. The belief system is defined as a combination of the 'as if' and 'should be' view. This belief system, if specified for a certain pollutant, illustrates Vewin's viewpoint with regard to this pollutant. These belief

systems will be compared to examine whether there are factors that may explain the difference in decision-making outcome so far (see §3.3.3).

B.3.6.1 Atrazine

The 'as is' view of Vewin to atrazine is derived by applying their general 'as is' view, presented in table 3.1. This is shown in table 3.2. The 'should be' view regarding atrazine is not displayed as atrazine is already labeled as Priority Substance, and therefore the current situation reflects Vewin's desired situation.

Table B.3.6: Vewin's 'as is' view on atrazine

Factor	***Regarding atrazine***	***Specification***	***Argument used?***
EU WFD	surface water concentrations are decreasing	see figure 3.2 as example	no
Non-EU legislation	use of atrazine was banned in many countries already before it was labeled PS	this helped in reducing surface water concentrations, already before listed as PS	yes, by Vewin
	WHO drinking water guideline and MTR Dutch surface water standard	WHO: 2,0 µg/l MTR: 2,4 µg/l	
Toxicity	labeled as 'unlikely to present acute danger' (WHO)	NOAEL = 0,5 mg/kg body weight (WHO)	yes, by Vewin
Removal potential	using low KOW	log KOW = 2,6 (relatively low) (EPA, atrazine factsheet)	yes, by Vewin
Effects	known public health effects	increased risk of ovarian neoplasia (reference)	yes, by Vewin
	known ecological effects	sexual development of frogs (reference)	
Value	unknown to Vewin	unknown to Vewin	yes, industry
Public opinion	mixed thoughts within Verwin	pesticides not accepted in drinking water because they destroy organisms; but pesticides required for economic growth	no

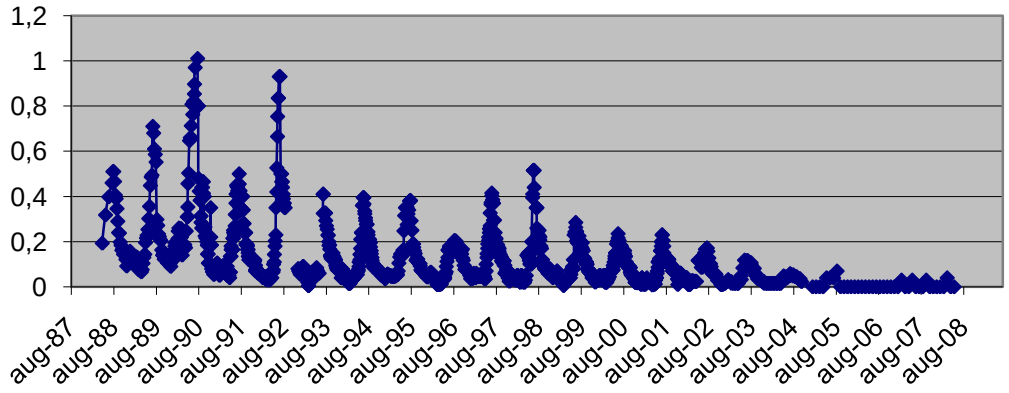


Figure B.3.4: Atrazine concentrations in surface water at location Keizersveer (data delivered by RIWA-Meuse)

B.3.6.2 Glyphosate

Again, the 'as is' view of Vewin is derived from their general 'as is' view; this time applied to glyphosate. This is shown in table 3.3. The 'should be' view regarding glyphosate is displayed in figure 3.3.

Table B.3.7: Vewin's 'as is' view on glyphosate

Factor	***Regarding glyphosate***	***Specification***	***Argument used?***
EU WFD	surface water concentrations are increasing	see figure 1.2 as example	yes
Non-EU legislation	not banned in EU Member States		no
Toxicity	labeled as 'unlikely to present acute hazard in normal use' (WHO, 2006?)	NOAEL = X mg/kg body weight (WHO)	yes, by Vewin
Removal potential	?	low [use logKow]	yes, by Vewin
Effects	known public health effects	(reference)	yes, by Vewin
	known ecological effects	(reference)	
Value	estimated to be very high as it is one of the most applied herbicides by volume	exact data unknown to Vewin	Industry
Public opinion	mixed thoughts within Verwin	pesticides not accepted in drinking water because they destroy organisms; but pesticides required for economic growth	no

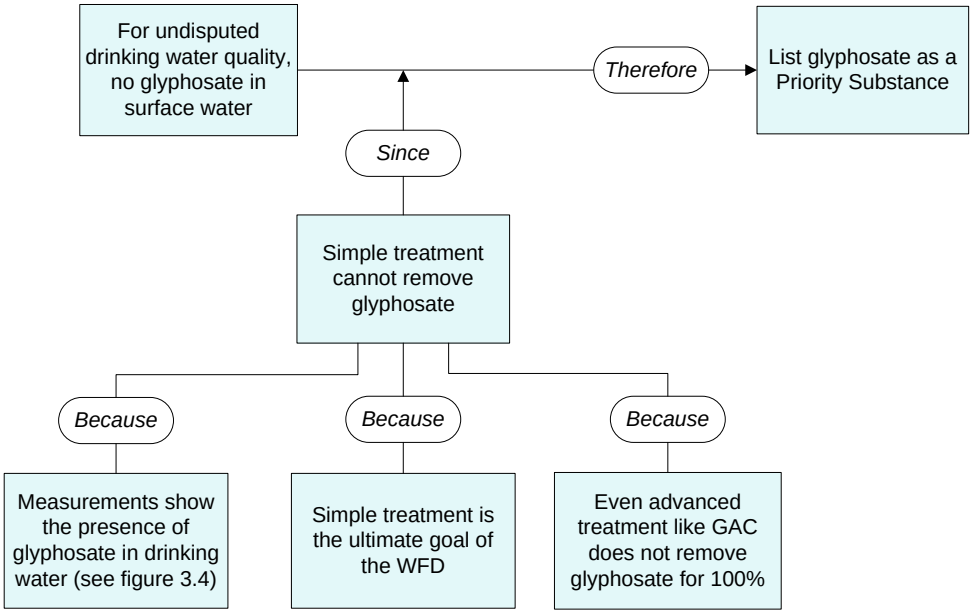


Figure B.3.5: Vewin's principal policy argument with regard to glyphosate, displaying their 'should be' view.

B.3.6.3 Comparison of specified belief systems: difference atrazine vs. glyphosate?

Obviously, the most important difference between atrazine and glyphosate is that atrazine is listed as Priority Substance and glyphosate is not. However, Vewin would like to understand why this is the case. It can be concluded from the specified belief systems, which were just presented, that the factors within Vewin's belief system do not really give an explanation: the surface water concentrations for glyphosate are only increasing, whereas the concentrations for atrazine were already decreasing before it was listed as Priority Substance (see figured 3.2 in the period before 2001). On a side-note, atrazine may be more toxic and, hence, toxicity may be part of the

explanation. In addition, atrazine was already banned in many EU Member States, making it easier for the EU institutions to list it as Priority Substance. But during the decision-making reconstruction, more convincing explanations will be given.

B.3.7 Conclusion

This chapter has presented the perspective of Vewin on the Priority Substances problem context. Factors that play a role in this context have been identified and described. Using this perspective, the belief system of Vewin (a combination of the 'as is' and 'should be' view) has been illustrated. This belief system has been specified for atrazine and glyphosate, and after comparison it can be concluded that there are no large differences in these specific belief systems that may explain the difference in decision-making outcome (atrazine listed as PS, glyphosate not listed as PS). Throughout the decision-making reconstruction (chapters 4 and 5), including an analysis of the legal procedures, more convincing explanations will be derived. Using the lessons from the decision-making reconstruction may therefore also result in recommendations to widen Vewin's belief system and enhance and/or extend the argumentation structure strategically (see chapter 7): one of the goals of this research is to better protect drinking water interests.

The following chapter will give an introduction to the decision-making reconstruction, by modeling the decision-making rounds and the identification of coalitions. Obviously, Vewin is part of one of these coalitions, based on a (more or less) shared belief system, as will be seen.

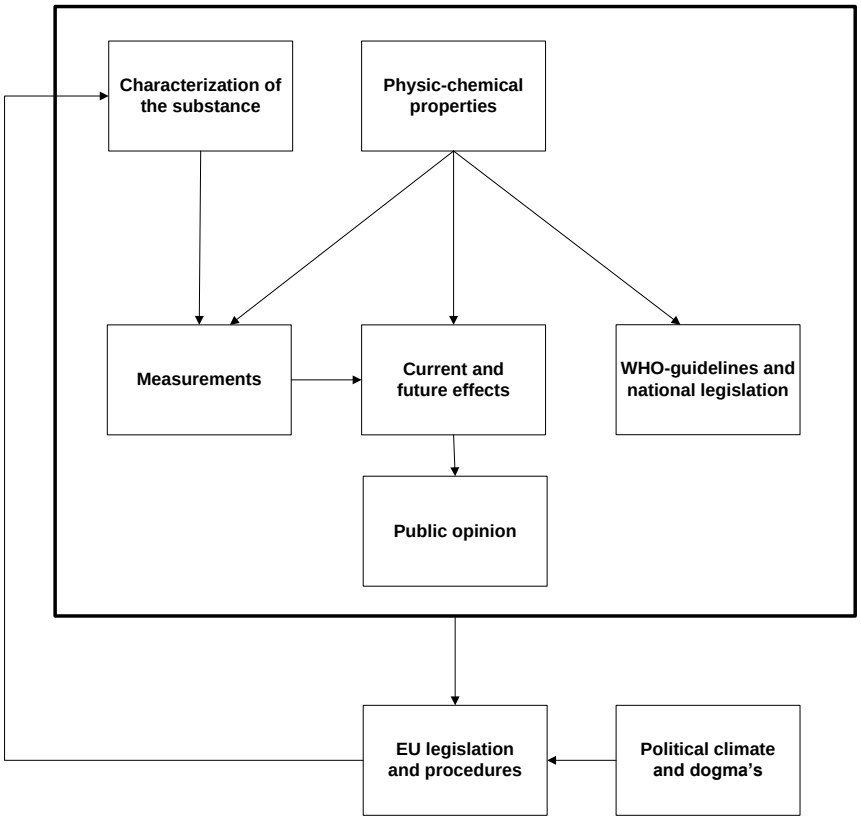


Figure B.3.6: Causal relations between components affecting decision-making according to Vewin.

Appendix C: Pragmatic measures for reduction concentrations

Due to the focus on the *decision-making process* instead of *implementation*, pragmatic measures to reduce the concentrations of Priority Substances in surface water have not been included in the main text. However, since there is a large variety of interesting measures to reduce PS concentrations, a concise overview is provided here based primarily on pharmaceuticals. A likewise overview could be given for pesticides.

Please note that for each measure, specific stakeholders must be involved (in case of voluntary cooperation) or are targeted (in case of national regulation). Also, there are large differences in the potential effect and the implementation costs of measures. However, since a whole study could be dedicated to each of these pragmatic measures, indications for these factors are not given due to practical time-constraints. Lastly, note that this overview by no means is exhaustive. Various references have been used as input for this overview:

- Dutch ministry of Housing, Spatial Planning and the Environment (VROM), letter to Dutch Parliament in 2007, *Geneesmiddelen in het milieu* (BWL/2007011956)
- Dutch ministry of Transportation and Water Management (V&W), *vergu(h)ulde pillen: onderzoek naar de emissie van geneesmiddelen uit ziekenhuizen* (2007)
- Swedish institutes, *the science and perception of the Swedish system for voluntary environmental labeling of pharmaceuticals* (see www.fass.se; highly recommended)
- International conference on *Sustainable Pharmacy*, Osnabrück, Germany (April 24-25, 2008)
- Various interviews with coalitions

1. Improve products

- green pharmacy: consideration of the environment during pharmaceutical production
- improved product design by increasing biodegradability (e.g. "biopharmaceuticals")
- analyze life-cycle of specific pharmaceuticals and find possible waste reduction measures

2. Improve awareness and behavior

- stimulate consideration of the environment during prescription of pharmaceuticals
- stimulate restrictive use of pharmaceuticals (campaign, package sizes)
- minimize waste: set up take-back/return schemes for expired or unused drugs

3. Improve water treatment

- reduce pharmaceutical emissions from hospitals (collection followed by specific treatment):
  - complete hospital, specific sections of the hospital or per patient
- minimize general exposure: upgrade waste water treatment plants with advanced treatment techniques
- minimize exposure via drinking water: equip drinking water treatment plants with GAC + NF/RO

4. Other measures

- draw up a hazard classification scheme based on voluntary environmental assessment of existing pharmaceuticals to determine the impact (see fass.se)
- decrease uncertainty: set regulation to enforce generation of relevant data
- voluntary cooperation with stakeholders, f.i. via covenants as result of working groups.

Appendix D: List of respondents

Below you may find a list that discloses the respondents. With 25 of these respondents, a 'physical' interview was conducted. With four others, a phone conversation was hosted. The 30th respondent gave a key-note speech at a conference (as indicated) and was informally 'interviewed' afterwards.

The list is primarily categorized by coalition/sovereign, secondly alphabetically by organization. Note that the columns 'abbreviation organization' and 'function within organization' do not necessarily reflect the official (English) abbreviations/functions. Finally, note that the column 'topic of interview' is only an indication.

Table D.1: Overview of respondents with whom an interview was conducted

	Name coalition/ sovereign	**#**	**Representing organization**	**Abbreviation organization**	**Name respondent**	**Function within organization**	**Date of interview**	**Topic of interview**
Coalitions	Water coalition	1	Association of Dutch drinking water companies	VEWIN	R. Schröder	Senior policy advisor	17/07/08	Strategy in DM
		2	Association of Dutch drinking water companies	VEWIN	N. Zantkuijl	Steering group secret. drinking water quality	22/07/08	Belief system + strategy in DM
		3	Association of Dutch water boards	UvW	M. Bentvelsen	Policy officer	18/08/08	Waste water vs. drinking water
		4	Brunel University	BU	J. Sumpter	Professor and head of institute of the environment	04/24/08 **conference*	Belief system
		5	Delft university of technology	DUT	A. Verliefde	Post-doc drinking water	10/06/08	Belief system
		6	Dutch institute for public health and the environment	RIVM	M. Montforts	Post-doc toxicology	04/03/08	(Eco)-Toxicology + authorization
		7	Dutch institute for public health and the environment	RIVM	S. Wuijts	Drinking water inspection researcher	04/03/08	Variety in water standards
		8	Dutch river water works	RIWA	A. Bannink	Senior policy analyst	21/02/08	Concentrations in surface water
		9	Dutch river water works	RIWA	P. Stoks	Director	19/08/08	Belief system + strategy in DM
		10	Dutch river water works	RIWA	G. van der Haar	Senior data analyst	15/05/08	Monitoring and processing data
		11	European Union association of water companies	EUREAU	D. Gâtel	Chairman drinking water	01/07/08	Belief system + strategy in DM
		12	International association of	IAWR	F. Wirtz	Director	31/07/08	Belief system +

			Rhine waterworks					strategy in DM
		13	Technologiezentrum wasser	TZW	F. Sacher	Scientist	28/07/08	Belief system + strategy in DM
		14	Technologiezentrum wasser	TZW	W. Kühn	Director / professor	28/07/08	Belief system + strategy in DM
		15	World wide funds for nature	WWF	S. Moroz	Water policy officer	23/07/08	Belief system + strategy in DM
	Agribusiness coalition	16	Committee of professional agricultural organisations	COPA-COGECA	A. Andugar	Policy advisor	17/07/08	Belief system + strategy in DM
		17	Committee of professional agricultural organisations	COPA-COGECA	R. Feller	Senior policy advisor	17/07/08	Belief system + strategy in DM
		18	Environmental crop protection agency	ECPA	S. Rutherford	Senior manager environment policy	29/07/08	Belief system + strategy in DM
		19	Monsanto company	Monsanto	M. Reding	Regulatory affairs manager	27/08/08	Glyphosate + strategy in DM
	Pharma-ceutical coalition	20	AstraZeneca / EFPIA	AZ / EFPIA	D. Taylor	Former director of environment &sustainability / former chairman working group on EHS	07/08/08	Belief system + strategy in DM
		21	European federation of pharmaceutical industries	EFPIA	C. Julou	Director scientific, technical and regulatory affairs	29/07/08	Belief system + strategy in DM
		22	Novartis Pharma AG	Novartis	A. Hartmann	Head, global environment	22/07/08	Belief system + strategy in DM
		23	Novartis Pharma AG	Novartis	K. Heidenreich	Senior public affairs manager	16/07/08	Belief system + strategy in DM
Sovereigns	European Commission	24			J. D'Eugenio	Secretariat-General on co-decision	14/07/08	Decision-making processes
		25			J. Rodríguez-Romero	Water Framework Directive team coordinator	14/07/08	Decision-making processes
	European Council	26			F. van Zomeren	Permanent representation for the Netherlands in Brussels/EU	17/07/08	Decision-making processes
		27			G. Niebeek	Senior advisor/specialist for DG Water, Dutch ministry of transport & water management	03/09/08	Preliminary work EU DM-processes
	European Parliament	28			Anonymous	Staff member European Parliament	23/07/08	Decision-making processes
		29			H. Blokland	Member of European Parliament / Shadow-rapporteur for EQS	19/07/08	Decision-making processes
		30			W. van Luik	Assistant to MEP / policy advisor	19/07/08	Decision-making processes

Appendix E: Interview questions

This appendix gives an overview of the general set-up of the interviews. Two sets of standardized interview questions were used: one set for respondents from a coalition, another one for respondents from a sovereign. Note that these questions served as basis only. Each interview was prepared separately, tailor-made in order to 1. connect to the perspective of the respondent and 2. use the opportunity to ask respondent-specific questions. Furthermore, please note that each question consists of multiple (sometimes subsequent) sub-questions; however, these sub-questions are not shown as they varied significantly over the respondents. Finally, consider that the questions for respondents were slightly adjusted depending on the coalition (the label 'problems' was used in the water coalition, whereas the label 'issues' was used for the other respondents; and, naturally, for the agribusiness coalition the questions were focused on pesticides, whereas the questions for the pharmaceutical coalition were focused on pharmaceuticals).

1. Overview of standardized interview questions for respondent from a coalition

A. Questions regarding your organization's position in general

Q.1. Do you see surface water quality problems as a result of certain chemicals (2002-2008)?
Q.2. What is the result of these problems, i.e. how do they impact your operations/interests?
Q.3. What are the causes of these problems?
Q.4. Which potential (types of) solutions do you see for these problems?
Q.5. Past (1998-2001): did your view on problems, causes and solutions change over time? Why?
Q.6. Future (2009-2015): what do you expect for the future with regard to problems and solutions?

B. Questions regarding the EU decision-making processes (1998-2001 and/or 2006-2008)

Q.7. What is the role of technical knowledge/research with regard to decision-making processes?
Q.8. Who do you see as 'allies' and 'enemies' within and around the EU decision-making processes?
Q.9. What strategy (i.e. presentation of your arguments: who, when, how) did you apply in the decision-making and which resources did you use? Which type of factual backing did you use?
Q.10. How did the decision-making process go, and how/between who were the negotiations going?
Q.11. What is the final decision-making outcome, what did you expect as outcome; are you satisfied?
Q.12. Past: what was your position regarding the identification of the initial list of Priority Substances (decision no. 2455/2001/EC), and where did your strategy differ to influence the process?

C. Other questions

Q.13. What is, or can be, the role of public opinion in water quality decision-making?
Q.14. What is, or can be, the role of river basins prior to and after EU decision-making?
Q.15. Generalization: How do your answers relate to other EU dossiers? Same line of reasoning?
Q.16. Could you please provide me with any documentation that you consider important regarding your position in the decision-making? Only documentation that you are willing to share, of course.
Q.17. Do you have any comments regarding the discussed topics, topics we missed, or my research?

2. Overview of standardized interview questions for respondent from a sovereign

A. Questions regarding the decision-making process revision PS / establishing EQS (2006-2008)

Q.1. Can you describe the course of the recent decision-making process regarding establishing EQS?
Q.2. Which deadlocks occurred throughout the decision-making process? When, and why?
Q.3. How, and by whom, were these deadlocks resolved (i.e. breakthroughs)?
Q.4. How was the compromise ultimately reached after negotiations with the Council?
Q.5. Which decision-making outcome did you expect? Are you satisfied with the result?
Q.6. Past: what was different in terms of deadlocks/breakthroughs in the decision-making process regarding the identification of the first Priority Substances (decision no. 2455/2001/EC; 1997-2001)?
Q.7. Future (2008-2015): what do you expect regarding future surface water quality and legislation?

B. Questions regarding several types of impact on the formal decision-making process

Q.8. What has been the role of technical knowledge and research in the decision-making processes?
Q.9. Which stakeholders are contacting you the most regarding this topic?
Q.10. What is the role of public opinion and media in general?
Q.11. What is the role of member states and river basins regarding PS? Will this change in the future?

C. Additional questions

Q.12. Why has atrazine been labeled as Priority Substance since 2001 (decision no, 2455/2001/EC), whereas glyphosate will only now be evaluated (2008-2010)?
Q.13. Could you please provide me with any documentation that you consider important regarding your position in the decision-making? Only documentation that you are willing to share, of course.
Q.14. Do you have any comments regarding the discussed topics, topics we missed, or my research?

Appendix F: Background information to the second decision-making round

This appendix provides background information to the second decision-making round regarding Priority Substances. It contains lists of the recommended PS via COMMPS, the proposed PS by the Commission, and the final set of PS found in the Directive.

Table F.1: Overview of substances proposed after COMMPS to be listed as Priority Substances

#	*Substance name*	*Proposed via Monitoring- or Modeling based list*
1	PAHs	monitoring-based
2	pentachlorophenol	monitoring-based
3	heptachlor	monitoring-based
4	chlorpyrifos	monitoring-based
5	hexachlorobenzene	monitoring-based
6	monochloronitrobenzenes	monitoring-based
7	trichlorobenzenes	monitoring-based
8	chlorfenvinphos	monitoring-based
9	diuron	monitoring-based
10	trifluralin	monitoring-based
11	trichloromethane	monitoring-based
12	dichloromethane	monitoring-based
13	1,2-dichloroethane	monitoring-based
14	isoproturon	monitoring-based
15	endosulfan	monitoring-based
16	alachlor	monitoring-based
17	hexachlorobutadiene	monitoring-based
18	HCHs	monitoring-based
19	**atrazine**	**monitoring-based**
20	simazine	monitoring-based
21	pentachlorobenzene	monitoring-based
22	brominated diphenylethers	monitoring-based
23	chloroalkanes, C10-13	modeling-based
24	benzene	modeling-based
25	nitrobenzene	modeling-based
26	di(2-ethylhexyl)phthalate (DEHP)	modeling-based
27	octylphenols -nonylphenols	modeling-based
28	nickel	metals (separate list)
29	lead	metals (separate list)
30	cadmium	metals (separate list)
31	copper	metals (separate list)
32	arsenic	metals (separate list)

Table F.2: Overview of substances included in the Commission Proposal to be listed as PS

#	***Substance name***	*#*	***Substance name***
1	Alachlor	17	Hexachlorocyclohexane
2	Anthracene	18	Isoproturon
3	Atrazine	19	Lead and its compounds
4	Benzene	20	Mercury and its compounds
5	Brominated diphenylether	21	Naphthalene
6	Cadmium and its compounds	22	Nickel and its compounds
7	C10-13-chloroalkanes	23	Nonylphenols
8	Chlorfenvinphos	24	Octylphenols
9	Chlorpyrifos	25	Polyaromatic hydrocarbons
10	Dichloromethane	26	Pentachlorobenzene
11	1,2-Dichloroethane	27	Simazine
12	Di(2-ethylhexyl)phthalate (DEHP)	28	Pentachlorophenol
13	Diuron	29	Tributyltin compounds
14	Endosulfan	30	Trichlorobenzenes
15	Hexachlorobenzene	31	Trichloromethane (Chloroform)
16	Hexachlorobutadiene	32	Trifluralin

Table F.3: Overview of Priority Substances as stipulated in the official Directive

#	***Substance name***	*#*	***Substance name***
1	Alachlor	18	Hexachlorocyclohexane
2	Anthracene	19	Isoproturon
3	Atrazine	20	Lead and its compounds
4	Benzene	21	Mercury and its compounds
5	Brominated diphenylether	22	Naphthalene
6	Cadmium and its compounds	23	Nickel and its compounds
7	C10-13-chloroalkanes	24	Nonylphenols
8	Chlorfenvinphos	25	Octylphenols
9	Chlorpyrifos	26	Pentachlorobenzene
10	Dichloromethane	27	Pentachlorophenol
11	1,2-Dichloroethane	28	Polyaromatic hydrocarbons
12	Di(2-ethylhexyl)phthalate (DEHP)	29	Simazine
13	Diuron	30	Tributyltin compounds
14	Endosulfan	31	Trichlorobenzenes
15	Fluoranthene*	32	Trichloromethane (Chloroform)
16	Hexachlorobenzene	33	Trifluralin
17	Hexachlorobutadiene		

* new substance proposed by the Parliament and agreed by Council compared to Commission Proposal

Appendix G: Background information to the third decision-making round

This appendix provides background information to the third decision-making round. It contains lists of the proposed EQS by the Commission, the proposed PS by the Parliament, the participants to an expert group, the proposed PS by ENVI-Committee in second reading and the final substances that will be reviewed by the Commission as part of the second reading agreements.

Table G.1: Environmental Quality Standards in the Commission Proposal (2006)

#	*Priority Substance*	*AA-EQS*	*MAX-EQS*
1	Alachlor	0.3	0.7
2	Anthracene	0.1	0.4
3	Atrazine	0.6	2.0
4	Benzene	10	50
5	Brominated diphenylether	0.0005	*not applicable*
6	Cadmium and its compounds	0.08	0.45
7	C10-13-chloroalkanes	0.4	1.4
8	Chlorfenvinphos	0.1	0.3
9	Chlorpyrifos	0.03	0.1
10	Dichloromethane	20	*not applicable*
11	1,2-Dichloroethane	10	*not applicable*
12	Di(2-ethylhexyl)phthalate (DEHP)	1.3	*not applicable*
13	Diuron	0.2	1.8
14	Endosulfan	0.005	0.01
15	Fluoranthene	0.1	1.0
16	Hexachlorobenzene	0.01	0.05
17	Hexachlorobutadiene	0.1	0.6
18	Hexachlorocyclohexane	0.02	0.04
19	Isoproturon	0.3	1.0
20	Lead and its compounds	7.2	*not applicable*
21	Mercury and its compounds	0.05	0.07
22	Naphthalene	2.4	*not applicable*
23	Nickel and its compounds	20	*not applicable*
24	Nonylphenols	0.3	2.0
25	Octylphenols	0.1	*not applicable*
26	Pentachlorobenzene	0.007	*not applicable*
27	Pentachlorophenol	0.4	1.0
28	Polyaromatic hydrocarbons	*not applicable*	*not applicable*
29	Simazine	1.0	4.0
30	Tributyltin compounds	0.0002	0.0015
31	Trichlorobenzenes	0.4	*not applicable*
32	Trichloromethane (Chloroform)	2.5	*not applicable*
33	Trifluralin	0.03	*not applicable*

Table G.2: Pollutants proposed by the Parliament in first reading to be added as Priority Substance

#	*Substance name*	*#*	*Substance name*
1	Amidotrizoate	15	**Glyphosate**
2	AMPA	16	HHCB
3	Bentazon	17	Iopamidol
4	Bisphenol A	18	Mecoprop (MCPP)
5	4 4'-Biphenol	19	4-Methylbenzylidene camphor
6	**Carbamazepine**	20	Musk ketone

7	Clotrimazole	21	Musk xylene
8	dibutylphthalat (DBP)	22	MTBE
9	Diclofenac	23	Naphthalene-1,5-disulfonate
10	Dicofol	24	Octyl-Methoxycinnamate
11	DTPA	25	Perfluorinated Compounds (PFCs)
12	EDTA	26	Quinoxyfen (5,7-dichloro-4-(pfluorophenoxy)quinoline)
13	ETBE	27	Tetrabromobisphenol A (TBBP-A)
14	Free Cyanide	28	Tonalid (AHTN)

Table G.3: List with participants to the expert group for EQS in 2002

Nominated experts for the "Expert Group on Setting of Quality Standards" (Status: 16/01/2002)
Meeting: 23/01/2002, Brussels, BU-5, Salle A

Representative of:	**Name**	**Email**
Austria	Prof. Dr. Wilfried Bursch	wilfried.bursch@univie.ac.at
Belgium	Reinhilde Weltens (VITO) Hilda Witters (VITO)	reinhilde.weltens@vito.be hilda.witters@vito.be
Denmark	Henning Ian Clausen	hcl@mst.dk
Finland	Johanna Peltola	johanna.peltola@vyh.fi
France	Marc Babut (CEMAGREF) Robert Diderich (INERIS)	babut@lyon.cemagref.fr or Robert.Diderich@ineris.fr
Germany	Bernd Mehlhorn (UBA) Norbert Kirchhoff	bernd.mehlhorn@uba.de norbert.kirchhoff@stua-mi.nrw.de
Greece	Prof. Themistocles Lekkas	vlekkas@aegean.gr
Ireland	Dr Conor Clenaghan	c.clenaghan@epa.ie
Italy	no reply	
Luxembourg	no nomination	
Netherlands	Drs. D.A. Jonkers	Douwe.Jonkers@MINVROM.NL
Portugal	no reply	
Spain	no reply	
Sweden	Alf Lundgren	alfl@kemi.se
United Kingdom	Dr Geoff Brighty Joly Tremelling	geoff.brighty@environment-agency.gov.UK Joly.Tremelling@defra.gsi.gov.uk
Norway	no nomination	
Czech Rep.	Mark Rieder	rieder@chmi.cz
CEFIC	Dr David Taylor	David.Taylor@brixham.astrazeneca.com
ECPA	Kees Romijn (Aventis)	kees.romijn@aventis.com
Eurochlor	no nomination	
EUREAU	**no reply**	
Eurometaux	Dr Katrien DELBEKE	kmd@eurocopper.org
EEB	see WWF	
WWF	Andreas Ahrens	a-ahrens@oekopol.de
Commission	Joachim D'Eugenio	joachim.d'eugenio@cec.eu.int
	Dr. Peter Lepper	peter.lepper@ime.fraunhofer.de
	Jack de Bruijn	jack.de-bruijn@jrc.it
	Prof. Jose V. Tarazona	tarazona@inia.es

Table G.4: Pollutants proposed by the Parliament's ENVI-Committee in 2nd reading to be reviewed

To be reviewed within 6 months		**To be reviewed within 12 months**	
#	***Substance name***	***#***	***Substance name***
1	AMPA	1	Amidotrizoate
2	Bentazon	2	4 4'-Biphenol
3	Bisphenol A	3	**Carbamazepine**
4	Dicofol	4	Clotrimazole
5	EDTA	5	Dibutylphthalat (DBP)
6	ETBE	6	Diclofenac
7	Free Cyanide	7	DTPA
8	**Glyphosate**	8	HHCB
9	Mecoprop (MCPP)	9	Iopamidol
10	Musk xylene	10	4-Methylbenzylidene camphor
11	Perfluorooctane sulphonic acid (PFOS)	11	Musk ketone
12	Quinoxyfen (5,7-dichloro-4-(pfluorophenoxy)quinoline)	12	MTBE
13	Dioxins	13	Naphthalene-1,5-disulfonate
14	PCB	14	Octyl-Methoxycinnamate
		15	Perfluorinated Compounds (CPF)
		16	Tetrabromobisphenol A (TBBP-A)
		17	Tonalid (AHTN)

Table G.5: Substances to be reviewed within 24 months as part of the second reading agreement

#	***Substance name***	***#***	***Substance name***
1	AMPA	8	Mecoprop (MCPP)
2	Bentazon	9	Musk xylene
3	Bisphenol A	10	Perfluorooctane sulphonic acid/PFOS
4	Dicofol	11	Quinoxyfen (5,7-dichloro-4-(pfluorophenoxy)quinoline)
5	EDTA	12	Dioxins
6	Free Cyanide	13	PCB
7	**Glyphosate**		

Appendix H: E-mail communication with Members of the Parliament

As part of this research, some questions with regard to the amendments have been e-mailed to specific MEPs and Parliament advisors to confirm the connection with the water coalition. Part of the communication is presented below.

1. E-mail correspondence with Margrete Auken, Danish Member of the European Parliament for the Greens. Together with two other MEPs, she is responsible for the majority of the amendments:

"Dear Mrs Auken,

My name is Perry van Overveld. Currently I am working on my final assignment from Delft University of Technology in order to receive my degree in Policy Analysis and Management. Within this project, I am looking at the decision-making process regarding water policy: establishing Environmental Quality Standards/Priority Substances (COD/2006/0129). This decision-making process came to an end in 2nd reading last month. One of my goals is to obtain insight in the relative lobbying strength of the drinking water sector and the environmental NGO's.

I have a specific question regarding some of your amendments on the proposal of the Commission (COM(2006)0397), in February 2007. Amendments 175, 180, 185, 191, 197 and 204 would list the substances Bentazon, Carbamazepin, Diclofenac, ETBE, Mecoprop and MTBE as a Priority (Hazardous) Substances. On a side-note, during negotiations with the Council these items were dropped.

My question is: could you please tell me on which information you based these amendments, and which stakeholder gave you this information?

Hopefully you can still remember. An answer would really help my research! Note that our correspondence is confidential if you desire and I will not use your answer directly in my research.

If you would require more information, please contact me by e-mail or phone (+31 6 1110 5353).

Thank you very much!

With kind regards,
Perry van Overveld
Graduate student Delft University of Technology
The Netherlands"

"Dear Mr. van Overveld,
Thank you for you e-mail of the 24th of July. Sorry for the late response, but we have as you may know been on holiday until now.

Here's a response from our environmental adviser, Axel Singhofen, to your inquiry:

"We based these amendments on the information about these substances we got independently from three different stakeholders:

- German water sector: they advocated for all of these substances (and many more, but we did not take on board all of them)
- German regional environment authority: they advocated for five of these substances - not for MTBE
- European Environmental Bureau, WWF and BUND (German FoE): they advocated for four of these substances - not for carbamazepin or diclofenac

The justification for each amendment represents the key arguments for our amendments, respectively.

For me, there is no need for confidentiality."

Hope that was what you were looking for.

Best regards
Esben Würtz Sørensen
Assistant to Margrete Auken, The Greens / Danish Socialist People's Party"

2. E-mail correspondence with Margrete Auken, German Member of the European Parliament for the Christian-Democrats. Together with two other MEPs, she is responsible for the majority of the amendments:

"Dear Mrs Klass,

My name is Perry van Overveld. Currently I am working on my final assignment from Delft University of Technology in order to receive my degree in Policy Analysis and Management. Within this project, I am looking at the decision-making process regarding water policy: establishing Environmental Quality Standards/Priority Substances (COD/2006/0129). This decision-making process came to an end in 2nd reading last month. One of my goals is to obtain insight in the relative lobbying strength of the drinking water sector and the environmental NGO's.

I have a specific question regarding some of your amendments on the proposal of the Commission (COM(2006)0397), in February 2007. Amendments 181, 186 and 196 would list the substances Carbamazepine, Diclofenac and Iopamidol as a Priority (Hazardous) Substances. On a side-note, during negotiations with the Council these items were dropped.

My question is: could you please tell me on which information you based these amendments, and which stakeholder gave you this information?

Hopefully you can still remember. An answer would really help my research! Note that our correspondence is confidential if you desire and I will not use your answer directly in my research.

If you would require more information, please contact me by e-mail or phone (+31 6 1110 5353).

Thank you very much!

With kind regards,
Perry van Overveld
Graduate student Delft University of Technology

The Netherlands"

"Dear Mrs. Overveld,
concerning the directive on priority subsances in water we worked closely with the german water and energy supply association BDEW (http://www.bdew.de/bdew.nsf/ID/DE_Home.) who is very concerned of providing clean and safe water.

Kind regards
Gina Braun-Friderici
For:Christa Klaß, MdEP
Europäisches Parlament"