EUWARENESS

Regime changes and sustainable water use

Elaboration of the theoretical framework

Version 27-7-00

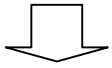
Hans Bressers
Doris Fuchs
Stefan Kuks

Summary

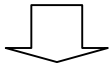
Overview scheme (see research proposal):

The structure of the variables involved in the theoretical explanation is the following one:

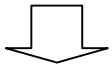
1. Change agents (many implying or stimulating differentiation; some pushing for integration): e.g. demographic, economic, technological, institutional, and cultural developments and feedback from the problem situation



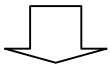
2. Initial changes in directly affected regime elements implying more complexity and sometimes more integration



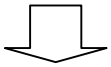
3. Adjustment by other regime elements to initial changes through adaptive mechanisms involving values, cognitions, and resources



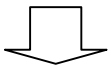
4. A. More complex regimes ('multi'-format of elements)



5. A. More complete coverage of uses and users + more risk of intra regime counter activity

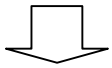


6. A. Indications of a more sustainable water resource use due to better coverage (cf. previous situation) + indication of threats to sustainability due to lack of coherence

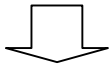


Feedback into 1.

B. More integrated regimes (high intensity of exchange)



B. More successful implementation + more mutually reinforcing side effects of regime elements



B. Indications of a more sustainable water resource use due to better implementation and more positive and less negative side effects

Contents

1. Introduction and research model
2. Water use and users
3. Types of ‘Property rights’
4. Public governance patterns and their elements
5. The transformation of regimes
6. The co-efficacy of property rights and government intervention
7. Regime effects on sustainable water use
8. Conclusion

Appendix 1: Brief sketch of “Policy Instrumentation Theory” on implementation

Appendix 2: Criteria for case study selection

Appendix 3: Case study protocol

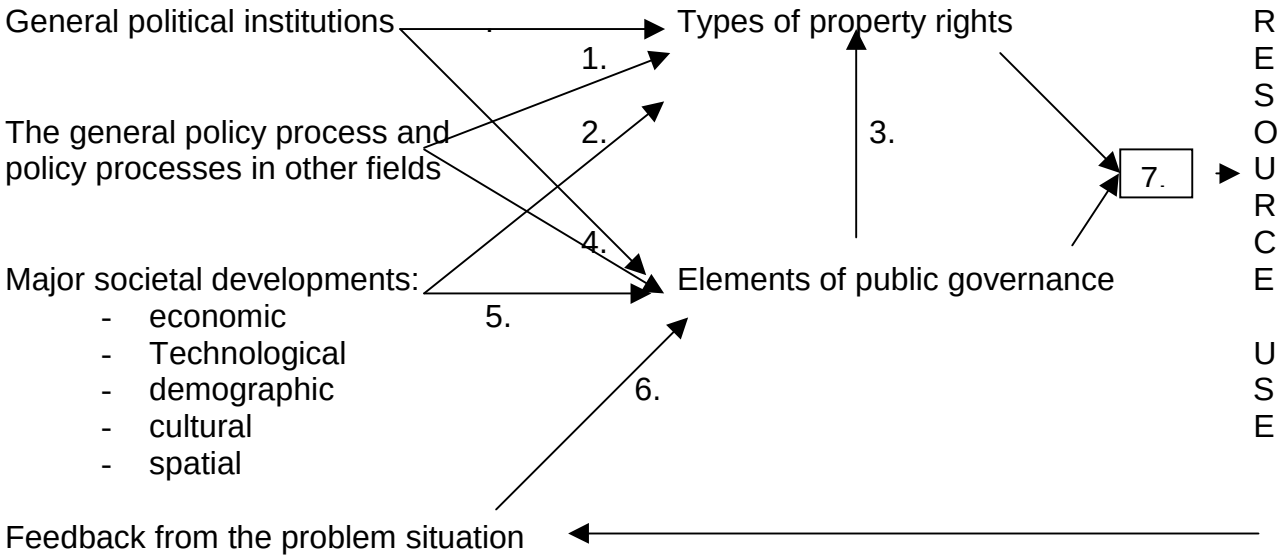
References

1 Introduction and research model

First an brief statement of the research goal (see proposal). Then an outline of the research model (on the basis of the proposal with possible changes due to developments in the crafting of this piece). Followed by an outline of the rest of the report itself.

On the model: I propose that the boxes of policy institutions and policy process are re-labelled ‘General and external policy xyz’, to make clear what the relation with the rest of the model is. Next to these boxes also a box called ‘major societal developments’ is added. This box contains demographic, cultural, economic or physical (technological and spatial) developments. From these boxes, arrows, named ‘change agents’, flow to the public governance and property rights boxes. Thirdly, a feed back line from the ‘use’ box should be added to these arrows. Figure 1 gives a graphical illustration of this model.

FIGURE 1:
The Theoretical Model



Explanation:
1. ‘Old’ (= proposal) boxes changing cultural and judicial conceptions of property
2. Economic (and other) major societal developments added by Doris
3. Influence on definition of property rights from public governance
4. ‘Old’ boxes plus ‘other policies’ influences as change agents
5. Major societal developments as change agents
6. Feedback from problem situation (water resource use and resource status) as change agent
7. The ‘switchboard’ box

2 Water use and users

On the basis of the proposal, the discussions in Barcelona and Lausanne about the relevant aspects for case selection, the Swiss conceptual work; and maybe also own earlier work on privatisation and the public tasks in water management.

In my view managing a “sustainable water use” is not only to prevent over-use and degradation of water resources, but also to protect the ecological functions of the water resource. This might be important to make explicit since in various cases – at least in the Netherlands - it is precisely the competition between human uses and the ‘use’ by nature that forms the basis of the sustainability problem at hand.

3 Types of 'Property Rights'

According to our project design, an institutional resource regime consists of a system of property rights (called regulative system in the proposal) and a policy design. Before we can turn to an analysis of institutional resource regimes, therefore, we need to establish an understanding of these two components: property rights and policy design. This chapter takes the first step towards this objective by discussing property rights, specifically their nature and role, their implications for environmental resource management, as well as property regimes and types of property rights. The next chapter, in turn, will focus on policy and its elements.

3.1 The Nature and Role of Property Rights

Property rights delineate rights of ownership in an asset, which generally include the rights to use and consume the asset, to exclude others from the use of the asset, to change its form and substance, to obtain income from it, and to transfer these rights either in their entirety through sale or partially/temporarily, for instance through rental (Barzel 1989, Furubotn and Pejovich 1975, Kasper and Streit 1998). While property rights may be exclusive, they are generally not unrestricted.[1] Governments, for example, often impose regulations limiting the owners' options in terms of how they can use their resource (a point we will take up again in chapter 6).

Correspondingly, economists argue that property rights should be conceived of as bundles of rights (Barzel 1989, Kasper and Streit 1998). With respect to environmental resources, for instance, property rights exist and frequently differ for the stock of a resource and the produced yield or the goods and services derived from a resource. "Ownership of the resource" would thus pertain to a specific bundle of rights the owner holds with respect to the resource. The owner may, for example, hold the right to farm the land, but not to kill rare species on the land.

We usually do not think about the specific bundle of rights we are purchasing when buying a good, because we have a common general understanding of what those rights are. Likewise, in legal terms, the purchase of a good is generally understood to mean the purchase of a given set of rights. Obtaining title to real estate, for instance, generally means that we have the right to live on our real estate, but not to kill somebody on our real estate.[2] This societal and legal understanding of which rights are included in our purchase does not negate the economic perspective of the (changeability of) bundles of rights,

[1] This fact is important to remember in the context of debates on the environmentally desirable property regime. In this debate, private property rights are often treated as absolutes, which in reality they rarely are. Rather than having to choose between private property regimes, common property regimes, and state ownership, the imposition of some constraints on private property often is a reasonable alternative.

[2] Except in self defence, in which case we do have that right.

however. After all, contractual specifications of bundles of rights in a property transfer are possible that differ from the "normal" case, and courts frequently have to deal with cases questioning whether an owner of a good or asset had the right to carry out a particular action. There are limits to the bundling and unbundling of property rights from a legal perspective, of course, as some contractual agreements on specific bundles of rights might be viewed as unconstitutional or immoral.[3] Furthermore, property owners may not be able to unbundle a particular right, often a negative right, i.e. responsibility associated with their property ownership. In general, however, the economic perspective on property rights as bundles of rights cannot be easily rejected.

Notions about which specific rights generally go with the ownership of a good or asset and the extent to which it is possible to unbundle specific rights differ across time and culture. Thus, it is much more common to differentiate between specific rights to attributes of a good or asset in the Common Law tradition than in German law, for instance. This is somewhat ironic, since the Common Law tradition happens to be based on old Germanic legal frameworks (in which this unbundling was possible). In contrast, German law today is influenced by the Roman concept of property rights, to which the countries on the continent reverted in the context of the "creation" of the concept of territorial sovereignty associated with the Westphalian peace in the 17th century. Under Roman law, unbundling was generally much more limited, especially with respect to real estate. Thus, the owner of real estate owned everything below the area of land as well as the space above the area of land. In consequence, owning apartments, for instance, was not possible under Roman law. Despite this difference in traditions, notions of bundling and unbundling are not written in stone, of course. Thus, unbundling is becoming much more common on the European continent these days, while in the United States property owners are fighting against the right of government to interfere with specific rights associated with their property (see chapter 6).

With respect to natural resources, the focus on "bundles of rights" highlights that property rights to multiple attributes of a resource can exist and be held by different individuals or groups. Even different "property regimes" (see below) are likely to exist with respect to the attributes of many environmental resources. Property rights and regimes for such a resource thus tend to form a complex structure with several layers and dimensions.

In the context of this project, this layering of property rights is of particular importance, since the project aims to emphasize heterogeneous demands for water resources. In contrast, much of the literature to date, such as Ostrom's early irrigation studies, has focused on homogenous uses. One way to characterize the difference between the two situations may be to distinguish between competing and conflicting property rights. In the case of scarcity in a homogenous use situation, property rights are competing with each other, while in the case of scarcity in a heterogeneous use situation, property rights are also conflicting with each other. The objective of policy intervention in the context of an institutional resource regime, then, is to lead to a coordination and

[3] Such limits on unbundling can also exist in terms of the feasibility of the separation of property rights to different attributes to the resource.

harmonization of rights to different attributes of the resource and pursue sustainable management through a reduction in conflict between these rights (this argument will be taken up again in chapter 6).

Property rights play a pivotal role in society as they structure the relations between decision makers with respect to any natural resource.

> For property rights are defined not as relations between men and things, but, rather as the behavioural relations among men that arise from the existence of things and pertain to their use. The prevailing system of property rights assignments in the community is, in effect, the set of economic and social relations defining the position of interacting individuals with respect to the utilization of scare resources (Pejovich 1975, p. 40).

Property rights are, of course, similarly fundamental in any social context and with respect to any good or asset. As Stubblebine (1975) argues, the definition of property rights becomes necessary as soon as two individuals share a living environment, e.g. with Friday's arrival on Crusoe's island: "Some set of property rights must, and will, be created to condition the relationship between these two individuals - whether that set be characterized as capitalistic, socialistic, or something else" (p. 13). This definition of rights will take place, whether or not the institution of "property rights" has been intentionally created by the community or by an outside authority and enforcer.

In combination with social norms, available technologies, and resource conditions, property rights yield collective outcomes in social settings (Young 1994). They determine the allocation and use of resources, composition of output, and distribution of income which result from interacting decision makers: "Such institutions critically affect decision making regarding resource use and, hence, affect economic behaviour and performance. By allocating decision-making authority, they also determine who are the economic actors in a system and define the distribution of wealth in a society" (Libecap 1993, p. 1). In an increasingly complex world with interactions between decision makers across space and time, the definition of relationships through property rights provides the foundation for environmental and economic activity.

The institution of property rights can take a variety of forms. Property institutions "range from formal arrangements, including constitutional provisions, status, and judicial rulings, to informal conventions and customs regarding the allocations and use of property" (ibid.). In contrast to traditional societies with dense social networks and accordingly low transaction costs, the interactions in today's Western societies require "elaborate institutional structures that constrain participants and minimize transaction costs" in the form of well-specified and well-enforced property rights (North 1989, p1320f).

3.2 Changes in Property Rights

While we tend to think of property rights as long-term, stable relations of ownership, property rights are never constant. Two major perspectives on changes in property rights and their long-term stability exist.

In the economic perspective, property rights are always in flux. In a functioning society, property rights are continuously being created, altered, and abandoned (Barzel 1989). As individuals desire to adjust to changed economic, political, and social conditions, they, thus, create demand for a change in property rights until they are satisfied and have reached a new "equilibrium" position in rights over resources.[4] Property rights to resources are determined by the interaction of supply and demand in dynamic sequences. This logic is most clearly expressed in Stubblebine's "Axiom of Modification": "Every individual seeks those property rights modifications which he believes will improve his welfare" (Stubblebine 1975, p. 15). As utility maximisers, in the economic perspective, people delineate and exercise property rights up to the point where the marginal costs of doing so exceed the marginal benefits, leaving the remainder in the public domain.

> People acquire, maintain, and relinquish rights as a matter of choice…People choose to exercise rights when they believe the gains from such actions will exceed their costs. Conversely, people fail to exercise rights when the gains from owning properties are deemed insufficient, thus placing (or leaving) such properties in the public domain. What is found in the public domain, therefore, is what people have chosen not to claim. As conditions change, however, something that has been considered not worthwhile to own may be newly perceived as worthwhile; conversely, what was at first owned may be placed in the public domain (Barzel 1989, p. 65).

Individuals' "calculations" of the net-benefit of changes in property rights, in turn, are affected by a number of factors such as changes in relative factor scarcities and relative prices, technological changes (affecting the costs of monitoring and enforcing property rights among others), changes in knowledge (changes in production functions, market values), or the opening of new markets, and the interaction between these factors. North, for instance, argues that institutional change in the past has been predominantly caused by changes in relative prices, which in turn are a function of population growth, technological change, and changes in the cost of information, with population growth being historically the single and most important factor (North 1989, p. 1324). Feeny, likewise, claims that an appreciation in the relative price of a factor leads to an "increase in the demand for an institution to define property rights in that factor" (Feeny 1988, p.273). He draws empirical support for his

[4] Property rights, thus, are continuously determined at the margins in an ongoing endogenous process. (Obviously, property rights are determined exogenously as well, for instance, through political changes such as revolutions or transitions from communist to capitalist regimes or even through "simple" policy changes (see chapter 6).)

argument from historical evidence of rising demand for property rights associated with the rising value of land in several South East Asian countries. Likewise, Ensminger and Rutten (1991) show that the desired system of property rights changed with ensuing economic growth and increasing sedentarization in the case of the Galole Orma of Kenya, as common property near settlements increased in value and the gains from the exclusion of nomadic herds increased. Property rights, then, are created or changed in response to economic forces, as opportunities to gain arise.

In contrast to the economic perspective, legal and political philosophy would emphasize the tendency of property rights to resist and work against change. Thus, one can argue that individuals tend to perceive property rights as rather permanent, and do not constantly perform cost-benefit calculations to determine the presently best allocation of property rights for them.[5] Furthermore, they might value "property ownership" independently of its direct economic return, because of personal values or status considerations, for instance. In addition, individuals are also guided in their actions by norms and habits, which tend to work against constant and rapid change on the basis of rational calculations.

Finally, legal provisions and normative conceptions in society can prevent a maximization in property rights due to economic calculations. Thus, normative conceptions might prohibit or at least question the possibility of ownership, as in the case of a human being or, for instance, the world oceans. In consequence, property rights discussions are frequently associated with normative debates or frameworks.

3.3 Property Regimes

The literature on environmental resource management generally differentiates between different property regimes, i.e. property arrangements characterized by different combinations of property rights, in terms of ownership, access, and withdrawal regulations. The most common categorization of property regimes differentiates between private property, common property, open-access, and state-ownership (Feeny, Berkes, McCay, and Acheson 1990, Devlin and Grafton 1998). While these property regimes can exist with respect to any good, we will focus in the following discussion on natural resources, since this is the focus of the project.

Private property according to this differentiation exists when the exclusive title to the resource is held by individuals or corporations. Accordingly, the respective individual or corporation has control over access to the resource, and is backed in this capacity by the state. Furthermore, the individual or corporation have decision-making capacity with respect to the management of the resource.

---

[5] In addition, the bounded rationality arguments, of course, apply (see chapter 3), and/or as some scholars call it, a boundary of imprecision in human decision making (Windrum and Birchenhall 1998).

Common property as a term has been used or rather abused in the literature because of its vague application (Schlager and Ostrom 1992). In the conventional categorization of property regimes it is important to differentiate situations of common property from situations of open-access or common pool resources in general. Common property generally refers to resources for which the exclusive title is in the hands of a group of individuals or a corporation. This group has control over access to the resource, is frequently backed in this capacity by the state, and has general decision-making capacity over the resource. Common property regimes can exist in that a small, voluntary group owns a resource and can exclude outsiders, but also in cases in which a large, inclusive group with compulsory membership owns the resource (Kasper and Streit 1998, p. 186). The latter possibility shows the difficulties of differentiating between common property and open-access, at least from an economic perspective.

Open-access refers to situations in which property rights have not been defined, i.e. nobody holds exclusive title to the resource. Accordingly, there is no possibility of access control and exclusion of non-owners, and no regulated decision-making process. From an economic perspective, as we will show in chapter 6, this situation is very similar to one in which everybody "owns" the resource, i.e. the ownership of the large, inclusive group with compulsory membership described above.

Finally, state-ownership generally is used to refer to situations in which the state holds the exclusive title to a resource and controls access to the resource. Frequently, state-owned resources are open to access by the public. Thus, it may seem that state-ownership refers to a situation in which there is limited potential to exclude non-owners. It is our view, however, that this is a function of convention rather than a necessary legal or economic characteristic of state-ownership. Fundamentally, the state can control access to the resource. In situations of state-ownership, decision-making capacity with respect to the resource is, of course, in the hands of the state.

The categorization of property regimes as private property, common property, open-access, and state-ownership is not unchallenged. From an economic and even in many cases from a legal perspective, common property resources are (similar to) private property, for instance. Moreover, the traditional view of a resource as being under one specific property regime is no longer maintained, as scholars highlight that for any specific resource numerous property regimes for the different attributes and functions of the resource exist (see above). Furthermore, state-ownership of rights to resources frequently takes the form of government intervention in private rights. Thus, any property arrangement can be thought of as a distribution of rights between government and private individuals. We will take up again such problems with the conventional differentiation of property regimes in chapter 6, when we suggest a different way of conceptualising property arrangements.

3.4 Property Rights and Environmental Stewardship

Property rights have been long hailed by economists as a provider of positive incentives for environmental stewardship. The basic idea here is that property rights are important for resource regimes because people tend to take better care of what belongs to them than of the possessions of other people or the collective (see the 'tragedy of the commons' story below), and thus should be granted rights to the resources they use. However, there are some problems with this idea which we will discuss after having laid out the original argument below.

3.4.1 The Traditional Economic Argument

From an economic perspective, property rights affect the potential for environmental stewardship by structuring choice sets for consumption and investment decisions. As decision makers base withdrawal and investment decisions on expectations about returns, property rights define the distribution of incentives decision makers face when maximizing their utility in the context of scarce resources. Only if decision makers have the assurance that they can control revenue in the long run, will they have an incentive to maintain the value of a natural resource and make consumption and investment decisions accordingly.

In terms of consumption decisions, the assurance of long-term control induces property owners to limit withdrawal from natural resources to a sustainable level, so that the resource can continue to provide benefits in the long run.

> The concentration of benefits and costs on owners creates incentive to utilize resources more efficiently…The development of private rights permits the owner to economize on the use of those resources from which he has the right to exclude others (Demsetz 1975, p.31).

Owners of a fishing ground, in this argument, are more likely to harvest just the amount of fish that allows a stable population, capable of renewing itself, to remain, if they can limit the access of other appropriators from the fishing ground. Owners of grazing grounds have an incentive to limit the number of cattle on the pasture to avoid the degradation of the land, if they can be sure that the benefit of "restraint" will not be predominantly consumed by other cattle owners.

In the absence of control, in contrast, overexploitation and eventually depletion or destruction of natural resources are likely. If decision makers lack control over long term costs and benefits in the absence of property rights, because they cannot exclude others from the use of the resource, it may be rational for them to forego long-term benefits in favour of lesser short-term benefits. In other words, if use of the resource by others cannot be prevented, decision makers can optimise private benefit (in the absence of cooperation) only by increasing their own withdrawal rates above the social optimum, as gains are distributed on a first-come, first-serve basis.

Like consumption, decisions in terms of rate and form of investment are a function of control over the benefits provided by a natural resource in the long run. Investing means sacrificing today's consumption for tomorrow's consumption in the expectation of net gain. If the expected net gain is small because of high uncertainty (which translates into the application of a high discount rate to future returns), the potential investor has no motivation to forego today's consumption. The lower the expected returns are, the lower the optimal amount of investment. A natural resource for which no secure property rights exist, in consequence, can suffer from lack of necessary inputs to sustain itself. Appropriators from fresh water sources, for instance, have less incentives to invest in facilities to keep the water clean, if they are unlikely to capture a sufficient share of the return on their investment, because most of the water is withdrawn by other appropriators. Likewise, farmers sharing fields have less incentives to invest in irrigation provisions if they know that rival farmers will capture a major part of the return on their investment.[6] If owners do make investments the context of insecure property rights, they have an incentive to invest in inputs that are more easily sold or used elsewhere. They will shy away from high sunk costs, which make disinvestments costly. Furthermore, if the uncertainty of their control results from joint use of an asset with others, they are likely to invest in inputs with higher levels of excludability, i.e. for which monitoring and enforcement costs are lower.

In sum, according to the original economic argument, the absence of secure property rights can cause environmental (and economic) waste. For natural resources, the subsequent dynamics lead to unsustainable exploitation rates and underinvestment in necessary inputs. These dynamics are best captured in the literature on collective action and "the tragedy of the commons."

Any collective action situation is characterized by a divergence between social and private costs and benefits, in other words, externalities, as not all costs of an individual's action are borne by that individual, and not all benefits from an individual's action accrue to that individual. Collective action problems exist whenever property rights are not fully defined, which means they always exist. As the costs of defining rights to every single attribute of a good are prohibitive, the benefits of those attributes for which the costs of defining property rights outweigh the gains are transferred to the public domain.[7] Thus, while we might

---

[6] Note, that individuals often do not just calculate their own costs and benefits in such situations though, which is where the economic argument is insufficient. Frequently, individuals will abstain from appropriate investments - even if they would receive a net-benefit - if other individuals have the potential to free-ride, because they conceive such free-riding as unfair. Thus, norms do play a significant role in influencing individual decisions, besides economic incentives.

[7] In every transaction involving the exchange of property rights, the costs of obtaining the necessary information about each of the multitude of attributes of a good prevent the complete definition of the rights that are being transferred: "Because transacting is costly, as an economic matter property rights are never fully delineated" (Barzel 1989, p.1). Because of the costs involved in stipulating and monitoring these attributes, parties to an exchange limit negotiations and delineation of rights to those attributes they consider worth the effort (for which the benefits outweigh the costs, thus satisfying multiple marginal equivalencies rather than one). Barzel argues that any attribute for which no stipulations are made and that therefore can be varied becomes a "free attribute"", "common property" or in the context of this discussion "open-access." With these attributes being relinquished to the public domain, anybody can choose to

tend to see land over which no property rights have been defined, for instance, as an open-access resource involving collective action problems, even land held as private property is associated with some collective action problems, caused for example by the impact of the specific form of land use on the air or groundwater quality in the area (for which property rights are not defined and enforced). While a better definition of property rights, then, reduces collective action problems, the impossibility of a perfect delineation of property rights implies that collective action problems will always exist.[8] This is especially the case, if we view nature itself as a stakeholder (part of the collective action arena, but unable to speak for itself). In many cases of natural resources management, nature or ecosystem sustainability, i.e. the nature support function of a water resource, for instance, is one of the rival uses to be taken into account when analysing the collective action problems.

In the context of environmental resources, a complete or partial lack of property rights is frequent and severe collective action problems abound. They reach from global problems, such as global warming, ozone depletion, and questions of biodiversity, to local problems such as the pollution and destruction of fresh water resources. This abundance of collective action problems partly results from the nature of many environmental resources, i.e. their limited excludability, which make the definition and enforcement of private property rights costly, and (partial) rivalness.

Collective action problems, thus, reflect a lack of individual control over the long-term use and management of natural resources, and are associated with the patterns of overuse and exploitation identified above. The rate at which individuals extract from a natural resource, which is determined by private costs and benefits, would exceed the optimal rate in terms of social/environmental costs and benefits. This dynamic has been recognized by various scholars such as Hardin[9] (1968), who argues that the necessary outcome of collective action problems in the context of environmental resources is the "tragedy of the commons." Hardin highlights the results of the divergence between individual and social rationality in the absence of coercion in the case of a communal grazing area.

> Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add

---

spend resources (monetary or other) on the capture of their benefits. Optimisation thus means a less than full delineation of property rights: "perfect delineation is prohibitively costly" (Barzel 1989, p. 64).

[8] For collective action problems to be completely avoided rather than reduced, contrary to Coase (1960), we do not only need property rights, but also a perfectly functioning market proving for a "correct" value of those property rights. The question of how to achieve that for many environmental resources is one of the fundamental concerns in the environmental field today, of course, as intergenerational dynamics, scientific uncertainty, and those characteristics of natural resources that make the assignment of property rights difficult to begin with complicate the assignment of monetary values.

[9] Hardin and the "father" of *Collective Action*, Mancur Olson, were not the first scholars to reveal the dynamics around collective action problems, however, and we should give credit where credit is due. Aristotle already argued that "what is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, and hardly of the common interest" (Aristotle, Politics, Book II, chpt. 3).

> another animal to his herd. And another, and another… But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all (Hardin 1968, p. 1244).

Even before Hardin, Gordon (1954) analysed the collective action problems associated with a fishing ground. He found that a lack of cooperation among fishermen results in higher expenditures of effort, higher fish landings, and a lower continuing fish population than the optimal level. Similar analyses have been conducted by a number of scholars (Sandler 1992). The traditional economic argument thus predicts that an absence of (private) property rights will lead to overexploitation of environmental resources and, in consequence, to their degradation or destruction.

3.4.2 Limits of the Traditional Economic Argument

The collective action and tragedy of the commons arguments are not without weaknesses, and scholars criticize them for their narrowness of perspective. In addition, scholars have gathered extensive empirical evidence against the necessary link between common property resources and collective failure.[10] Thus, Ostrom has argued that Hardin's argument about the tragedy of the commons refers to open-access resources, but not common property resources. She and her colleagues at Bloomington have conducted numerous analyses identifying determinants of successful cooperation among appropriators from common property resources, providing for a sustainable management of these resources.

Substantial criticism of the tragedy of the commons argument also comes from developments in game theory. Ostrom (1990), for instance, points out that that isolation and the lack of communication as the determinative factors underlying the simple analysis of the Prisoner's Dilemma, the game generally used to demonstrate the tragedy of the commons, are absent in many real-life situations in which people depend on a common resource. Other critics highlight that numerous other factors such as the technology of public supply[11], the pay-off structure, length of the game, the modelling of cooperation and defection as a continuous variable, and institutional rules have an impact on outcomes, allowing results other than the "tragedy of the commons" (Sandler 1992).

---

[10] For the most extensive selection of cases and literature see the data bases maintained by the International Association for the Study of Common Property (IASCP) and the Workshop in Political Theory and Policy Analysis at Indiana University, Bloomington.

[11] The technology of public supply captures how individual contributions add to the total public supply achieved. The most common technology defined by Sandler (1992) is that of summation: $Q = \text{sum } q^i$, where q^i is the collective good's provision level of individual i. Alternative technologies are those of the weakest link: $Q = \min (q^1, \ldots, q^n)$, and the best shot technology: $Q = \max (q^1, \ldots, q^n)$.

Ultimately, the slightest variations in the cost-benefit constellations combined with different technologies of public supply can lead to different collective action outcomes.

The most fundamental criticism to the traditional argument for property rights in environmental management, however, results from its implicit assumptions about economic and environmental values of resources. This criticism is particularly powerful as it stays within the economic logic adopted by the proponents of the "tragedy of the commons" argument, and therefore challenges them *on their own turf*. After all, under the assumption of homo oeconomicus, the control over natural resources provided by property rights will only lead to an environmentally superior management of the resource, if the greatest economic benefit to be derived from the resource results from its environmentally desirable use. The following example illustrates this dynamic: Imagine that there are two fishing ponds, one in Northern Norway and the other in the middle of Paris. Both are owned by individual private owners. In the case of the Norwegian pond, it is likely, that fishing is the best use to which the owner can put the pond. Therefore, the owner is likely to only harvest fish from the pond to the extend that a sustainable fishing populations remains, to ensure long-term maximum benefits from the pond. In the case of the Parisian pond, however, the best (economic) use the owner can make is to drain the pond and sell the real estate to a developer for a few billion French Franc.[12] Obviously, there is a difference in conditions between these two ponds.

This difference in conditions is the relationship between the "economic value" and the "environmental value" of the ponds, the *e-e gap* as a shorthand (Fuchs 1997). The *e-e gap* is an important and frequently overlooked factor influencing the environmental implications of different property arrangements (it is also of fundamental importance in determining the necessary extent of government/policy intervention in private property rights, which is why we will return to this concept in chapter 6). Please note that in the context of this argument, "economic value" refers to the *maximum long-term economic value to be obtained from any use of the resource*. In contrast, "environmental value" refers to the *economic value that can be obtained from the environmentally most desirable use of the resource*. The difference between these two values is the *e-e gap*.

The *e-e gap* is important for the environmental desirability of property rights and arrangements because it determines the implications of the maximization of expected (economic) utility for environmental stewardship. If economic and environmental values of a resource are close, the decision maker's maximization of expected utility can imply a maximization of environmental stewardship, and therefore the most efficient property regime in economic terms

[12] Note that this argument only applies if we conceive of the owner as "homo oeconomicus" rather than "homo oecologicus." This assumption can not always be made, of course, especially when it comes to environmental values. Experience shows, however, that there a limits to the guidance in decision making provided by personal convictions and norms of behaviour: "Empirical evidence suggests that the price we are willing to pay for our convictions is a negatively sloped function, so that ideological attitudes are less important as the price increases; but both the slope of the function and shifts in the functions are subjects about which we now very little" (North 1989, p. 1322).

may also be the most desirable one environmentally, i.e. lead to the least environmental overexploitation or degradation. If, however, the difference between the two values is large, the maximization of expected utility is likely to result in the maximization of environmental degradation, and therefore the economically most desirable property regime will not be the environmentally most desirable one.

The *e-e gap* is a function of market prices, as these determine both the maximum economic value derivable from a resource, as well as the economic return on its environmentally desirable use. Besides market prices, characteristics of a resource, such as annual growth rates relative to the current interest rate influence the *e-e gap*. As the interest rate indicates the prevailing return on investment, it highlights the opportunity costs involved in a restraint on harvest. Clark (1973) has shown for whales, and Berkes (1996) convincingly argues that the same dynamic applies to redwoods, that for slow growing species economic rationality does not lead to sustainable harvest rates.

The *e-e gap* thus highlights the limits of the traditional argument for (private) property rights. Recall, that advocates of private property rights argue that the high level of individual control and responsibility provided by private property rights leads to low levels of collective action problems and consequently less economic and environmental waste. As the above discussion shows, economic and environmental waste (or if put in positive terms, economic efficiency and environmental desirability) are not always closely correlated. Only if the *e-e gap* is small, does greater individual control imply superior environmental stewardship. In cases in which the *e-e gap* is large, greater individual control implies a greater potential for an economically efficient environmental degradation of the resource.

3.5 Types of Property Rights

Some scholars suggest that it is useful to differentiate between different types of property rights, especially as an analytical framework for studying property arrangements in the context of environmental resources. Thus, Schlager and Ostrom (1992) develop a categorization of rights that ranges from access and withdrawal rights (use rights) to management rights. They argue that it is important to distinguish between owners, appropriators, claimants, and authorized users of a resource (see Table 1).[13] Schlager and Ostrom base this schema on a differentiation between operational level rights of access and withdrawal and more powerful collective choice rights of management, exclusion and alienation. Such a conceptual schema of distinguishing among rights allows to capture the harvesting and investment incentives better than the traditional differentiation between private property, common property and open-access. Schlager and Ostrom point out that the five types of rights are independent, but frequently held in the cumulative manner described below (at least with respect to fisheries, to which they apply this conceptual schema).

[13] In addition, one can talk about the final beneficiaries from the resource, i.e. the consumer of the final product. In the context of our project, however, such a focus appears less important.

Authorized Users

In Schlager and Ostrom's typology, authorized users are individuals holding rights of access and withdrawal. Sometimes these rights can be transferred to others either temporarily or permanently. Rights of withdrawal and access, in turn, are defined as the right to enter a defined physical property and the right to obtain the "products" of the resource. These rights thus are similar to what our project proposal calls use rights. According to Schlager and Ostrom, authorized users have little incentive to invest in efficient resource management, and are likely to seek to gain as much as possible with inefficient outcomes being the likely result.

Claimants

Claimants, in turn, possess the collective choice rights of management in addition to access and withdrawal rights. Thus, they can design operational level rights of withdrawal.[14] According to Schlager and Ostrom's typology, claimants cannot, however, design rights of access to resources. In consequence, claimants have some incentives to invest in governance structures for their resources. Given a lack of assurance that rewards for their investments will not be captured by others, however, such investments are highly context dependent. Schlager and Ostrom argue that claimants are most likely to invest in resources which are not being utilized by any other group, due, for instance, to a lack of interest or physical accessibility.

Proprietors

In contrast to claimants, proprietors have the right of exclusion (in addition to operational level rights of access and withdrawal and collective choice rights of management). Thus, proprietors have the authority to decide who may access resources, and how these resources may be utilized. Rights of exclusion provide proprietors with substantial incentives to make "current" investments in resources, as they allow them to be "reasonably assured of being rewarded for incurring the costs of investment" (op. cit., p. 257).

Owners

Finally, owners hold the collective choice right of alienation, i.e. the right to sell or lease their collective choice rights, in addition to rights of access and withdrawal, management and exclusion, according to Schlager and Ostrom's schema. Schlager and Ostrom argue for the importance of rights of alienation

[14] In our view, maintenance, monitoring and control, and conflict regulation belong to management rights.

for the efficient use of resources, as they provide incentives - if combined with rights of exclusion - for owners to make long-term investments in a resource.[15] Ownership rights thus come closest to what traditional economic analysis considered as private property rights, in that they provide owners with the expectation that they can capture the benefits of long-term investments in a resource.[16] They do not, however, as Schlager and Ostrom point out (and as we saw above) guarantee the survival of a resource in the context of relatively high discount rates.

TABLE 1:
Bundles of Rights Associated with Positions[17]

	Owner	Proprietor	Claimant	Authorized User
Access + Withdrawal	X	X	X	X
Management	X	X	X	
Exclusion	X	X		
Alienation	X			

De jure versus de facto

Schlager and Ostrom further differentiate between de jure and de facto rights. They consider de jure rights to be rights that "may be enforced by a government whose officials explicitly grant such rights to resource users,… [so] that they are given lawful recognition by formal, legal instrumentalities" (op. cit., p. 254). In contrast, de facto property rights are considered to originate among resources users: "such rights are de facto as long as they are not recognized by government authorities" (ibid.). This differentiation between de facto and de jure property rights highlights the importance of assurance of property rights by the state, as one condition for de jure property rights to effectively exist and to determine (environmental) outcomes (see also Fuchs 1996). Schlager and Ostrom acknowledge that with respect to a single common pool resource "a conglomeration of de jure and de facto property rights may exist, which overlap, complement, or even conflict with one another" (ibid.).

The strength of Schlager and Ostrom's categorization of types of property rights is that it allows to capture differences in the security of property rights and therefore differences in incentives to manage resources efficiently. Critics of this categorization, however, will point out that it does just that: highlight the difference that expectations (about the ability to capture rewards for investment) make in the efficient management of resources and add nothing to what economists have been pointing out all along. This criticism is especially powerful since the types of rights identified by Schlager and Ostrom may differ

[15] Recall that a sustainable harvest rate is a kind of investment, as it means sacrificing today's consumption for tomorrow's consumption.
[16] Ownership also comes closest to what our project proposal considers as property right or title.
[17] Source: Schlager and Ostrom 1992.

greatly within their individual categories. Thus, it will be of great importance for management and exclusion rights, whether they are given for life or until the owner decides differently. Likewise, it will make a substantial difference for ownership rights, if the owner has signed over management and exclusion rights to a proprietor for a substantial period of time, as ownership rights in that case have no bearing on the efficient management of the resource.

Schlager and Ostrom themselves raise doubts about the importance of the different types of rights with their differentiation between de facto and de jure rights. Indeed, they find that de facto rights of authorized users might lead to a more efficient management of a resource than de jure rights of proprietors.[18] Thus, economists would claim the legal definition and reach of rights matters little. Only expectations about returns and resulting incentives matter, which may be influenced by the legal context. The question, thus, is whether Schlager and Ostrom's categorization really allows us to capture the differences in expectations and incentives in most cases.

An additional weakness arises from the focus on the efficiency of resource management in Schlager and Ostrom's argument. As pointed out above, (economically) efficient resource management often does not mean sustainable resource management. Schlager and Ostrom, however, fail to consider situations in which a large *e-e-gap* exists. In sum, the usefulness of this categorization of rights for the purposes of our project needs to be further discussed.

[18] An additional weakness, here, arises from the potential difficulty to differentiate between de facto and de jure in traditional societies.

4 Public governance patterns and their elements

4.1 Introduction

This chapter develops a model of 'governance' as an aid for comparing governance patterns and applies it to a particular policy arena: policies on the management of water resources. When we use the term 'governance' here, we intend to restrict ourselves to 'public governance', since self-steering, e.g. on the basis of a certain model of property rights, is dealt with in another part of the model. On the other hand, the concept of 'public governance' is wider than just government intervention, since all kinds of external interventions for a collective purpose, other than self interest, can provide forms of public governance. In practice though, public governance usually will imply participation or even dominance of one or more government bodies.

Various current approaches in policy science focus on changes in government policy when making comparisons (Sabatier & Jenkins-Smith 1993, 1999; Baumgartner & Jones 1993). This chapter does not only try to develop a model which can be used to focus on (long-term) changes in policy (diachronic study) but also to compare policies in a certain sector in different areas (synchronic study). As far as developments in time are described, this is primarily intended to provide indications of the relationships between the various elements of the governance pattern and between the governance pattern and the property rights regulative system.

The model is concerned less with interaction processes (activities and interactions between actors) than with the more structural elements of governance, which form both the inputs and outputs of such policy processes.

The research questions examined by this chapter are:
1. Which elements make up a public governance pattern?
2. In what ways do these elements influence each other?

Policy and 'governance'
In recent decades, there have been many developments in the way we think of the concept of government policy. One reason for these changes in the way we view government policy in recent years is that more attention has been given to the fact that developments in different sectors of society are guided not only by government but are a result of an interplay between many actors. Within such networks of actors, government may have a more or less central and dominant position, or it may not. This means that attention is shifting from government policy – or 'government' – to 'governance'. In addition, there is also greater recognition of the fact that sectors of society are not managed at one level or at different levels separately, but by an interplay between these different levels. These levels might coincide with different tiers of government, but this does not need to be the case if there are powerful non-governmental actors that provide direction at a specific level without there being a government body active at that level. Also, it is quite possible that the same actors take initiatives at various levels, sometimes even simultaneously. This process is known as 'multilevel governance'.

4.2 Visions and synthesis

4.2.1 Introduction

In this part of the chapter, we will try to develop as complete a model as possible of the elements of a ‘public governance pattern’. Later, using this model, we can compare the governance patterns and the changes they undergo and the effects they have on property rights and the sustainability of water resource management. We develop this model through a synthesis of policy science approaches, and the different emphases in various approaches each have a place in the model. When developing the model we start from the concept of ‘policy’, which we build up using the various elements until we arrive at a ‘public governance pattern’.

In the synthesis that is made here, we do not start with the policy process but with the context and content of government policy. But what is context and what is content is not so easy to establish. The perception of the problem, for example, may be considered to be a part of the policy or a part of the context; it all depends on how narrow or broad one’s conception of policy is. We choose to view policy in the broadest sense. The consequence of this approach is that, on the one hand, all elements of the governance pattern can be accommodated in the scheme (but not the activities and interactions that are part of the process of governance itself), while, on the other hand, we can assume that there are relationships between all these elements (and not just between elements of the context and elements of the content of policy). All the identified elements are part of the content of policy and all are a part of the context of each other. In the following sections, we identify the various elements of the governance model and then turn to examining the relationships between them.

A definition of government policy much used in the Netherlands, and which we use as a starting point, is that of Hoogerwerf (1998: 23). He describes policy (as a synonym for the content of policy) as: ‘attempting to achieve a particular objective using particular means at particular times’. Thinking in terms of objectives and means is considered by him to be the basic structure of every policy. The term ‘means’ is considered to be a synonym for instruments.

This premise will be further developed using various policy science approaches. Of course, many of these approaches have other purposes than identifying elements of the content of policy and governance. For example, they may be used to explain long-term policy changes, or the effectiveness of policy instruments. It is not the intention of our discussion to do justice to the approaches in their own right; what we want to do here is use these approaches as sources of inspiration for our goal of building as complete a model as possible of governance patterns.

Moreover, an ‘injustice’ will be done to most approaches in the sense that they will not be left intact, but only the most specific features highlighted. Aspects that are also to be found in other approaches and that generally tend to

soften the bias in these specific features in a certain approach are not treated. The intention is not to judge these approaches but to enrich our approach to ‘public governance’ in the light of the wealth of aspects brought to light by the policy science approaches examined.

4.2.2 The stage model of the policy cycle

In the stage model of the policy cycle, the policy process is divided into a number of subprocesses, such as political agenda-setting, policy preparation, policy determination, policy implementation and policy evaluation and feedback. This could provide a useful basis for analysing the content of policy as, in principle, each stage produces an ‘intermediate product’ (in turn: points of particular interest, proposals, decisions, applications, results and lessons), which will eventually lead to the complete policy content. Nevertheless, we will not use these assumed intermediate products as elements.

The classical stage model of the policy cycle raises the question of the extent to which such subprocesses are only analytical constructs or whether they can also be identified in real life. Setting political agendas can be considered to be an aspect that is present in all policy processes. The same can be said for evaluation. Feedback consists of shorter and longer loops that lead to repetition in an altered form of other subprocesses, and so this is also not a subprocess in its own right. In short: if we are to use ‘real life’ processes, then setting agendas, evaluation and feedback are possibly *not* separate subprocesses of the policy cycle. Policy preparation and policy determination are in day-to-day empirical practice often also so closely related that it is usually not worthwhile analysing them as separate processes.

This leaves just two policy processes from the traditional policy cycle: policy development and policy implementation. But where does this leave the succession of many administrative levels? (In climate policy, for example, these are the global, EU and national levels, and sometimes the provincial and local levels.) What is policy implementation for one level, is policy development for the next level. In principle, it is possible to make an analytical distinction between policy development processes and policy implementation processes that can be useful for analysing these processes. In doing this, policy development processes are processes that involve turning diffuse inputs into a more focused output, and policy implementation processes are processes that involve turning a more or less focused input (the ‘policy’) into a number of diffuse outputs. When looked at this way, though, making a distinction between policy development and policy implementation means that the analyst must first specify himself what this focused output–input is.

Whether policy development and policy implementation are different processes depends on the question of whether there is a separate arena (playing field), an separate game that can reasonably be distinguished from others, and a largely non-overlapping group of actors involved. In other words, this is an empirical question. The answer will sometimes give cause to draw a distinction between policy development and implementation processes and sometimes not, depending on the goal of the research (cf. DeLeon 1999).

The above is not much help for our purposes, though. It would seem to be sensible not to view the division of the policy process into subprocesses as a

matter of fact but as an empirical question. In many cases only a distinction between the process of developing and implementing the content of a policy as specified by the analyst will hold water. A listing of possible intermediate products is unsuitable as a basis for a model of the content of policy and governance.

4.2.3 Interaction processes and instrument theory

An elaboration of thinking in terms of policy processes is to emphasize the character of these processes as social interaction processes, as has been the case in the Twente policy sciences approach. Here, attention has shifted from viewing policy as a sort of production process with semi-finished products and an end product to a vision in which the actors participating in the process are the central concern. In this vision, the course and outcomes of the processes depend not only on the inputs to the process but mainly on the characteristics of the actors involved, particularly their objectives, information and power. All other factors that influence the process do so because, and in so far as, they influence the characteristics of the actors involved. This also applies to the influence of policy instruments. Not all characteristics of actors, however, are determined by policy, and so it is not possible to describe a policy without paying attention to the ***actors*** involved in that policy. These actors are, therefore, allocated a place in a graphic model of the policy (Bressers, 1983).

Moreover, the processes in this vision are not only linked in one series or cycle, but are part of a large number of societal processes in which government authorities sometimes participate and sometimes do not. All these processes are connected to other processes in a complicated web via their inputs and outputs, and possibly indirectly linked to *all* other processes. Each definition of a sector of society draws a more or less arbitrary boundary round a cluster of processes in this web. In practice, the boundaries that are drawn between policy development and policy implementation are the same as those between a higher and lower ***administrative levels of government*** (Bressers 1983; Honigh 1985; Bressers & Honigh 1986).

The ‘instrument theory’ which stems from this perspective focuses on the application and effects of instruments on the target groups of policy (Bressers & Klok 1987; Bressers, Klok, Kuks & Lulofs 1988; Klok 1991). It also takes account of the fact that instruments do not influence the characteristics of the actors involved separately but rather as a package or as an ‘instrument strategy’. ***Instruments and strategies*** have various properties, for example a certain proportionality between target group behaviour and government reaction to this behaviour, or giving resources to the target group or taking these resources away from the target group. Such properties of instrument strategies affect their applicability in practice. Klok emphasizes that some of the instruments are designed to give those implementing the policy the power to apply other instruments (Klok 1991: 176-194) and also that the implementing organizations depend on being equipped with sufficient capacity and expertise (idem: 163-164; see also Bressers 1983: 218-237 and 256-274). In his thesis, Arentsen (1991) exhaustively discusses the relation between the policy organization and policy implementation. So also the ***organization of implementation*** is important.

Later publications on this approach (Bressers & Kuks 1992; Bressers 1993; Bressers, O'Toole & Richardson 1994; Bressers, Huitema & Kuks 1994) have paid more attention to the interrelations between the actors, including actors that do not directly participate in the processes under examination. Klok (1995) gives primary importance to the allocation and removal of resources in such contexts and in the classification of policy instruments. The mutual relationships between actors within such policy networks are seen as an important factor in the development of the content of policy (Ligteringen 1999). In addition, the relation between policy processes at the various administrative levels is explicitly dealt with (Bressers, Kuks & Ligteringen 1998). During this theoretical development, the approach to policy as an interactive process and the instrument theory based on this gradually grew into an integrative policy science approach, uniting elements from a variety of other approaches.

This discussion brings us to the following provisional elements of public governance: (1) administrative levels, (2) actors in the policy network, (3) objectives, (4) strategies and instruments, and (5) organization of implementation.

From this starting point, we examined what modifications to this elementary public governance model are to be made. First, we take a few other integrative policy science approaches into consideration: Ostrom's institutional approach and Sabatier's 'advocacy coalition framework' (sections 4.2.5 and 4.2.6) and thereafter turn to a wider range of policy science approaches (section 4.2.7). First, in the section 4.2.4, we will present the conclusions derived from these exercises.

4.2.4 A model of governance in five elements

Based on the consideration of the various policy sciences approaches, no completely new elements will be added to the model of governance. But is should be possible to improve on the five elements and make them operational. For instance, the scale aspect will be de-coupled from tiers of government, since a truly multilevel governance pattern is not tied to specific governmental organizations. Similarly, a much wider notion of problem perception will replace policy objectives, and so on.

In its shortest form the 'governance model' consists of five questions: Where? Who? What? How? and With what? A characteristic feature of modern 'governance' systems is that they have many aspects. They are: multilevel, multi-actor, multifaceted, multi-instrumental and multi-resource-based. The questions mentioned under each heading operationalise the contents and meaning of the element.

(1) Levels and scales of governance
Where? – multilevel –
Which levels of governance dominate policy and the debate on conducting policy, and in which relation? What is the relation with the administrative levels of government? Who decides or influences such issues? How is the interaction between the various administrative levels arranged?

(2) Actors in the policy network
Who? – multi-actor –
How open is the policy arena in theory and practice, and to whom? Who is actually involved and with what exactly? What is their position? What is the accepted role for government? Who has relevant ownership and use rights or is a stakeholder in some other capacity (including policy implementing organizations)? What is the structural inclination to cooperate among actors in the network? Are there actors among them who operate as process brokers or 'policy entrepreneurs'? What is the position of the general public versus experts versus politicians?

(3) Problem perception and objectives
What – multifaceted –
What are the dominant maps of reality? What is seen as a problem and how serious is this considered to be? What do people see as the causes of this problem? Is the problem considered to be a problem for individuals or a problem for society as a whole? What values and other preferences are considered to be at stake? Which functions are allocated to the sector? Is the problem seen as a relatively new and challenging topic or as a topic in the 'management' phase without much political 'salience'? To what degree is uncertainty accepted? Where are the recognized points of intervention? What relationships with other policies fields are recognized as coordination topics? Which policy objectives are accepted? What are the levels to which policy makers aspire (ambition) in absolute terms (level of standards) and relative terms (required changes in society)?

(4) Strategy and instruments
How? – multi-instrumental –
Which instruments belong to the policy strategy? What are the characteristics of these instruments? What are the target groups of the policy and what is the timing of its application? How much flexibility do the instruments provide? To what extent are multiple and indirect routes of action used? Are changes in the ownership and use rights within the sector anticipated? To what extent do they provide incentives to 'learn'? What requirements do they place on the availability of resources for implementation?[19] How are the costs and benefits of the policy distributed?

(5) Responsibilities and resources for implementation
With what? – multi-resource-based –
Which organizations (including government organizations) are responsible for implementing the policy? What is the repertoire of standard reactions to challenges known to these organizations? What authority and other resources are made available to these organizations by the policy? With what restrictions?

[19] For example, some systems of emission charges or tradable licences may require so much information that it makes them almost impossible to apply. The fine tuning of the instrument is very important in this respect, and can make the difference between an effective intervention and a dead end.

The next sections discuss a range of policy science approaches and highlight the aspects derived from these approaches to enrich our governance model.

4.2.5 The 'institutional rational choice approach'

Ostrom's institutional model is in essence a 'rule-based' approach. Although in later work (for example Ostrom 1999) attention is also paid to the characteristics of the actors themselves and the physical conditions as the context of the processes, the distinguishing feature of the approach is that collections of rules are used to describe the 'action arena' in which such processes take place.

Ostrom (1999: 52-53) distinguishes seven different types of rules which together define the arena: 'entry and exit' rules that determine who may take up a position between the actors and who may not; 'position' rules that determine which position these actors have in the network; 'scope' rules that state the field to which this position relates; 'authority' rules that indicate the competences of the actors as experienced by themselves; 'aggregation' rules that state for certain actions, in the experience of the actors, whether permission from others is required or not; 'information' rules that state what is known and to whom and how this information is disseminated – for example whether information must remain secret or whether it should be made public; and 'payoff' rules that state what the benefits or sanctions are for the various actors and how these are arrived at (for example, regarding compliance with or infringement of rules, who checks compliance and imposes sanctions, and how). These categories appear to partly overlap (Heilman 1992: 81). Nevertheless, they can enrich the elements of governance we have identified.

This applies in particular to the element 'networks and actors'. In the instrument theory the composition and position of the actors involved in the network is assumed to be a given fact. The first two types of rules require that attention is given to the fact that these are crucial variables. A similar situation applies to the 'scope' rules that determine the extent of certain positions, competences and other sources of power. For that matter, when applying the model many of these rules are related to the allocation of ownership and use rights between those involved (Ostrom 1990).

An interesting fact is that a few times it is explicitly stated that it is not the 'objective' rules that describe the actual arena but the way in which these are experienced in the eyes of those involved. Something similar is emphasized by listing the 'information' rules as separate entities, which also require that particular attention be paid to the limitations of the available information. Incidentally, a parallel can be drawn between the last four types of rules and the three characteristics of power (2x), information and objectives from the instrument theory. The difference always lies in the fact that these are not described as characteristics of the actors involved but of the rules of the game for each situation. Besides institutional arrangements, Ostrom also recognizes 'characteristics of the community' and 'events and the nature of the goods (for example groundwater and the physical features of the aquifers) as influencing the choice situation (Kiser & Ostrom 1982; Sabatier 1991).

Another aspect of Ostrom's approach is that she makes a distinction between the different levels of analysis. Rules that influence 'operational'

situations such as production and consumption are made at a higher or deeper level of ‘collective choice situations’. The creation of these rules is, in turn, subject to ‘constitutional’ rules, etc. This layered structure of the rule context is not the same as a classification of administrative layers. After all, constitutional rules apply to all administrative layers and collective choice situations arise at each administrative level. This structure developed by Ostrom accentuates the fact that action arenas are ‘nested’ in the rules that are set by other arenas, independently of the question of whether this takes place in another administrative layer. On the other hand, such administrative layers are usually established to create just such a context for policy processes at ‘lower’ levels. Moreover, the analytical separation between the various types of rules appears difficult to differentiate in practice. Thus, it is not clear to what extent the application of policy instruments is part of the operational level or part of the collective level.

A compromise between both interpretations of the term ‘level’ could be – as in the introduction to this section – to speak about levels within a concept of ‘multilevel governance’, in which the other level often, but not always, and not by definition, also has its own characteristic administrative level.

4.2.5 The ‘advocacy coalition framework’

The ‘advocacy coalition framework’ developed by Sabatier and others was developed as an answer to the stage model of the policy cycle and to better understand the relation between ‘technical information’ (expert knowledge) and the policy process (Sabatier & Jenkins-Smith 1999: 117). An ‘advocacy coalition’ is a collection of actors from both within and outside government who hold common beliefs and who coordinate their activities to a considerable degree (Sabatier 1988, 1991). Within a sector of policy – the ‘political subsystem’ – there is usually more than one advocacy coalition active. In addition, there are actors who are more likely to have objectives that relate to policy processes than to the content of policy, and these actors are referred to by Sabatier as political brokers. The characteristic features of coalitions are their political convictions or ‘policy beliefs’ and the resources they have, which lead to the proposed strategy and instruments of the coalition. The decisions that result from the policy process provide implementing organizations with both policy lines and resources. The actors in the subsystem are influenced by resources and restrictions from outside the subsystem, which in turn arise out of more or less stable conditions and events elsewhere in the system.

In the development of the model much more attention has generally been paid to the aspect of policy beliefs than to the aspect of resources. Only recently have Fenger & Klok (1998) developed a connection between the model and resource dependence, which has been enthusiastically received by Sabatier (Sabatier & Jenkins-Smith 1999: 141). For our purposes, it is important that the allocation of resources to the implementing organizations is explicitly recognized to be part of the policy decision. Besides that, what is of particular importance is the idea that there are coalitions of actors in the policy network that do not just simply represent the division between government and other actors, but contain actors from both of these groups and are based on common beliefs.

Regarding the beliefs of actors, we can identify various layers. In the ‘deep core’ are issues relating to fundamental values. The ‘policy core’ contains positions relating to the perception of problems, the division of the costs of policy implementation, the desirability of contributions from experts, politicians and the general public and other relevant values and preferences. The ‘derived aspects’ contain elaborations for each given situation. Besides this layered structure what is also important to us is the importance that is attached to the perception of the problem.

The next section reviews a few other approaches, which may be seen partly as precursors to the perspectives examined above. The discussion will concentrate on aspects that can be used to improve on the operationalization of the five elements, asking ourselves each time whether the approach can really contribute something extra to the model.

4.2.7 Some other approaches

Synoptic rationality, bounded rationality, incrementalism and mixed scanning (Simon, Lindblom, Etzioni)

It may be strange to begin this treatment of a series of approaches with one that we describe mainly in order to reject it, namely the approach based on fully rational choice. In particular, the premises that the decision maker has unambiguous preferences and complete information are invalid.

It was the Nobel prize winner for economics Herbert A. Simon (1997 (1945)) who provided the most famous criticism of these premises. His view of mankind is not that of an all-knowing ‘Homo oeconomicus’ with clear and confident preferences, but of a being with ‘bounded rationality’. While the concept of rational decision making only refers to the decision making process itself, and not the context, ‘bounded rationality’ takes account of the limitations in the capacity of actors to collect and process information.

Lindblom’s ‘incrementalism’ (Lindblom 1959; Braybrooke & Lindblom 1970 (1963)) also assumes a limited human capacity to process information. In addition, it devotes much attention to the power of continuity (see next section) and to the character of pluralistic processes geared to political negotiations. This approach also pays attention to the interaction between ‘values’ and ‘facts’. The latter feature again, more prominently, in the cognitive approaches, which are examined at the end of this section.

‘Mixed scanning’ (Etzioni 1967) is primarily meant to be a description of the process of policy development (either in a normative sense or not). It offers little extra of relevance to the context of governance. Opening up the possibilities of non-incremental policy changes has to do, for example, with ‘megapolicy changes’ (cf. Dror 1971). This fits with the previously mentioned cognitive approaches, for instance, with their frames and maps of reality.

Bureaucracy and politics (Allison)

In his groundbreaking work, Allison (1971) attempts to explain the course of the Cuban missile crisis in three ways. He, too, starts with the model of the rational actor, not only to determine his own position but also to provide an initial

explanation of the process. This allows him to present the added value of discussing and using the other two explanatory models with extra clarity.

The ‘bureaucracy model’ (following Allison’s example) specifically addresses the standard approaches and repertoires of organizations, which restrict flexibility in conducting policy. The model has some aspects in common with elements of our governance model: it goes into the role of organizations at various levels; it is also one of the few approaches that explicitly addresses the organization of implementation. In the construction of objectives, it addresses the phenomenon of ‘solutions in search of a problem’ (compare the flow model, examined below), an aversion to risky measures (dealing with uncertainty) and the organizations’ own management objectives.

The ‘political negotiation’ model (à la Allison) looks at the positions, interests and mutual power relations between actors (in so far as these do not relate to the game itself). The reasoning in terms of power in the interaction process approach (see above) is based on this model.

Flows and garbage cans (Kingdon)

Decision making does not always follow an orderly procedure but sometimes seems more like a process of fermentation in a compost heap (‘garbage can’ model of Cohen and others 1972), in which various issues come together by chance. The flow model of the policy process (Kingdon 1995, 1984) builds further on this and examines how three relatively autonomous flows come together each time a decision has to be made. Political ‘entrepreneurs’ promote this by making use of ‘windows of opportunity’ (or creating them). The three flows consist of problem perceptions, ideas for possible policies and political ‘salience’ for the voters and those elected, and of the people who emphasize each of these three or parts of them.

It is tempting to link these three flows to our elements ‘beliefs and objectives’, ‘strategies and instruments’ and ‘actors in the network’. With respect to this it should be noted that Kingdon considers the three flows more as notions than as matters of fact (Zahariadis 1999: 74-78) (see also the subjectivist approaches discussed below). We should also note that where we emphasize more or less stable features of policy sectors in the governance model, to allow comparisons to be made between sectors, Kingdon looks instead at the changeability of these features with regard to individual subjects of decision making. Nevertheless, the three elements mentioned allow the issues Kingdon wants to highlight to be accommodated.

Conversely, reasoning from the governance model to the flow model, the following can be added to the requirements that have to be met if a policy is to be amended. The convergence of problem perception, policy opportunities and political salience should not take place at different levels (as, for example, when there is concern about a problem at the national level while solutions are being sought at the European level). Moreover, it is necessary that ideas for solutions include ideas about the management and allocation of tools and resources for implementation. Otherwise, an issue will lead to a policy decision (and be thrown out of the ‘open window’ and removed from the political agenda), but that decision will only result in a symbolic policy.

Real games (Scharpf)
In his recent overview of policy science approaches, Sabatier (1999) classifies the game theory of Scharpf (1997) with the institutional rational choice approach (see above). There is something to be said for this, but still, Scharpf and his colleagues highlight a few points left out by Ostrom and her group. Scharpf calls his approach 'actor centred institutionalism'. Besides links to the Ostrom approach, it is true that much attention is paid to the 'actor constellations'. The goal and structure of the approach appear similar to that of the instrument theory, namely that the course and outcome of the processes are explained, but without being specially concerned with one of the five elements of governance as outcome. The most important difference from the instrument theory is that the outcome to be explained is related to the question of whether those involved can cooperate or not, while the instrument theory mainly tries to explain the relation between inputs and outputs of the policy process. The explanation takes place primarily in terms of the distribution of preferences for alternatives. Much attention is also paid to information, but only to direct information and not so much to frameworks for interpretation (see below). Further, the approach is based primarily on individual rational actors, although other values are also taken into account.

Cognitive maps, 'discourses', 'frames', argumentation and cultures (Axelrod, Dryzek, Fischer, Schön, Thompson & Wildavsky e/o.)
A large number of current theories in the policy sciences can be characterized as cognitive approaches. Characteristic for these theories is that they all emphasize that the behaviour of actors rests on their subjective interpretation of reality and furthermore that this subjective interpretation is formed because observations of actors are given a place in frameworks of interpretation that provide meaning to these observations, but also distort them. Such frameworks of interpretation can be partially viewed as a form of dealing with uncertainty. To assume for the analysis that an 'objective' context exists, which the researcher simply assesses, leads in this vision to false analyses, because not the facts but the interpretations count in reality. So, as a contexts of decision-making, not the facts but the interpretations are 'true'. Think of the well known adagio: 'What is believed to be real is real in its consequences'.

In the layered 'policy beliefs' of Sabatier one finds a partial sentiment of these theories. That doesn't mean however that Sabatier has very much respect for these theories. In his recent work, he assesses some of these as still too vague to be regarded as a real theory. For this reason, he doesn't deal with them in his book (Sabatier 1999: 11). The differences between the various theories are to be found especially in the way in which the frameworks of interpretation are conceptualised. In this respect, one can observe a certain range of foci from more individual to more collective frameworks of interpretation.

Axelrod (1976) writes about the 'cognitive maps' of political elites. For him, the emphasis of the cognitive map is on those aspects that decision-makers are able to recognize in a certain situation and on the complex web of causal relationships that they think are linking these aspects. Because the various cognitive maps of participants in decision-making processes often do not match it is hard to find a common ground for the exchange of ideas. Unless one is able to make the cognitive maps more explicit that is.

Schön (1983 and Schön & Rein 1994) starts his analysis from the viewpoint of the professional, who - whether as an actor or as an analyst - creates an image of the situation. According to Schön, he does so by building a 'frame' (as framework of interpretation) in which he can 'store' his lessons learnt about the world and his own repertoire of reactions. In this way, he is able to react adequately in the numerous situations in which a fundamental and thorough analysis is impossible. Needed for this is that the 'frame' remains flexible, in other words that new lessons can obtain a place in it and are not simply kept out, when they threaten to disturb the frame. He calls this process 'reflection-in-action'. To make effective communication with others possible sometimes 'cross frame discourse' is needed, in which the participants try to escape the limitations of their own frame and try to learn to understand the frame of the others in order to better understand their interpretational frames. Necessary condition is an open societal debate.

Fischer (1985, 1995 and with Forrester 1993) concentrated initially especially on the various layers of values that play a role in the assessment process in evaluation. In the layer of the policy goals, one can seek optimal realization. But it is also possible to criticize the policy goals themselves from the perspective of general norms that one identifies as relevant to the situation. In doing so, the role of government itself can become a topic. These norms can in their turn be judged from the perspective of the central values of society. And even these can be subject to further evaluation in culture or social critique. In his later work, emphasis is more on the 'social construction' of reality. In other words: the way in which a society views reality is regarded as a sort of implicit agreement.

Dryzek (1987, 1997) views frameworks of interpretation as 'discourses.' Characteristic for a discourse is that it is not only a set of points of attention, assumptions and judgements. The discourse is also linked with specific language expressions. Because different words and metaphors are used, it is extra difficult to communicate across borders between discourses. In that way, discourses can also become both stabilized and rigid. The frameworks of interpretation are thus not only 'social constructions'. They are also a sort of 'story that we tell each other about how the world works' (Milbrath 1993).

Thompsom & Wildavsky e/o. (Thompsom, Ellis & Wildavsky 1990, Schwarz & Thompsom 1990) build upon the cultural anthropologic approach of Mary Douglas. Their 'cultural theory' discerns four (sometimes five) cultural positions on the basis of two dimensions that represent the relation between the individual and society: 'grid' and 'group'. A precise explanation of these two concepts would be too demanding for our purpose, but they have consequences for the way in which the role of government is judged. The resulting cultural positions are called 'biases' because they induce an inclination to interpret reality in a certain way. The result is that frameworks of interpretation in this view are not seen as specific to certain actors in relation to a certain topic, but in principle as belonging to a fixed attitude of persons, groups or even societies. Admittedly, in later work, this strong linkage of various frames of interpretation to one common collective cultural bias has been relaxed.

For our model (see 4.2.4), the above theories have the consequence that we will pay attention to access to the societal debate and the acceptance of the

role of government in the first element of the model. With respect to problem perception, we should pay attention to the images of reality that act as filters for the interpretation of observations and to the degree to which uncertainties are accepted as one of the indicators of the degree to which one is in need of such images in order to prevent a feeling of uncertainty. With the strategies, it is important to assess whether the chosen instruments provide incentives to learn, in other words to change and expand existing images of reality. Often, flexible instruments and indirect steering methods are used for that purpose.

Now that we have tried to formulate as complete as possible a model of public governance, we will examine the types of connections that can be expected between the five elements of the governance pattern.

4.3 Patterns and dynamics

4.3.1 Introduction

In this section, we describe the relationships between the five elements of governance. The assumed relationships between the five elements described in this paper are based on the basic principle that the elements of policy each form the context of the other elements and that they will tend to adjust to each other.

By choosing mutual adjustment as a basic principle, emphasis is placed on stability rather than change. Nevertheless, such a model also offers a framework for explaining change. Changes in the external context of factors that are not considered to be part of the governance model can influence one or more of the elements. Through the same mechanisms of mutual interaction, this can in turn lead to changes in all of the elements of the governance model. This combination of stability (by convergence in situations without major external challenges) and dynamics (by the impact of change agents from outside through one of the elements to the rest of the governance pattern) goes along well with certain theories on policy change (e.g. Baumgartner and Jones 1993, De Vries 1999).

The idea of mutual adjustment also offers the possibility of explaining differences between the situations in two or more countries, in this case differences in governance in the field of water resource management. Differences in external factors, for example in geological and hydrological features, or in solidly grounded aspects of governance, for example the constitutional allocation of competences to government authorities, will, according to this idea, indirectly bring about a series of differences in (other) elements of governance.

There is a certain ‘logical’ relation between the five elements of governance. This, however, means no more than that it is easy to see why each previous element imposes harder or softer limitations on aspects of the following element. In this sense, these influences create a situation in which the elements adjust to suit one another. In our opinion, however, there is no a priori reason for thinking that influences between the elements are restricted to this ‘logical sequence’ alone. In principle, the idea of mutual adjustment means that there is every reason to believe that all 25 mutual influences are possible. All

elements form the context for the others and can therefore be both independent and dependent variables. Likewise the previous status of an element forms a context for its later status. All in all, this means that we can distinguish 25 relationships.

4.3.2 Premises and mechanisms

Our expectations about the relationships between the elements of public governance are based on the following premises and mechanisms.

Main assumption: The influences that the five elements of governance exert on each other will promote the mutual adjustment of these elements in a governance system.
Subsidiary assumption: Changes within a governance system occur because factors 'from outside' alter characteristic features of one or more of the five elements to a greater or lesser extent, and the other elements adjust themselves to this.

The main assumption rests on three mechanisms. These can be formulated as secondary assumptions and applied to the formulation of the hypotheses on the relationships between elements of governance.
Secondary assumption 1: The influences that the five elements of governance exert on each other arise partly from the tendency towards an increase in the mutual consistency of the values that play a role in these elements if there are no disturbances from outside.
Secondary assumption 2: The influences that the five elements of governance exert on each other arise partly from the requirement that the elements fit into a common framework for interpretation if there are no disturbances from outside.
Secondary assumption 3: The influences that the five elements of governance exert on each other arise partly from the dependence of each of these elements on resources from the other elements.

Before dealing further with our expectations about the relationships between the elements of our governance model, we will elaborate upon three perspectives on decision making that are important for the mechanisms of change (values, cognitions and resources – to want, to know and to can).

Values, cognitions and resources
Why are objectives, information and power (with values, cognition and resources in the background) the useful perspectives when examining the relationships between the five elements of the governance model? As we have indicated above this has to do with the fact that the relationships between the elements are brought about by processes of social interaction. These three perspectives have proven to be exceptionally useful in explaining the dynamics of such processes. In his thesis, Bressers (1983: 1898-197) attempts to indicate why these three in particular are essential. He first looks at what is needed to make a relatively simple object: making a chair requires the carpenter to have an object in mind, and it requires expertise and resources, such as tools and materials. In a multiple-actor process, goals also relate to the actor's position

relative to other actors as well as information and resources (in the form of power). Bressers also considers the long tradition of thinking about these perspectives (idem: 352-328).

A second way of clarifying the three perspectives is to link them to ideas on policy instruments. Policy instruments are often classified into rules, incentives and communication. This, in our opinion, does not so much reflect different policy instruments but different ways in which they exert their influence. Regulations are not always couched in terms of compulsory rules but may also work by influencing the outcome of balancing the costs and benefits of alternative patterns of behaviour (incentives) and ensuring that attention is given to certain alternative forms of behaviour (communication). Subsidies are not only incentives, but are also linked to conditions (rules) and information (communication). Communication, certainly two-way communication, often leads to agreements being made, such as covenants or voluntary agreements (rules) and the exchange of concessions, for example acceptance of change in exchange for flexible timing (incentives). In other words, these are aspects of all policy instruments rather than separate groups of instruments. The fact that the classification of instruments in terms of rules, incentive based instruments, and communicative instruments, still remains so important has more to do with their connections with the general existence of the three perspectives on societal interaction processes than with their usefulness for this purpose.

A third way of illustrating the rich significance of the three perspectives is to relate them to social science disciplines. There is a certain connection between these disciplines and the three perspectives mentioned above. This connection is partial, though, and relates to the core principles of these disciplines rather than any details, drawing a distinction in principle between individual and social methods of consideration.

The fundamental concept in economics is the scarcity of resources and the decisions and bartering that result from this. In its most classical version, the complexities of all other aspects (the social, cognitive and value aspects) are reduced to assumptions of ‘methodological individualism’, ‘complete information’ and ‘individual behaviour that maximizes benefits’. If ‘benefit’ cannot simply be equated with money, multiple objectives are formulated, for example ‘bureaucrats strive to obtain as large a budget as possible’. This is, in essence, an unethical and pragmatic premise. So, to sum up: ‘A: that which gives the greatest benefit will be chosen.’

In political science, the social aspect of the distribution of resources, and so the power of one actor over another, are emphasized. Reasoning, then, is about the question of who is going to dominate the field. To sum up: ‘B: Whoever has the most power is free to choose.’

Sociology is partly about understanding social problems and psychology is partly about human skill in collecting and processing information. To sum up: ‘C: It is not the facts that are important, but how what is observed is interpreted.’ (Or: ‘What is believed to be real is real in its consequences.’)

Social psychology and communication science emphasize the transfer of information in mutual communication processes. Also, the role of information collection and processing is often emphasized in the process of making choices and power relations (and of the development of values). The ‘argumentative

tendency' in policy sciences (e.g. Hoppe 1999) fits largely into this track. To sum up: 'D: Interpretations of reality are the product of social construction.'

The value aspect is pivotal in ethics and other areas of philosophy. To sum up: 'E: People should want what is good.'

Regarding normative social aspects, imposing values on others, for example the whole community, we enter the domain of the law. To sum up: 'F: The limits to what is good are set by rules.'

Of course, this characterization of perspectives (and certainly of associated disciplines) is too simple when forced into a simple matrix. Each scientific discipline can and does borrow elements from the other cells. In doing so, though, it is often clear that they reject some of their own principles and integrate some of the principles of other social sciences into their own set of considerations.

Scientific Perspectives	Individual	Social
Resources (power)	a. Choosing the greatest benefit	b. Those with most power can choose
Cognitions (information)	c. It is not the facts that are important but how what is observed is interpreted	d. Interpretations of reality are the product of social construction
Values (objectives)	e. People should want what is good	f. The limits to what is good are set by rules

Table 2: A Sketch of Scientific Perspectives

All in all, the above shows, in our opinion, the value and significance of these perspectives when a rather complete picture is required of the relationships between social science concepts, such as the elements of the public governance system identified by us. A central 'premise' is that values, cognitions and resources are not just a random selection from a number of more or less equivalent alternative factors, but together more or less cover the ground. After this account of the power and significance of the three perspectives used in this paper, we now formulate the expectations regarding the relationships between the elements of governance that are used in this study.

4.3.3 Expectations

The expectations that are connected to the specified premises and mechanisms are the following ones:
(1) *The best predictor of the status of an element at t2 is its status at t1.* Each change takes up energy and will not take place if the governance system is in balance. Only changes in other factors (within and outside the 'governance system' and via the efforts of the actors) can bring about changes. This idea forms the basis for the five 'continuation' relationships, in which an element influences its own status at a later time.

(2) *The elements in the model mentioned earlier form a more or less limiting or determining context for later elements.* The division of the conduct of policy between administrative levels activates networks that are active primarily at these levels. Those participating in these policy networks are, of course, those who give shape to the perception of the problem and the ambitions in the public debate and subsequently the policy itself. These, in turn, are the focus of discussions about policy strategies, for one reason because certain actors are considered to be a target group while others are not one because certain intervention points in the policy field are utilized while others are not. The selected strategies and the instruments that are part of these, in turn, require the availability of an implementation structure and resources to make implementation possible (see also footnote 2 in Table 3). These ideas form the basis for the four 'logical order' hypotheses. The five elements form a sort of cascade of influence.

(3) *This 'logical order' of influence is not the only way in which (changes in) elements of the 'governance cascade' can influence each other.* In fact, we believe that all the other conceivable 16 relationships are possible, including the influence of elements mentioned later on elements mentioned earlier. All 25 relationships should be considered, for example to analyse clusters of differences between policies in certain sectors in two countries or in two periods. It is possible, after all, that the influence of the 'network' on strategy works via the influence of the former on 'ambition', for instance.

(4) The general idea behind all of these relationships is that they promote the mutual adjustment of elements. *Dynamics of change will always have an external source.* These sources may consist of (a) major social developments, such as demographic, cultural, economic or physical (technological and spatial) developments, and (b) developments in other policy fields (Ligteringen 1998: 214-215 and following).

To give an example: such an external 'change agent' might be a national policy demanding an increase in sustainably produced energy from domestic energy producers, which creates pressures to dam a small and locally managed river for this purpose. So, a new *actor* will enter the scene. But since his plans will not necessarily be in accordance with those of other actors, conflict is likely to arise. Probably, then, the *level* of national authorities and other national organizations will demand a say in the affairs, since local opposition may be perceived as frustrating the specific national policy measure. *Problem perceptions and objectives* will not be untouched by these developments. Etceteras. Ultimately also the *property and use rights* of the various stakeholders could be affected.

(5) *All these mutual influences do not occur in and of themselves but need processes of social interaction to bring them about.* In the description of the governance system here, however, we do not explore further the process side of the system, but only go into the elements that are (re)produced by these processes (as outputs of processes) and which, in turn, again form a context for other processes (as inputs to processes). By accepting that the relationships between the elements actually work through processes of social interaction we can best explore the assumed relationships on the basis of what we see as the

central factors in such processes (Bressers 1983; Bressers & Klok 1987a, 1987b; Kuks 1987; Klok 1991).

(6) *An adjustment may take place along three possible perspectives, referring to: objectives ('desire', ultimate basis: values), information ('knowledge', ultimate basis: cognition) and power ('ability', ultimate basis: resources).* The mechanism of mutual adjustment, distributed over the five elements of the governance system, will tend to make values consistent, to make cognitions fit better into a common framework for interpretation, and to make resources act to mutually facilitate the elements. But take note: just as in expectations 1 and 2, these are not compulsory determinants but probabilistic influences, taken for the moment to be preliminary working hypotheses. In essence, the influences also play a role in the 'logical order' of the elements in the model.

The assumptions and the expectations that are based on these assumptions are informative and not tautological because, in the first place, it is conceivable that 'disturbances from outside' are so numerous nowadays that the tendencies listed are not recognizable in the empirical data, even when they are, in principle, not incorrect. In the second place, the core ideas can also be questioned, for example from a 'post-modern' perspective in which the autonomous tendency towards fragmentation and coexistence of values and cognition is emphasized.

The expectations are testable because the mutual relationships between the elements, both in comparisons between cases and comparisons in time, can be mapped and can be compared with what is to be expected according to the general expectations. For that, it is necessary to specify the expected relationships between the elements along all three lines of reasoning (mechanisms). This has been done (Kuks and Bressers, 2000: 23-28), but we will not present this specification here for lack of space.

To conclude this section, we present the twenty-five relationships for reasons of overview in one single scheme. The cells are filled with very short descriptions that are meant to provide a single key indicator of the nature of the expected relationship rather than a complete description.

Influence Of On	Level	Network	Ambition	Strategies	Resources
Level	Perpetuation	Dominance of Strongest actors	Dominant paradigm has level implications[2]	Target group covenants are national	Implementation (un)attractive
Network	Logical Sequence	Perpetuation	Fragmentation creates openness	Multilateral can lead to neo-corporatism[21]	Resource sharing motive for co-operation
Ambition	'Composition' of problem's aspects	Logical Sequence	Perpetuation	'Solutions in search of a problem'	Ambitions on the 'Procrustus bed' of resources
Strategies	Mirroring the Fragmentation of levels	The 'Network-Instrumentation model'[22]	Logical Sequence	Perpetuation	Making them 'fit for use' (bottom up argument)
Resources	Dominance of Strongest level	'Who gets what' games	Symbolic Allocation	Logical Sequence	Perpetuation

Table 3: The five elements of governance and the relationships between them

This scheme of relationships between the five elements of our governance model will be used to analyse the differences between the various countries and cases within these countries regarding their water resource management. A further elaboration of this scheme is presented as part of the 'Case study protocol' in appendix 3.

Although theoretical expectations have been formulated in this chapter, it is not this set of expectations that is the core of the EUWARENESS research topic. The expectations presented are relevant because they show HOW change in governance patterns takes place. But they do not answer the questions why and when change takes place, and what direction changes will take. Thus, we need to pay extra attention to theorems that explain how external influences set change in motion and how such changes are related to the complexity and integration of water resource management. This will be the topic of the next chapter.

[20] Compare for instance 'sustainability' and 'residential environmental quality' (leefomgevingskwaliteit).
[21] Which means both extra openess for some and closedness for others.
[22] Cf. Bressers 1998, Bressers & O'Toole 1998, Ligteringen 1999.

5 The transformation of regimes

5.1 Introduction

One of the central questions the EUWARENESS project is focused on, reads literally in the proposal: “Which political conditions give rise to sustainable water resources regimes and how do they affect their evolution?”

Already the research proposal itself showed that our interest is somewhat broader in this respect. First, as for the evolution of regimes our main attention is to the transformation from complex into more integrated regimes, under the assumption (to be tested as a hypothesis elsewhere) that more integrated regimes tend to be more sustainable. But other regime changes, from none to simple and from simple to complex are also paid attention to, especially in the longitudinal ‘country screening’ phase of the research.

Secondly, the relevant factors affecting these changes are not necessarily restricted to ‘political conditions’, unless their ‘political’ nature would be derived from the fact that they seem to influence political constellations like resource management regimes. Thus, a more open formulation of the question could be: “What are the factors or constellations of factors that explain the gradual evolution or regime shifts of water resources regimes?”

In elaborating the theoretical background for studying this research question, we should bear the users perspective of the European Union in mind. From this perspective, “the research focus should be on applied socio-economics aimed at assessing how to induce technological, managerial and organisational changes, especially where traditional approaches to water management prevail.” This means that not only the fact of regime change counts, but also the consequences of these changes in terms of a more sustainable resource use.

5.2 Analysis of the theoretical framework of the research proposal

In the research proposal, the transformation of regimes is dealt with in two places. Firstly, assumptions about regime change are inherent in figure 1 and its graphical representation of regime development in relation to demand for the resource and time. The underlying hypothesised typical history of regime evolution includes the following phases: no regime; discovery of the scarcity > simple regime; new or growing rival uses, with pressing forms of scarcity > regimes growing more complex; crisis, collapse and degradation due to heterogeneous over-use > new, typically more integrated, regimes. Successful or (more) sustainable cases will typically be forms of ‘integrated water resource regimes’.

The factor affecting regime shifts in this representation of reality consists in all three cases of new cognitions regarding the un-sustainability of the actual resource use. In our theoretical framework on the governance system (chapter 4), we explained that, besides cognitions, the aspects of values and resources can change. Furthermore, the problem perception might not be the only ‘entrance’ for change agents. The distribution of governance over scales and levels, the actors involved and their networks, the strategies and instruments used, and the responsibilities and resources for implementation can be

changed by outside factors as well, initiating further changes in other elements of the regime.

The second place at which regime transformation is dealt with in the research proposal is the set of partial hypotheses ('of a temporal nature to be reduced later', as it is stated). The first seven are dealing with 'the emergence and transformation of institutional resource regimes'. We will analyse them one by one.

Hypothesis 1 is about the transformation of none to a (very) simple regime and – in accordance with figure 1 – attributes this transformation to a degradation of resources commonly perceived or expected by both politicians and others. The relevance of the hypothesis for this study is limited, since not many – if any – of these no resource regime starting points are likely to be found, not only in the cases that will be selected for the analysis of transformations into more integrated regimes, but also in the twentieth century country screenings.

Hypothesis 2 is also about the transformation into a simple regime, this time attributing the transformation to a politically articulated demand for new public goods or services to be derived from the water resource. The idea behind this hypothesis might be that the nature of the non private good or service will provoke a regulative reaction, even if scarcity is not immediately obvious. This hypothesis is of limited relevance for this study, as well, for reasons similar to those stated above.

Hypothesis 3 (like all the following ones) is not about the conditions that provoke regime transformation from one stage to another, but about the nature and extent of changes. It states that changes in property tittles are often unlikely and that incremental policy changes, redefining and restricting some use rights, will dominate the picture. This hypothesis might be regarded as pointing to the fact that existing property rights form a context for the development of new water resource governance, restricting its flexibility and forcing a certain degree of incrementalism. In this respect, it is related to the following hypothesis.

Hypothesis 4 states that strong target groups will prevent changes hurting them. Here too, the basic idea is that the context provided by one of the elements of the resource regime – not the one that is itself directly affected by the change agent - will restrict the extent and nature of the regime changes. Both hypotheses 3 and 4 fit with the general idea that is embedded in the governance model, explained in chapter 4. This idea is that elements of the governance model (and the regime in general, thus including the four elements of property rights) exert a stabilising influence on each other by processes of mutual adaptation of values, cognitions and resources.

Hypothesis 5 claims that common property regimes are unlikely to be established now since present day differentiated post-industrialised societies tend not to have the type of regional and homogeneous uses that are apt for these regimes. Therefore, mixed regimes with public interventions are expected to appear. Although the hypothesis is stated in terms of regime development, the hypothesis doesn't really seem to deal with the likelihood of changes, but more with the aptness of them (the relation between regime change and its effects on the sustainability of the resource use). We think that the statement as it is now might hold true in all our cases and even in the twentieth century country screenings. The question is not so much whether there will be any

public intervention in an active modern regime, but what the optimal mix between regulation through property rights and regulation through public intervention will be. On this subject, the next chapter will elaborate.

Hypothesis 6 seems to be phrased wrongly. When regulative system refers to property rights and regime is the combination of this and the relevant policies – like elsewhere in the research proposal – the statement that 'a weak policy causes regime changes to influence the regulative system directly' makes no sense. Its probable meaning is that when the policy is weak, changes in property rights directly affect the resource use. This seems to be more a statement about the effects of regime changes than about the likelihood of them. The next chapter 6 will elaborate on the relationship between property rights and public intervention in the regime and the influence of this mix on sustainable use, against the background of some relevant factors. All in all, hypotheses 5 and 6 will be removed here and re-enter the scene in the form of a more general concluding hypothesis on the relation between the property rights – public policy mix and the effect on a more sustainable use. So both are transferred to the domain of the other main research question.

Hypothesis 7 holds that technological developments that decrease demand for the resource lower incentives for regime changes. This statement resembles the famous IPAT formula (Impact = Population x Affluence X Technology). In our case: Impact on sustainability water resources = Users X Intensity of uses X Way ('technology') of uses. In the research model, most attention is paid to users and uses. This hypothesis also draws attention to the technology of use as a factor that provides intervention points for measures aimed at improving the sustainability of resource use. Here, another relationship is hypothesised, however, namely that if the objective problem situation diminishes due to this factor (through problem perception?), the necessity of regime change will decrease as well. If we regard technological change as a possible way to combat sustainability problems, this simply states that successful regimes will tend to be stable. If we regard technological change as an autonomous force 'from the outside,' then technology is only an addition to possible sources of change, one of the factors that might worsen in many cases (or improve in other cases) the actual sustainability of water resource use. A more general formulation would then be that a worsening of the problem by new users, uses or technologies might provoke new problem awareness resulting in regime changes, while a softening of the problem by these factors (e.g. less users, uses, or better technologies) might lead to regime stabilisation. Phrased in such way, this hypothesis simply points to the feedback from the actual problem development (as one of the possible change agents) to elements of the regime, such as the subjective problem perception.

All in all, these seven hypotheses present interesting thoughts, but are not yet suitable as a framework for explaining regime transformations, especially those from complex to more integrated regimes. Below, we will try to develop such a framework in which, by the way, many of the above hypotheses have a natural place. We also prefer more general hypotheses because they diminish the risk that the mentioned factors are part of the case setting only in a few cases and that in many cases the hypotheses simply do not apply.

5.3 Elaboration of the theoretical framework on regime transformation: Stability and dynamics

In modern societies, change seems to be overwhelming. Stability might be regarded as the exception to the rule of change. But it might depend on how we look. The bottle might be regarded both ‘half full’ and ‘half empty’. The best predictor for next years’ expenditure of governments still is provided by that of this year. This holds true even though it are the changes that attract our attention. Several scholars even point to the relative closedness of systems and their perseverance in resisting change.

For our purpose, the question whether change or stability is to be expected most commonly and what the basic assumption underlying our theory consequently should be, is not very relevant. It is the research interest that counts here. It is not our purpose to assess the degree of regime change in general, but to explain it when it occurs. In this case, a different kind of logic applies.

When one wants to explain change, it makes sense to work with a theoretical model that holds stability as its ‘normal status’. Precisely because in such a model change is not simply accepted as being omnipresent, ‘explained’ on an ad hoc basis by numerous plausible factors (“everything is apt enough to provoke changes”), a stability model highlights change agents more as phenomena that deserve a decent explanation. Building on the governance model of chapter 4, we will elaborate such an explanatory model.

External change agents

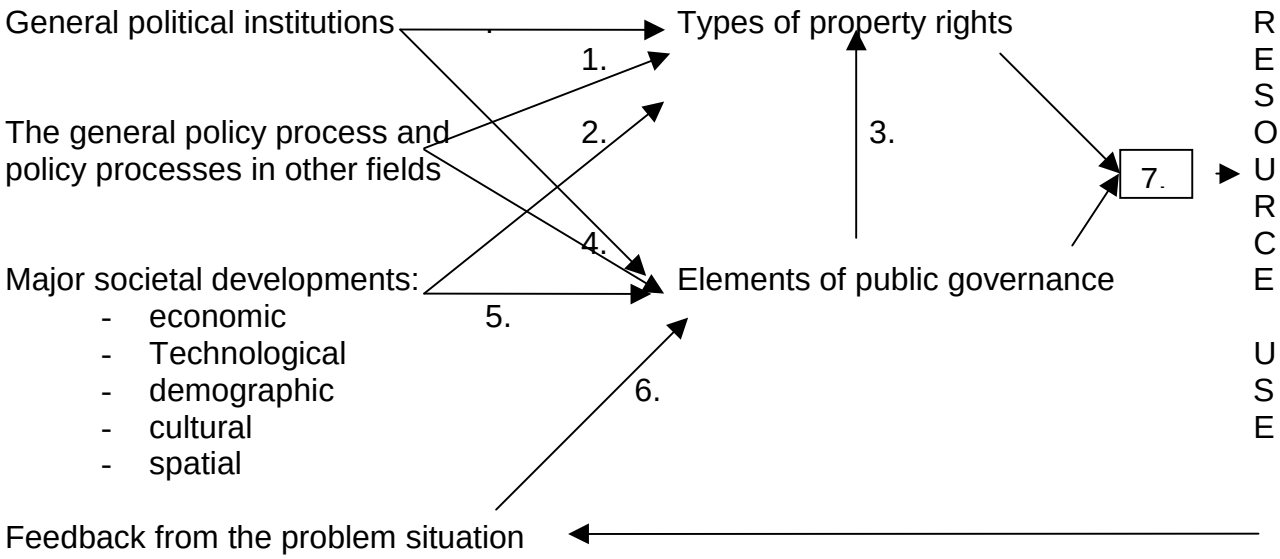
Chapter 4 elaborated upon the idea that elements of the governance model (and the regime in general, so including the four elements of property rights) exert a stabilising influence on each other by processes of mutual adjustment of values, cognitions and resources. Changes in the elements of the governance pattern are then caused by changes in other elements, but ultimately these changes must have external sources that affect one or more elements. Likewise, in the relationship between the elements of the governance pattern and property rights similar processes occur.

In principle, external change agents can enter the scene through all of the elements (of governance and property rights) discerned in the regime. There is, however, a difference in terms of the transmissions of pressures for change among the elements. Property rights are somewhat more stable and less oriented towards invoking change than the elements of governance. That means that though property rights may act as a powerful context for developments in governance, changing governance patterns is not their subject. On the other side, many changes in property rights are the effect of interventions from the governance system (Cf. chapter 3). Changes in property rights may develop from three sources: (a) changes in the general cultural and judicial conceptions of property and its meaning in terms of rights, stemming from general policy institutions and policy processes as a context, (b) specific and often deliberate influences from the governance pattern on water resource management adjusting property rights as a means of promoting policy goals, and (c) economic changes, some with technological developments as drivers, that create, increase or decrease the value of certain uses and by that of (aspects of) the resource itself, next to other major societal developments, like demographic, cultural and spatial.

Since most influences on regime change (change agents) will start as influences on one or more of the five elements of governance (cf. research proposal hypothesis 3) it makes sense to discuss these possible external factors for each of the five elements. Changes in one element could be followed by changes in other elements and in property rights, resulting in substantial regime shifts, as was explained in chapter 4. Mutual adjustment mechanisms, that without external 'disturbances' have a stabilising influence, then become the mechanisms by which substantial changes in one of the elements lead to corresponding changes in other elements, resulting in complete regime changes. [23]

The sources of these change agents are specified as depicted in Figure 1:

FIGURE 1:
The Theoretical Model



In the overview below, some general external sources of change (and general developments that are influencing the water management field) are mentioned and linked with the five elements of the governance model (cf. Bressers & O'Toole, 1995):

(a) Levels and scales of governance
- Rise of the European Union
- Tendency to multi-level governance

[23] Note however that when these other elements (e.g. the constellation of actors involved and their network relationships) prove to be too hard too tackle also the induced change in for instance problem perception can be rolled back or isolated in response instead of being gradually reflected in the rest of the elements. This may be labelled a 'failed regime change'.

(b) Actors in the policy network
- Rise of environmental and nature organisations
- Tendency to multi-actor governance: increased number of actors involved in relevant networks

(c) Problem perception and objectives
- Increase in information on environmental degradation
- Tendency to incorporate multiple perspectives

(d) Strategy and instruments
- Rise of general ideological preferences for indirect and procedural instrumental strategies
- Tendency to incorporate multiple instruments in the policy mix

(e) Responsibilities and resources for implementation
- Rise of the proportion of (relatively) independent and businesslike implementation organisations, including privatisation of water management tasks
- Tendency to rely on more than judicial resources and to clarify responsibilities

The general hypotheses should, in our opinion, reflect the following sub-questions of the main research question on regime transformation:
1. Under which circumstances do regime transformations result in more complex regimes?
2. Under which circumstances do regime transformations result in more integrated regimes?
3. Which circumstances influence the characteristics of the changes that occur?

Developing into more complexity
When we speak of complexity, we mean that regimes can be characterised by a multi-variate format in most of their elements (see the examples above). A regime becomes more complex when more layers and scales are involved, more actors are involved, more perceptions of the problem and accompanying goals are involved, more instruments are part of the policy mix and more organisations share responsibilities for implementation. Complexity as such is not wrong. Most of the time, growth in complexity is an answer to real needs and developments. As a matter of fact, societies generally grew into more complexity generally during most of the modern times. This sector is no exception to that general course of development. A growth in complexity of its governance can be viewed as a logical adjustment to such developments and pressures. Thus, many change agents, like technological developments, add new scales, new actors, new problem perceptions, new instruments and new responsibilities to the existing ones. For example: different levels of government can define different specific regimes or elements of the general regime. So in that case, the regime gets not only differentiated due to the various possible specific uses, but also due to the multi-level character of regimes.

The above leads to *hypothesis 1* that is specified at the end of the section.

Developing into more integration
While the growth in complexity in water management regimes seems a fairly straightforward part of a more general development in society, integration as a development is not. In the research proposal, the central assumption is that integration will occur when the relevant actors acknowledge that integration is necessary to prevent further deterioration of the resource. That means that integration is not a spontaneous development, but has a deliberate character. By (full) integration we mean:

(a) Internal integration within the elements of public governance
- that levels are interacting more closely and are aware of their mutual dependencies,
- that actors belong to 'policy communities' rather than 'issue networks', implying more interaction and consensus orientation,
- that interrelatedness of different aspects of the problem and their dependencies are recognised and intensely debated, and that goals are set accordingly,
- that the policy mix contains instruments that are mutually reinforcing each others' incentives,
- that the implementing organisations share their resources (e.g. information, manpower) and co-operate intensively to complement each other.

(b) External integration between the governance pattern and property rights regarding water resource management and other relevant sectors.

Chapter 4 deals with relationships between the elements of governance and chapter 6 with the relationship between governance and property rights. These relationships, however, are not regarded as forms of integration in the conceptualisation of this study.

Obviously, much integration will be of a partial kind. In principle, a lot of combinations could be imagined. For the purpose of analysing the development and effect of regime changes, such a differentiated view, however, is not easily usable as a single integration-'variable'.

The governance concept that was described in chapter 4 contains the assumption that the various elements of governance will tend to adjust to each other. Thus, although empirically many intermediate forms can exist, we assume for now that the five elements will form cohesive patterns that differ more or less clearly in terms of complexity and integration.

When conceived of as dichotomies, the two variables of complexity and integration would form a four cell matrix. We do not choose such a representation, however, and we do not stick to the representation of integrated regimes as a logical next step following the development of more complex regimes either. More singular (or simple) regimes (one level, one governing actor, one problem aspect – e.g. a certain use – one instrument, one implementer) will not be in need of integration. Only after some growth into

complexity, integration becomes a relevant concept. But then, it is by no means a logical follow up. Complex but fragmented regimes are empirically quite common as well. In fact, while integration has clear theoretical advantages - as we will show in chapter 7 - it also comes at a price. Every form of integration creates the need for additional interaction and increases, at least initially, transaction costs. While more complexity is part of a stream of societal development, both integration and differentiation (or: fragmentation) seem to part of this development.

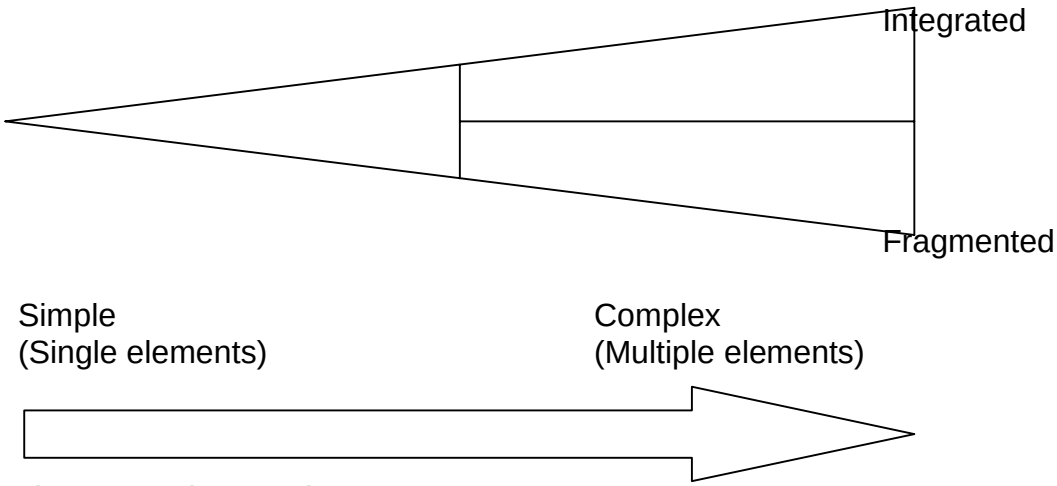


Figure 2: Regime Developments

This means that integration typically stems from discernible change agents that demand some form of integration (see examples a, b, c, d and e above). An 'integration'-agent can, for instance, consist of the recognition of the interaction of multiple water uses or of a European Union directive that demands multilevel co-operation in water resource management planning. Also international and inter-local learning is a possible change agent. Unlike an increase in complexity, thus, developments in the direction of more integration need some sort of deliberate attempt by motivated actors.

The above leads to *hypothesis 2* that is specified at the end of the section.

Conditions for integration

Until now, we stated that regime changes in the direction of more integration are not spontaneous and will not only require external change agents (like all other regime changes), but typically will require a deliberate attempt to push for integration by motivated actors to occur. That leaves the question open, however, when such attempts are likely to be successful. Knoepfel (1995: 202-203), for instance, assumes that integration and co-operation between two or more agencies will go better when these agencies each have less separate tasks and goals and the agencies are matrix organisations.

We express here the following expectations. Attempts to change regimes into a more integrated status will have relatively more success when:

a) There is already a longer *tradition of integration* in the water management sector (see the specification of integration at the beginning of this subsection).
b) There is a common understanding that the counteracting (side) effects of non-integrated water management harm sustainability and that this sooner or later will have to be stopped anyhow (*joint problem*).
c) There is a notion of possible joint gains from integration, so-called 'win-win-situations' (*joint chances*).
d) There is a credible threat of a dominant actor accumulating power and altering the governance pattern in his own way if no solution is reached (*credible alternative threat*).
e) There are well functioning institutions that provide a fertile ground for integration attempts (*institutional interfaces*)

The last stimulating condition, in particular, needs some further specification. These institutional interfaces (as opposed to institutional barriers), we mean, for instance, well functioning free mass media as a pre-requisite for a more integrated public debate on the various aspects and perceptions of the problem, strong representative organisations that make is possible for large groups to become an effective actor in the policy network, or water laws or environmental laws that enable attempts to increase integration in water resource management strategies.

The above leads to *hypothesis 3* that is specified at the end of the section.

The devil is in the details

Naturally the dimensions of simplicity vs. complexity and integration vs. fragmentation are characteristics of the regime that are of a rather general nature. Often 'the devil is in the details'. When some actors find the network closed for them, it is important to learn who they are. And when new aspects of the problem gain recognition, it matters whether these are related to sustainability or not. Etceteras. Though at a general level no precise prediction can be given for these contents matters, the general proposition of mutual adjustment of elements of governance leads to the expectation that the balances in the initially unaffected elements of governance are reflected in *the way in which* the bigger or lesser 'seismic shocks' caused by change agents are absorbed in other elements. This idea provides an umbrella for the hypotheses 3 and 4 of the research proposal, among others. It stipulates that not only the degree of regime transformation, but also aspects like the distribution of costs and benefits might be important to explain. For the impact of the regime on a more sustainable use these kinds of characteristics may be important too.

The above leads to *hypothesis 4*, that is specified below.

Drivers of regime change ('external change agents') intervene in one or more elements of the governance pattern directly and cause adjustments by other elements of the governance pattern and possibly also property rights through that element. Against this background (cf. chapter 4), this chapter leads, all in all, to the following general hypotheses:

1. Most change agents will lead to more differentiation in the regime (resulting in more complex regimes).

2. Other external change agents of a specific nature (see above) can also lead to integration in one or some elements of the regime, but only in combination with deliberate attempts of motivated actors (ultimately resulting in integrated regimes or in ‘failed’ regime shifts with encapsulated initial changes).

3. Integration attempts will be more successful when:

a) There already is a longer *tradition of integration* in the water management sector (see the specification of integration at the beginning of this subsection).
b) There is a common understanding that the counteracting (side) effects of non integrated water management harm sustainability and that this sooner or later will have to be stopped anyhow (*joint problem*).
c) There is a notion of possible joint gains from integration, so-called ‘win-win-situations’ (*joint chances*).
d) There is a credible threat of a dominant actor accumulating power and altering the governance pattern in his own way if no solution is reached (*credible alternative threat*).
e) There are well functioning institutions that provide fertile a ground for integration attempts (*institutional interfaces*)

4. The more detailed characteristics of regime changes reflect to a large extent, the balances in other elements of the regime that were not directly influenced by the change agent(s) initially (including property rights).

6 The co-efficacy of property rights and government intervention

This chapter focuses on the question of how policy decisions and property arrangements come together to determine the sustainability of environmental management. The chapter lays out an argument that almost every policy decision can be interpreted as a change in property rights, or, in fact, government intervention in property rights. On the basis of this argument, the chapter then discusses to which extent government intervention in private property rights is environmentally desirable. Government intervention here refers to the government aspect of governance, the complete model of which was laid out in chapter 4.

As the project proposal emphasized, there is a need for analysing the combination of resource specific property arrangements and governance (policy) strategies existing with respect to natural resources, which the project calls institutional resource regimes. Thereby, the project aims to concentrate on the possibilities for public intervention in property rights, which adds the political steering dimension to the property rights approach. An institutional resource regime, thus, provides the institutional framework for the political steering and managing of the demands of heterogeneous user groups. A strength of this perspective is that institutions, specifically property arrangements, are not just treated as frameworks within which actions are carried out, but also identified as the result and integral part of the political process.

As the proposal points out, this perspective on institutions as both the result and an important element of the process allows the project to avoid a fundamental weakness of many studies of resource regimes. The latter tend to focus on the analysis of the regulative systems as they exist at one point in time. Lesser emphasis is generally placed on an analysis of processes of change. For the highest degree of policy relevance, however, i.e. to be able to avoid further degradation of resources, it is important to know when and under what conditions in the political process regimes can be changed and how this change can be accomplished and managed. The study of institutional resource regimes combining property rights arrangements with policy intervention allows us to obtain such insights.

The focus on the interaction of policy with property rights is important, because in "highly developed societies characterized by increasingly heterogeneous demands and an expanding scope of effects - factors which dictate against a local and regional solution like the common property [arrangements]," guidance of heterogeneous, growing and increasingly rival use demands is required.[24] In the case of homogenous demands for resource benefits discussed in much of the literature, scholars often found that is was possible to prevent the degradation of resources on the basis of voluntary cooperation, i.e. without

[24] See the project proposal.

state intervention.[25] From a liberal perspective, this can be viewed as a very efficient strategy, of course. In the context of complex resource regimes, however, this solution is less likely to be feasible or effective. Here, the task of government intervention becomes to develop an integrated governance regime to avoid conflicts in property rights.[26] In fact, government intervention is likely to be an important although not necessary determinant of change from complex to integrated regimes, either on its own initiative or because of a demand for such change voiced by one of the other actors involved in the regime (for a detailed discussion of institutional resource regime change see chapter 7).

6.1 Policy as a Change in Property Rights

Almost every policy can be interpreted as a change in property rights. An institutional resource regime, thus, is determined at any point in time by how policies structure, i.e. create and influence, property arrangements. Policies shape property rights by intervening in specific parts of the bundle of rights held by the property owner. A per litre water charge imposed on withdrawal of water from the river by owners of real estate on the river banks, for instance, establishes a new property situation. If the real estate owners were not charged for the water before, they either "owned the right to free water withdrawal" or rights to the water were not defined. In the latter case, the water resource was an open-access resources of which the appropriators took advantage. After the policy change, the definition of property rights is clear. The real estate owners now own the right to obtain a given quantity of water for a given price. In fact, they can go to court and claim that right, if they are being charged more. Alternatively, the government can take them to court, if they refuse to pay the charge. For purposes of environmental management, the interpretation of the situation before the policy change does not matter. Real estate owners had free access to the water, and therefore no incentives to save water. For legal purposes, different interpretations of the situation before the policy change might matter, to the extent that the difference influences the possibilities of government to change the rights. After all, creating property rights in a previous open-access situation is less interventionist from a legal and political perspective than the appropriation of property rights previously held by private owners.[27]

Different degrees of policy intervention in private property rights, thus, may require different actions by government, and therefore different levels of political

[25] It is possible to distinguish between rules concerning property ownership made by government and rules made by the collective. Both, however, are forms of governance. Ostrom and her colleagues clearly do deal with questions of governance in their studies. However, in the settings they choose to study, government intervention is often not necessary (and sometimes not possible). The heterogeneous use cases in highly developed societies with relatively strong states studied in this project, in contrast, can focus on questions of governance with government.

[26] Given the distinction between de facto and de jure property rights discussed in chapter 3, the task of government may well be to avoid conflicts between de facto property rights rather than de jure property rights, at least in the short term.

[27] The counter argument is, however, that customary rights often can also be claimed in a court suit.

will and capacity depending on the constitutional framework. Sometimes governments can simply change specific property rights through simple policies, such as with respect to water charges, for instance. In other cases, government might have to first pursue a constitutional change in the constitution to be allowed a certain intervention in private property, or have to compensate the property owners. The extreme cases of government intervention in private property are, of course, expropriation and nationalization of private property. Because of their extreme nature and conflict with the constitutions of most democracies, these strategies are rarely chosen. For most environmental purposes, however, they are also not necessary, as governments can achieve substantial change in environmental management through simple policy modifications of property rights. As this theoretical framework focuses on environmental management rather than legal questions, we will not pursue the legal perspective of government intervention in property rights here. Rather, interpreting policy changes as changes in specific property rights, we will explore the environmentally desirable extent of government intervention in private property rights.

6.2 The Environmental Desirability of Intervention in Property Rights

The following discussion will show that the environmental desirability of government intervention in property rights depends on the specific resource in question and the socio-economic context of its management. This socio-economic context is a function of the number of appropriators from the resource and the extent of collective action problems among them, the relationship between the economic and environmental values of the resource, and the level of government capacity and commitment to environmental objectives. The role of the relationship between economic and environmental values of the resource, the *e-e gap*, has already been discussed in chapter 3 and will be recapitulated only briefly in the following discussion. The other factors, however, will be laid out in some detail, before the analysis draws the different factors together to provide a comprehensive image of the environmental desirability of government intervention in property rights and its determinants.

6.2.1 From Property Regimes to the "Size of CAP"

As a first step toward an analysis of the environmental desirability of government intervention in private property arrangements, we suggest to abandon the traditional categorization of property regimes as private property, common property, and open-access (Feeny, Berkes, McKay, and Acheson 1992). Rather than thinking of these property arrangements as categorically different, this analysis perceives them as stages on a continuum. After all, both private and common property regimes are essentially special cases of private property arrangements, with the difference that in the latter case the number of appropriators is greater than one. Furthermore, the reasons for resource degradation for private property, i.e. "lack of incentives to fight against negative

externalities[28]" can also be applied to common property. It is, after all, this lack of incentives to fight against negative externalities which drives non-compliance with group rules by members of the group.

The differences between private and common property regimes on the one side and open-access on the other are bigger. In the legal sense, open-access means that no property rights have been defined and that therefore nobody holds the rights to the given resource. Environmentally, however, the expected consequences of an open-access situation are similar to a common property regime that has failed to achieve a sustainable cooperative solution. Alternatively, even without the definition of legal rights in the Western sense or even tenure in a more traditional sense, appropriators from an open-access resource might achieve sustainable management of a resource similar to a successful common property regime.

Environmentally, then, the difference between a common property regime and an open-access situation is that the former is more likely to succeed in the sustainable management of a resource, while the latter is more likely to result in its overexploitation. This dynamic can be expected because in common property regimes the group of appropriators would tend to be better defined, and therefore communication and cooperation are more easily established. In other words, common property regimes generally have less collective action problems, due, for instance, to lower transaction costs. Fundamentally, however, common property regimes can be perceived as cases in which appropriators have developed successful institutions of governance, while in open-access situations these institutions have broken down or have never been created. In terms of a continuum, the transition from common property regimes to open-access corresponds to an increasing breakdown of institutions of governance among appropriators from resources.

The potential sustainability of environmental management in private property situations, again ranging from individual ownership to open-access situations, is, thus, a function of the collective action problems among the appropriators, in shorthand the *size of CAP.* Governance breaks down and common property turns into open-access when these collective action problems become too big to be solved. As Ostrom and others have shown, the *size of CAP* is determined by the characteristics of the appropriators from the resource, such as the number of decision makers, the heterogeneity of the group in terms of capabilities, preferences, information, beliefs, effective leadership, and the internal structure of the actors (Keohane and Ostrom 1995). Furthermore characteristics of the resource and socio-economic context, such as rivalry/subtractibility of the benefits from the resource, underlying geophysical structures, existing institutional arrangements, and exogenous determinants such as technology of extraction matter. The *size of CAP* thus needs to be viewed as an index summarizing these variables. We adopt this construct in the interest of simplification and illustration of our argument. Based on the *size of CAP*, we can align the three "property regimes" along a continuum from small collective action problems with high probabilities of successful cooperation to large collective action problems with low probabilities of successful cooperation.

[28] See project proposal.

The smaller the *size of CAP*, the more economically efficient the property arrangement.

6.2.2 From State Ownership to Government Intervention

As a second step in the development of our argument, we suggest abandoning the traditional fourth category of property regimes, state ownership, as well. "State ownership" insinuates that an entire resource is owned by the state in contrast to resources held under private property or common property regimes in which the state is not present at all. Neither case is common in real life. If we return to our conception of property rights as bundles of rights defined with respect to different attributes of a resource, we see that individuals rarely own rights to all attributes of a resource. This is partly the case because defining and enforcing property rights to all attributes would be prohibitively costly, partly because governments are unwilling to relinquish rights to certain attributes. For example, governments generally hold the rights to the airspace above "private" land, or do not give citizens the right to use their "private" ponds to drown people. In almost all cases of private property ownership, the government retains some rights, precluding the owners of the remaining rights from a certain action or forcing them to execute another.

In common usage, government rights are often referred to as policies or regulations, but from an economic/environmental perspective, they are, in fact, property rights to attributes of goods held by government. In the case of what traditionally is identified as state ownership of natural resources, the government just holds more rights and, most importantly, rights to more visible attributes of the resource. In consequence, we suggest transforming the category of state ownership to a continuum of government intervention, where a higher level of government intervention means that the government holds rights to more attributes of a resource. A low degree of government intervention, in contrast, refers to what traditionally is called private property, common property, or open-access regimes.

The degree of government intervention, then, forms a second continuum. It is fundamentally different from the *size of CAP*, since it captures the extent to which attributes are held by a formal authority. Any property arrangement with respect to a given natural resource is defined by the level of collective action problems among the appropriators and the degree of government intervention in the rights of these appropriators. Indeed, governments intervene to a similar degree at any *size of CAP*, or - if described in the traditional categories - in "private property," "common property," or "open-access."

6.2.3 State Capacity and Commitment to Sustainability: the C-C Level

The third step in the development of our argument introduces government capacity and commitment to sustainability (in other words, government's will and skill) as an additional determinant of the environmental implications of

property arrangements, represented by the *c-c level*. The *c-c level* of a government determines the environmental implications of government intervention. Government intervention is often considered as an alternative to private ownership, in cases in which the maximization of private economic gain leads to the undersupply of an environmental good or the oversupply of an environmental bad. The capacity and commitment of governments to protect their own property rights and to use environmental resources in a sustainable manner determine the chances that government intervention does indeed lead to an environmentally superior outcome in such a situation. Government intervention has a high potential for environmental stewardship only if the respective government has high levels of capacity and commitment. The lower the *c-c level* of the state, ceteris paribus, the fewer resources should be subject to government intervention and the more should be held in private property arrangements.[29]

A high level of capacity, i.e. skill, captures the ability of government to achieve its desired policy outcomes. A high level of commitment, i.e. will, refers to the mission of the government in terms of maximizing public environmental welfare rather than private gain. In the context of this development of our argument, states with high *c-c levels* are those which have *both* the capacity and the commitment to protect their property rights to attributes of natural resources and to use these resources in an environmentally sustainable manner. States with low *c-c levels*, in contrast, are those where the government either lacks the capacity to protect government rights to natural resources, or pursues the maximization of private economic gain rather than public environmental welfare or both. Thus, commitment is a necessary but not sufficient condition for an environmentally desirable impact of government intervention. The same applies to capacity, with the caveat that capacity without commitment is likely to have worse environmental impacts than commitment without capacity, as discussed below. The relationship between high and low *c-c levels* is, of course, not a dichotomous one, but continuous. Most governments in the world do not fall on either end of the spectrum but somewhere in-between.

Government *capacity* is a necessary condition for a high potential of government intervention for environmental stewardship because only a capable government will be able to enforce rights and regulations and be able to protect or provide an environmental good, which is threatened by private interests. General government *capacity* is a function of the availability of resources to government, such as material and human resources, and the efficiency of their utilization (Organski and Kugler 1980, Arbetman and Kugler 1997). Government capacity is, to a large extent, determined by its perceived legitimacy and authority and its corresponding support in the population and among powerful (military or economic) elites. If a government lacks support within the country, its activities become costly and, ultimately, weaker. Specific government capacity, i.e. government skill with respect to its involvement in a particular issue or issue area is a function of the validity of the policy strategy chosen, its implementation, and its integration with related policies. Since these three factors will be taken up in detail in chapter 7, they will not be discussed

[29] Please note that the effects of capacity and commitment are combined in the c-c level purely for illustrative purposes, as these variables do not necessarily move together.

further at this point. Suffice it to say, that a weak performance by government with respect to these aspects has a direct negative impact on sustainable use. Therefore, such a weakness implies that the mix between private property rights and government intervention should be different.

Government *commitment*, in the context of this paper, identifies whether the government is likely to maximize public environmental welfare or private economic benefit. If a government is interested in deriving the maximum "private" economic benefits from environmental resources under its control rather than protecting the public good of environmental quality, government intervention is similar in its environmental implications to unregulated private property arrangements. For a government that is weak in terms of commitment to sustainability, government intervention will be less environmentally desirable than for a government that is strong in this respect.

Different degrees and causes of weakness of governments in terms of *commitment* can be imagined. On the one side, governments might give in to pressure from special interests and therefore might not be sensitive to questions of environmental sustainability. On the other side, governments might pursue their own financial gain through the unsustainable exploitation of "state-owned" natural resources. From those governments, it is sometimes not a big step to governments appropriating previously private property for their own gain.[30]

Given the constraints *capacity* and *commitment* impose on the potential of government intervention for environmental stewardship, it becomes obvious that a high degree of government intervention in private property arrangements is not necessarily environmentally superior to a low degree of government intervention. Indeed, only in situations in which a capable government pursues the public good of environmental quality has government intervention the potential to improve on environmental outcomes from private ownership. Ceteris paribus, a high *c-c level* of the government increases the environmental desirability of government intervention in private property arrangements.

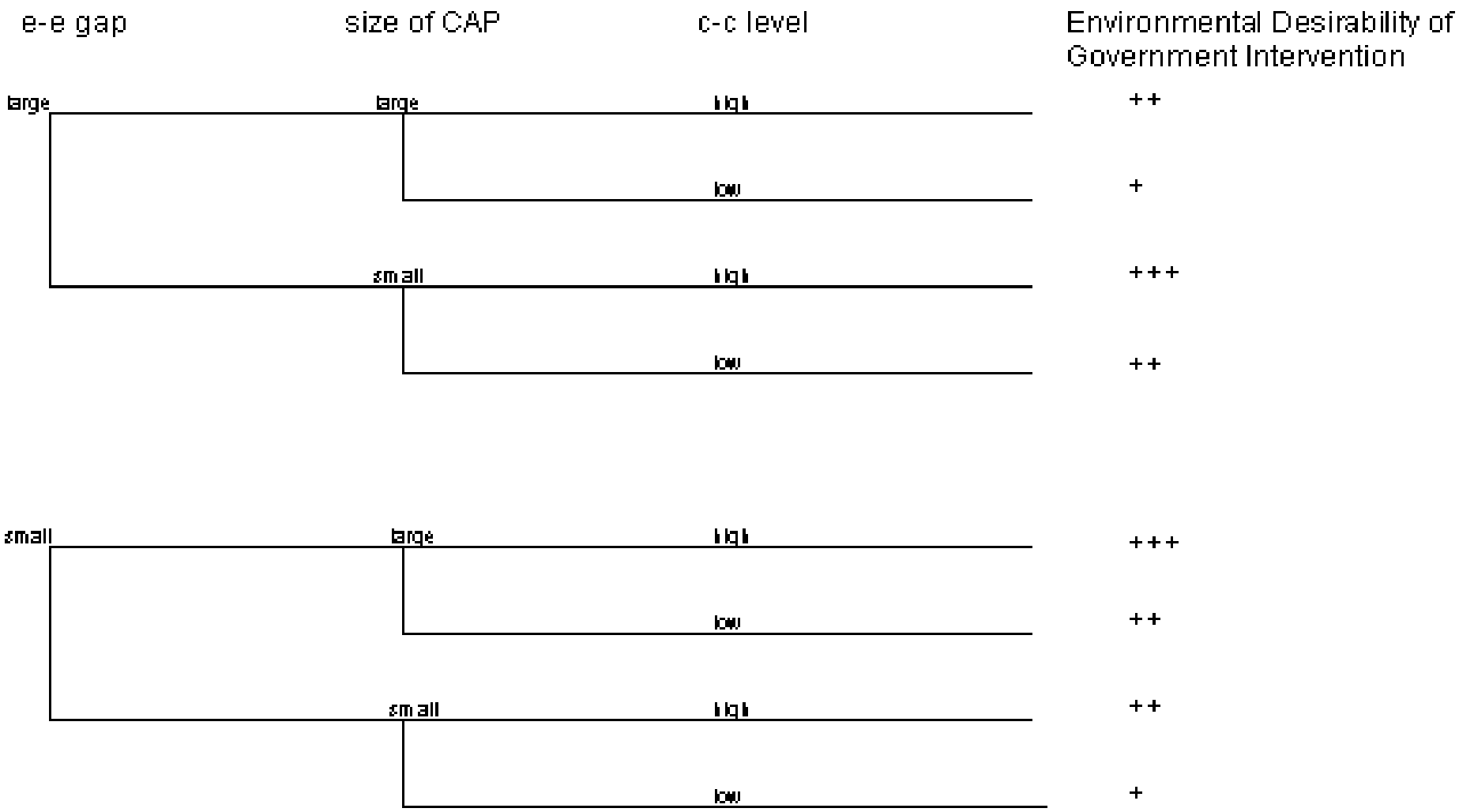
[30] In some developing countries, a lack of government *commitment* has been reflected in an intentional failure of governments to recognize traditional (tribal or communal) rights of ownership to natural resources. Governments have frequently appropriated such resources, in order to increase governmental or personal revenues or to sustain political support by giving these resources to political and economic allies. A lack of commitment based on such a preference structure of the governing elites will likely carry the worst consequences for environmental stewardship as it does not only affect the environmental fate of "state-owned" resources but of all resources. Predatory behavior by government has two consequences. Since the new "owners" of the resource are generally aware of the illegitimacy of their rights and the lack of accountability of the government, they have an incentive to deplete the resource as fast as possible. After all, they know that they might fall out of favor with the government themselves, or fear the overthrow of the government by a disenchanted public. Likewise, the traditional owners of resources have similar incentives to deplete them as fast as possible, if they witness such predatory behavior by government, since they have to fear that they will be the next ones to lose their rights. The higher the chances for resources to be appropriated by governments, the higher the discount rate owners will apply to future revenues from resources (Deacon 1994).

6.2.4 Recapitulation: The e-e Gap

The fourth variable influencing the environmental implications of property arrangements and therefore the environmental desirability of government intervention is the *e-e* gap, which we introduced in chapter 3. Recall that the *e-e* gap is the difference between the "economic value" of a resource and its "environmental value," with "economic value" referring to *the maximum long-term economic value to be obtained from any use of the resource,* while "environmental value" refers to *the economic value that can be obtained from the environmentally most desirable use of the resource*.

The *e-e gap* determines if the economically most efficient property arrangement is the environmentally most desirable one. In chapter 3, we saw that this the case if the *e-e gap* is small (the fishing pond in Norway), but not if it is large (the fishing pond in Paris). If the *e-e* gap is small, i.e. the economic and environmental values of a resource are close, the decision-maker's maximization of expected (economic) utility implies a maximization of environmental stewardship. If, however, the *e-e gap* is large, i.e. the difference between the two values is substantial, the maximization of expected (economic) utility is likely to result in the maximization of environmental degradation. This insight was important with respect to the implications of private property rights for environmental stewardship. With the aid of the *e-e gap,* we showed that a small *size of CAP* only implies a greater potential for environmental stewardship in certain cases, specifically in cases in which the *e-e gap* is small. In cases, in which the *e-e gap* is large, a small *size of CAP* implies a greater potential for an economically efficient environmental degradation of the resource. Here, government intervention on behalf of sustainability would be desirable.

Figure 3: The Environmental Desirability of Government Intervention in Property Arrangements



6.2.5 Pulling It All Together

These four variables, the level of collective action problems among appropriators, the degree of government intervention, the capacity and commitment to sustainability of the respective government, and the relationship between the environmental and economic values of a given resource determine the environmental implications of any property arrangement. Since our interest is primarily in potential policy implications of this analysis, the degree of government intervention will be treated as the dependent variable in the following discussion. Based on the above analysis, the environmentally desirable degree of government intervention is a function of the *size of CAP*, the *c-c level* of the government, and the *e-e gap*, in the context of a given resource. Figure 3 combines these factors, depicting the interaction between the *c-c level* of the state, the *size of CAP*, and the *e-e gap* and their implications for the environmentally desirable level of government intervention. This figure illustrates under which conditions a larger share of the attributes of a given resource needs to be protected by government intervention for sustainability.

Figure 3 demonstrates that for a large *e-e gap*, the highest degree of environmental desirability of government intervention applies to cases in which a high *c-c level* is combined with a small *size of CAP*. The lowest degree of environmental desirability of government intervention applies to the opposite case. If a low *c-c level* is combined with a large *size of CAP*, government intervention will not be able to significantly increase the potential for environmental stewardship, and indeed might lower it. Cases for which a low *c-c level* is associated with a small *size of CAP*, or in which a high *c-c level* is associated with large *size of CAP* fall somewhere in the middle between the two extremes above. The reasons for this ranking in the environmental desirability of government intervention is that given a large *e-e gap* a small *size of CAP* is likely to lead to the most efficient environmental degradation. In contrast, a large *size of CAP* has the potential to inhibit the most efficient exploitation of this resource, thus, requiring less government intervention to protect the resource. Furthermore, a state with a high *c-c level* is more likely to pursue and achieve environmentally desirable outcomes than a state with a low one.

The presence of a small *e-e gap* changes the situation dramatically. Here, the highest degree of environmentally desirable government intervention results from the presence of a high *c-c level* and a large *size of CAP*, because the latter leads in this case to the greatest waste of natural resources. Since a small *e-e gap* means that the economic efficiency resulting from a small *size of CAP* translates into environmental "efficiency," the environmentally desirable level of government intervention in the case of a small *size of CAP* is lower. Since for any *size of CAP* a higher *c-c level* translates into a higher degree of environmentally desirable government intervention, the lowest degree of environmental desirability of government intervention applies in cases in which a small *size of CAP* is matched with a low *c-c level*. Again, the relationship between the presence of a high *c-c level* and small *size of CAP* on the one side, and a low *c-c level* and a large *size of CAP* on the other cannot be determined easily.

As expressed by Figure 3, higher *c-c levels* are, ceteris paribus, associated with higher degrees of environmental benefits of government intervention. Putting it more controversially, Figure 3 highlights the limits of the environmental desirability of government intervention if a government is weak in terms of capacity or commitment. Looking at government capacity and practices in countries around the globe, these conditions would apply to a large share of global resources.

At the same time, the support for the claim that a large *e-e gap*, ceteris paribus, is associated with a higher level of desirability of government intervention should become clear. Thus, the *e-e gap* highlights the limitations of private property rights as a means to raise the potential for environmental stewardship, just as the *c-c level* identifies the limitations of government intervention.

In addition, Figure 3 illustrates that the degree of environmental desirability of government intervention is larger for a small *size of CAP* if the *e-e gap* is small, but may be smaller for a large *size of CAP* if the *e-e gap* is large. This finding is in stark contrast to the agreement in the literature that open-access resources generally fare the worst. This discussion suggests that this is not necessarily the case. A small number of appropriators from a resource can be associated with worse degradation if the increase in efficiency in the maximization of the economic value of the resource is associated with an increase in the efficiency of environmental degradation. The neglect of this dynamic in the literature results from the fact that most of the resources that are usually considered are resources under some form of environmental use, where the difference is in degree of sustainability of that use (such as land used for agriculture, or forests used for timber extraction). Again, the analysis highlights that a small number of appropriators from a resource will only necessarily be associated with higher environmental benefits, if the environmental costs and benefits of actions are fully internalised, which would render the *e-e gap* small.

The above arguments can be summarized in the following hypotheses:

1. The higher the *c-c level* the state, ceteris paribus, the higher the environmentally desirable degree of government intervention.[31]

2. The larger the *e-e gap*, ceteris paribus, the higher the environmentally desirable degree of government intervention.

3. Given a small *e-e gap*, the larger the *size of CAP*, the higher the environmentally desirable degree of government intervention.

[31] Future research needs to look at the relationship between c-c levels and environmental state intervention to determine if strategic behavior on the part of potential environmental "villains" exists. Strategic polluters, for instance, could anticipate a response by a state with high c-c levels and therefore reduce their environmentally polluting activities. In other words, while the environmental desirability of government intervention in theory is higher the higher the c-c level, in practice high c-c levels might be associated with lower levels of actual intervention. This would suggest a non-linear relationship.

4. Given a large *e-e gap*, the smaller the *size of CAP*, the higher the environmentally desirable degree of government intervention.

6.2.6 Implications

The implications of this analysis are very informative with respect to the property rights debate. They show how the various arguments and evidence from previous research can be integrated into one cohesive picture. Thus, the analysis supports findings in the resource economics literature that show that there is neither a theoretical nor an empirical reason for believing that one property regime is generally environmentally superior to another. As Devlin and Grafton (1998) state there is no "best" regime from an environmental perspective.

Furthermore, by abandoning the traditional categorization of property regimes and replacing it with two continuous variables, the *size of CAP*, and the degree of government intervention, the analysis can focus on key determinants of the environmental implications of different property arrangements: the *c-c level*, and the *e-e gap*. In addition, the argument illustrates the dynamic nature of the environmental implications of property arrangements, allowing scholars to capture changes in these implications as a function of changes in specific underlying conditions over time. Thus, the project allows us to take a step in the desired direction as identified by Schlager and Ostrom (1992):

> Instead of blind faith in private ownership, common-property institutions, or government intervention, scholars need a better understanding of: (1) the conditions that enhance or detract from the emergence of more efficient property-rights regimes related to diverse resources, (2) the stability or instability of these systems when challenged by various types of exogenous or endogenous changes, and (3) the costs of enforcing regulations that are not agreed upon by those involved (Schlager and Ostrom 1992, p. 260).

The argument also makes explicit the potential and limitations of various property rights based strategies for improving environmental stewardship. First, the analysis highlights that for government intervention to be environmentally desirable, governments have to be both committed to environmental goals and capable of effectively pursuing their policy objectives. The analysis, therefore, shows that critics of government intervention are correct in highlighting its limitations, and there is ample evidence on the nationalization and subsequent degradation of environmental resources, especially in developing countries, to support their argument. Recognizing the impact of capacity and commitment in determining the potential and limitations of state intervention highlights the importance of further research on the determinants of these two variables.

At the same time, the analysis underlines that these conclusions cannot easily be generalized across cases or countries and that government intervention can indeed be environmentally desirable. If governments are both capable and committed, government intervention can prevent or at least reduce

environmental damage by unregulated private ownership. Importantly, one finds the closest match for such conditions especially in those countries where the costs of government intervention and the benefits of private ownership are proclaimed most loudly: the industrialized countries, especially the US. Here the critics of private property rights are correct when arguing that government intervention can increase the public good of environmental welfare.

Secondly, the analysis highlights the potential and limitations of privatisation and improvements in the security of property rights for environmental stewardship. In other words, our argument illustrates under which circumstances an increase in individual control over natural resources, as advocated by proponents of privatisation and secure property rights is environmentally desirable. If the *e-e gap* is small, the advocates of private property rights are correct, and therefore one will find examples cited in support of their arguments to be characterized by the respective conditions: small *e-e gaps* (and/or low *c-c levels*). As the analysis has shown, a small number of appropriators from a resource is unequivocally preferable in the case of a small *e-e gap*. Given a significant divergence between economic and environmental values of a resource, however, the number of appropriators from the resource has ambiguous implications for environmental stewardship. In the latter case, governments would probably fare better in setting up institutional support for governance problems (which can draw on the capacity of the community if the central government is lacking capacity) than in "privatising" the resource. Alternatively, for governments with sufficient capacity and commitment, privatisation could be accompanied by the retaining of specific rights by the state, i.e. government intervention ensuring sustainable resource use.

Even more, our analysis suggests that rather than viewing a resource as being managed under one particular property regime, we need to differentiate between the different attributes of the resource and identify the environmentally desirable owner or owners for those. Thus, some parts of the bundle of rights associated with a resource might be held by the state, others by a group of owners, and others again by individual owners. Who should own a specific right or bundle of rights needs to be decided on the basis of the factors identified in this discussion; the *c-c level*, *e-e gap*, and *size of CAP*.

7 Regime effects on sustainable water use

Having discussed what factors influence the optimal property rights – public governance mix in water resource regimes in the previous chapter, we now explore the relationship between this mix and the resulting more or less sustainable resource use. First, the four hypotheses from the research proposal on this relationship will be discussed briefly. Then, an elaborated theoretical model will be presented.

The first of the four hypotheses in the research proposal on regime effects states a sort of base-line assumption. Uncontrolled but wanted resources are endangered. In our case studies, this kind of situations can actually occur, but only for specific uses that are still in the status of no regime (while for other uses the regime may already be much further developed.

The second and third hypotheses are elaborated in this chapter and are basically kept.

The fourth hypothesis points to the problem situation and the perception of it (temporary vs. chronic, local vs. global) as an interaction variable modifying the relationship between regime elements and the behaviour of users. Since (almost) no further theoretical elaboration is presented in the proposal and the hypothesis can only be tested by multiple case comparisons, the relevance of the hypothesis depends especially on the case selection. Possibly intervening case characteristics should be consciously kept constant or deliberately used to differentiate the cases. We already decided on the approximate scale of the cases and our suggestion is that we should concentrate on more chronic threats to sustainability, peak incidents, or cases where a technological solution to the scarcity problem is already in sight.

The general principle that guides us in the relationship between this mix and the resulting more or less sustainable resource use is that the incentives for the development of water resource management and use that are provided by the whole of the regime (property rights plus public governance) will contribute to a more sustainable water resource in as far the following conditions are met:

(1) The completeness and *validity* of the *'policy theory'* that is explicitly or implicitly the foundation of the elements of the regime and the incentives it is expected to provide, need to be sufficient.
(2) The degree and quality of the *implementation* of the incentives should be sufficient.
(3) The degree of coherence and *integration* in the regime and its implementation should be sufficient.

Validity. The optimal mix between the policy and property rights aspects of the regime mix could be regarded as an aspect of the validity of the policy theory ('policy design'). The analysis that is developed in chapter 6 provides a tool to assess the extent to which there is a need for government intervention (possibly by actors other than government as well, but, in any case, as a form of public governance, outside intervention, in addition to the self governing capacity that is provided by the property rights pattern). Chapter 6 analyses in how far there

is a task for policy. But, of course, that policy will only improve the sustainability of water resource use when it really fills the gaps that the initial property rights pattern leaves.

So, the concept of *'policy theory'* (Hoogerwerf, 1990) encompasses more than just the completeness of the policy design regarding the various aspects of the problem, e.g. the uses and users of the water resource. The concept of 'policy theory' builds on the idea that policy can be regarded as an attempt to attain certain goals with certain means in a certain time perspective. Even if the policy is actually very heterogeneous and is also to be viewed as the temporary or intermediate result of an ongoing struggle between various interests and their representatives, its nature by which it deviates from all kinds of other 'products' of society is that it is about influencing developments. As a consequence, it builds, explicitly or implicitly, on sets of assumptions regarding the causal relationships between variables in the targeted policy field, relationships between 'chosen and newly induced causes' and 'desired effects' (sometimes called final relationships) and relationships between general values and more specific standards and objectives. These assumptions can be more or less valid from the perspective of a certain policy objective. In our case (EUWARENESS), this is the perspective of sustainable use (cf. chapter 2).

The aspects of the policy sector that the policy theory should reckon with include not only the causes, features, and effects of the physical water resource use, but also the pattern of property rights that is connected to these uses. To design a policy that improves the use from a sustainability perspective the policy has to reckon with what is already there as 'self-governing' capacity and what is lacking.

An important aspect is the instrumental validity of the policy: 'are the chosen strategies and instruments in principle, when implemented correctly, capable of causing the desired results?' Hoogerwerf (1990) provides a methodology to reconstruct the policy theory.

Implementation. The sets of incentives that are provided by the regime (including both property rights and governance) are in many cases not self executing. In order to be realised in practice, many need interaction processes in which they are applied (cf. second sentence of hypothesis 2 on regime effects in the proposal). Often these processes deal with the individualisation of general rules and subsidy or charge schemes or the enforcement of restrictions in resource use that are mandated by such rules or alternatively by the decisions of owners. When part of the foreseen incentives are not implemented or implemented incorrectly (meaning that the form in which implementation takes place decreases the incentive effect) even in principle complete and valid elements of the regime will prove to be insufficient to counteract unsustainable practices in resource use.

For the analysis of both aspects (probability of application and degree of correct application) the 'policy instrumentation theory' (e.g. Bressers and Klok 1988, Klok 1991, Bressers and Ringeling 1995, Bressers, Klok and O'Toole, 2000) contains modules, that can be used as a methodology. On the assumption that implementation processes are social interaction processes that ultimately can be explained by the goals, information, and power of the actors

involved[32], various combinations of settings are discerned and projections of the course and results of such processes provided. To assess the goals, information, and power of the actors involved, the elements of the regime can be used as a check list of relevant circumstances.

Appendix 1 provides a summary of these implementation modules of the 'policy instrumentation theory'. If insufficient implementation of one or more of the regime's incentives seems to be the bottle neck in our case study, these models can help find the underlying factor(s) that explain the failed implementation, ultimately going back to the elements of the regime itself. All elements of the regime can have certain implication for the goals, information, and power of the actors involved in implementation. The elements can be used as a sort of checklist when trying to estimate the values of the goals, information, and power of the actors.

A special aspect of the regime's elements is connected with the next success condition, that of integration. But before coming back to that we will first discuss the direct influence of higher degrees of integration of the sustainability of water resource use.

Integration. In the EUWARENESS project, the most central condition for regimes to be successful in sustainable resource management is integration. This is not because it is more important than validity and implementation, but because it is connected to the main focus of the project, in which the transformation to a more integrated regime is seen as a condition for sustainable resource management. This condition is less obvious than the importance of validity and implementation. While the basic theorems underlying the ideas of *validity* of regime incentives and of the necessity of correct *implementation* are not difficult to imagine for a modern policy scholar, the necessity of *integration* needs some further theoretical underpinnings. Also, 'sufficient integration' can be conceived of as an aspect of the validity of the policy theory for the design features concerned and as an aspect of implementation for the process features concerned. But by doing so, its emphasis would be lost. Given the acknowledged position of the former two in explaining policy success and failure, the innovation of EUWARENESS in this respect lies precisely in this emphasis on the possible importance of integration.

First, we elaborate what forms the integration of a regime can take. We can use here again the various elements of the governance pattern. When more than one layer of government is dealing with the same water resource (as is often the case), integration means that the activities of these governments are recognised as mutually dependent and as influencing each others' effects. When more than one actor, especially also a target group, is involved in the policy, integration means that there is a substantial degree of interaction in the policy network. When more than one use or user is causing the unsustainable problem situation, then integration means than the various resulting objectives are analysed in one framework so that deliberate choices can be made when goals are conflicting. (Goals are conflicting to the degree that the realisation of the one goal hampers the realisation of the other goal. Thus, not all different goals are conflicting.) The same holds for instrumental strategies that are used

[32] Not coincidentally connected to the 'values, cognitions and resources' that are discussed in Chapter 4 as providing the mechanisms of mutual adaptation between the elements of the regime.

to attain the different objectives, as well as for the different instruments in a policy mix. To conclude, integration of the organisation of the implementation means that responsibilities and resources of various persons or organisations that are to contribute to the application of the policy are co-ordinated or that these actors themselves are co-ordinated.

All in all, integration can take various forms that all can contribute to the integration of the regime as a whole, but all of them do not necessarily provide decisive contributions to overall integration on their own. To be able to judge what (combination of) aspects of integration provide the stipulated conditions for sustainable resource management, it is important to make clear what is to be expected from integration. In our opinion, the principal benefit of integration is to prevent negative side-effects from some elements on the positive effects of other elements on a sustainable resource management and, simultaneously, to obtain extra opportunities for productive co-operation of various elements of the regime.

As Ligteringen (1996, 1998) has shown, side-effects of policies can actually have a bigger impact on the attainment of certain environmental goals than the specific policies designed to influence that aspect of the problem. She states that part of these side effects occur indirectly trough influencing major societal developments that have a substantial effect on sustainability themselves. These indirect influences resemble the famous IPAT formula (Impact = Population x Affluence x Technology). Apart from the direct effects on the targeted behaviour, she also discerns influences from demographic, economic, cultural and spatial developments. In accordance with the IPAT formula, we would mention these demographic (P), economic (A) and technological (T) developments, where technology is considered in its broad meaning like it was meant to in the IPAT formula (impact = how many x how much x how). Next to the status of the technical equipment (that can by the way both improve or worsen the situation), cultural and spatial aspects can be seen as part of this ‘how’ as well. Because of these indirect influences, there is a multitude of possible effects of the various elements of the regime on the sustainability of the resource use. Also, it is possible that the effects of one instrument are counteracted directly or indirectly by the effects of other regime characteristics.

On the one hand, this means that ‘integration’ cannot be conceived of as one of the best ways of dealing with these interactions. For that, the multiple possibilities are simply too overwhelming. Various forms of integration might provide for various partial solutions to existing problems. On the other hand, it is clear that there are even more ways in which a lack of integration can be detrimental to the regimes’ effects on sustainable use. All in all, it means that we predict that substantial steps toward more integration will decrease specific forms of unsustainable use (cf. effect hypothesis 3 of the proposal) and that even in cases of a valid policy design and good implementation certain specified forms of lack of integration will cause specific flaws in the sustainability of the resource use (cf. effect hypothesis 2 of the proposal). The implementation aspect of hypothesis 2 has already been dealt with above, and will receive additional attention below.

Phrased in a simple and straightforward way, these hypotheses read as follows:

(1) Complex regimes with low integration will be more likely to lead to over-use and degradation of water resources or inability to protect the ecological functions of the water resource.
(2) Integrated water regimes will be more likely to be able to prevent over-use and degradation of water resources and to protect the ecological functions of the water resource.

For the case study methodology, this means that we should not try to measure some general degree of 'integration' to be correlated with a general measurement of 'sustainability', but instead try to specify the pathway along with specific forms of (lack of) integration in the case under study have caused specific forms of improvements (or specific problems) in the sustainability of the resource use. Since not all differentiation and complexity is bad, the analysis in the cases should assess what specific problems regarding the sustainability of the resource use certain differentiations did cause and to what extent the later integration solves these problems without creating new ones.

For an additional impact of better integration, we need to go back to the implementation condition. In a dynamic context and surrounded by uncertainties regarding the problem and possible solutions, an adaptive and learning form of policy implementation is important. Such a policy style depends on the uneasy combination of both pluralism (e.g. allowing complexity, openness, differentiation) to give room for challenging stimuli and on the other side co-ordination (e.g. integration, consensus seeking devices) to be able to produce new solutions on the basis of these challenges (Arentsen, Bressers & O'Toole, PSJ, forthcoming 2000).

Cases in which consensus seeking devices are strong, but pluralism is restricted to 'insiders' (like the 'iron triangle' of agriculture has been for a long time in many countries) are, however, vulnerable to becoming too closed for external stimuli that would provide the system with timely incentives to adapt and learn. Cases in which pluralism is strong, but no strong devices press for a co-ordinated agreement (like in some examples of US environmental policy) lack the incentives to explore win – win situations or at least profitable trade-offs.

For our analysis, this means that the role of integration is connected to the ability to incorporate complexity in productive collective action. While we assume goals, information, and power of the actors involved as the key (or: core) circumstances that explain the course and results of social interaction processes (see appendix 1) this means that we assume that more integration correlates with less unproductive constellations of goals, information, and power of the actors involved in the implementation process.
By (full) integration we mean:

- that levels are more mutually interacting and are aware of their mutual dependencies,
- that actors belong more to 'policy communities' rather than 'issue networks', implying more interaction and consensus orientation,
- that interrelatedness of different aspects of the problem and their dependencies are recognised and intensely debated and goals are set accordingly,

- that the policy mix contains instruments that are mutually reinforcing each others incentives,
- that the implementing organisations share their resources and co-operate intensively to complement each other.

Under such circumstances, the goals of the implementers and target groups involved in the implementation process can be expected to be less likely in discord, especially because of the second and third aspect of a more integrated regime. All elements of a more integrated regime can be assumed to contribute to a lesser degree of experienced uncertainty by and increase in information exchanges and a lower degree of distrust. (In the short run, more awareness of the various sides of the coin can cause confusion, but in the somewhat longer run the ‘surprises’ that are caused by an initially too simple view of reality will cause more distrust and uncertainty than open information exchange.) What integration will do with the power balance between implementers and target groups is that there will typically be less possibilities for target groups to play the implementers off against each other and more standard operation procedures for the solution of conflict.

Our hypotheses are that:

(3) In the implementation process, the additional fragmentation that is typical for complex regimes will tend to lead to more discord between the actors (goals), more uncertainty (information), and more stalemates (power) and, thereby, can hamper implementation.

(4) In the implementation process, integration of the regime will tend to lead to less discord (due to more ‘win-win’- solution creativity), less (subjective) uncertainty (due to more exchange of information and less distrust) and less stalemates (due to less possibilities for target groups to play the implementers off against each other and more standard operation procedures for the solution of conflict).

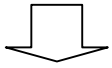
All in all, the expectations that are phrased in hypotheses 3 and 4 imply that a more integrated regime can outperform an equally complex but fragmented one not only through the direct effects of more mutually reinforcing and less mutually destructive side effects on the resource use, but also through the indirect effects on the quality of the implementation process.

8 Conclusion

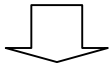
Overview scheme: See research proposal

The structure of the variables involved in the theoretical explanation is the following one:

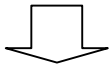
1. Change agents (many implying or stimulating differentiation; some pushing for integration): e.g. demographic, economic, technological, institutional, and cultural developments and the feedback from the problem situation



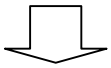
2. Initial changes in directly affected regime elements implying more complexity and sometimes more integration



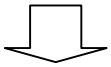
3. Adjustments by other regime elements to initial changes through adaptive mechanisms involving values, cognitions, and resources



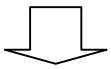
4. A. More complex regimes ('multi'-format of elements)



5. A. More complete coverage of uses and users + more risk of intra regime counter activity

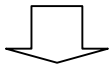


6. A. Indications of a more sustainable water resource use due to better coverage (cf. previous situation) + indication of threats to sustainability due to lack of coherence

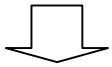


Feedback into 1.

B. More integrated regimes (high intensity of exchange)



B. More successful implementation + more mutually reinforcing side effects of regime elements



B. Indications of a more sustainable water resource use due to better implementation and more positive and less negative side effects

Appendix 1

A brief sketch of “Instrumentation Theory”

Introduction

Many implementation studies set out not only to identify policy outputs, but also to explain them. These explanations vary from case to case, putting forward a vast array of factors, both in the Netherlands as in other countries. The policy may have run aground because `the municipalities responsible for implementation were not sufficiently motivated', `there were staff shortages', `the guidelines arrived late', `the applicants did not understand the subsidy arrangements', `there was insufficient support in society', `the statements of the under-secretary spread confusion in the media', to mention but a few. There are two disadvantages to such ad-hoc explanations. First of all, though they may contain some degree of truth, they rarely tell the whole story. Mostly the identified factor or factors could only exert influence in combination with other factors which, in themselves, need not adversely affect implementation. For instance, a lack of motivation on the part of the municipalities to implement the policy is only a decisive factor if these municipalities enjoy a large degree of discretion (or can afford to act like that: actual discretion). However, a large degree of discretion in itself needs not to prevent effective implementation.

Secondly, ad-hoc explanations do not engender a cumulation of knowledge of factors that influence policy implementation. The studies show little uniformity, being based on different terms and levels of abstraction. As a result, information from new research cannot be tested against predictions based on earlier research. It is possible, up to a point, to induce certain general factors from the concrete factors mentioned in the various studies. Indeed, this was done at an early stage (e.g. in the Netherlands: Hoogerwerf, 1977, Hoogerwerf, 1983, cf. Sabatier & Mazmanian, 1980, Mazmanian & Sabatier, (1989, 1983). But the interaction between these general factors, the way in which they reinforce or weaken each other's influence, is rarely taken into consideration. Another drawback is that these general factors tend to remain fairly abstract. As a result, they are not often used in practice as a basis for hypotheses, but rather as a basis for fruitful diagrams for the clear classification of ad-hoc explanations. But in order to achieve cumulative knowledge of the factors that influence policy implementation and effectiveness, it is vital to develop theories with explanatory power.

A feature of the Dutch implementation studies field is that there has been some works that not only state the importance of the formulation of explanatory and predictive theory, but also actually develop and apply such theory. Such a theory, developed in the Netherlands, is the `instrumentation theory', which is the subject of the present section. The theory derives its name from the fact that it was developed to facilitate the comparison of policy instruments. One of its basic assumptions is that the working of policy instruments cannot be seen in isolation from the circumstances in which they are applied. The theory therefore not only looks at the characteristics of policy instruments and their impact on target groups, but also at the policy implementation processes. Its first version was developed in

1986 (Bressers & Klok, 1987, 1988). After a series of empirical studies (a.o. Klok, 1987, Grimbergen e.a, 1988, Kraan-Jetten, 1991), which generally provided evidence supporting the theory, a further clarification of concepts and theorems led to the second version (Klok, 1991). Thereafter, new empirical studies followed (e.g. Pullen, 1992). Naturally, the treatment in this paper will only be a summary.

Interaction processes and instrumentation theory

An elaboration of thinking in terms of policy processes is to emphasize the character of these processes as social interaction processes, as has been the case in the Twente policy sciences approach. Here, attention has shifted from viewing policy as a sort of production process with semifinished products and an end product to a vision in which the actors participating in the process are the central concern. In this vision the course and outcomes of the processes depend not only on the inputs to the process but mainly on the characteristics of the actors involved, particularly their objectives, information and power. All other factors that influence the process do so because, and in so far as, they influence the characteristics of the actors involved. This also applies to the influence of policy instruments. Not all characteristics of actors, however, are determined by policy, and so it is not possible to describe a policy without paying attention to the actors involved in that policy. These actors are, therefore, allocated a place in a graphic model of the policy (Bressers, 1983).

Moreover, the processes in this vision are not only linked in one series or cycle, but are part of a large number of societal processes in which government authorities sometimes participate and sometimes do not. All these processes are connected to other processes in a complicated web via their inputs and outputs, and possibly indirectly linked to *all* other processes. Each definition of a sector of society draws a more or less arbitrary boundary round a cluster of processes in this web. In practice, the boundaries that are drawn between policy development and policy implementation are the same as those between a higher and lower tiers of government (Bressers 1983; Honigh 1985; Bressers & Honigh 1986).

The ‘instrumentation theory’ which stems from this perspective focuses on the application and effects of instruments on the target groups of policy (Bressers & Klok 1987; Bressers, Klok, Kuks & Lulofs 1988; Klok 1991). It also takes account of the fact that instruments do not influence the characteristics of the actors involved separately but rather as a package or as an ‘instrumentation strategy’. Instruments and strategies have various properties, for example a certain proportionality between target group behaviour and government reaction to this behaviour, or giving resources to the target group or taking these resources away from the target group. Such properties of instrument strategies affect their applicability in practice. Klok emphasizes that some of the instruments are designed to give those implementing the policy the power to apply other instruments (Klok 1991: 176-194) and also that the implementing organizations depend on being equipped with sufficient capacity and expertise (idem: 163-164; see also Bressers 1983: 218-237 and 256-274). In his thesis, Arentsen (1991) exhaustively discusses the relation between the policy organization and policy implementation.

Later publications on this approach (Bressers & Kuks 1992; Bressers 1993; Bressers, O’Toole & Richardson 1994; Bressers, Huitema & Kuks 1994)

have paid more attention to the interrelations between the actors, including actors that do not directly participate in the processes under examination. Klok (1995) gives primary importance to the allocation and removal of resources in such relations and in the classification of policy instruments. The mutual relations between actors within such policy networks are seen as an important factor in the development of the content of policy (Ligteringen 1999). In addition, the relation between policy processes at the various administrative levels is explicitly dealt with (Bressers, Kuks & Ligteringen 1998). During this theoretical development, the approach to policy as an interactive process and the instrumentation theory based on this gradually grew into an integrative policy science approach, uniting elements from a variety of other approaches

Explaining implementation with "Instrumentation Theory"

The theory assumes that the policy implementation process is not only about implementation, but also about attempts to prevent implementation or to change the character of what is implemented. The process involves activities and interactions between the implementing government officials and the members of the target group. Often the same actors already maintain contact with each other in connection with other matters. Moreover government and target group often exert influence on each other before the policy that is to be implemented is introduced. The new policy does not replace this interactive process, but adds a new element to it. Therefore, to assess the possibility of the new instruments being applied and correctly applied, it is necessary first of all to gain insight into the factors determining the nature of the interactive process between government and target group. We can then try to find out how these factors change due to the introduction of the new policy instruments (Bressers & Ringeling, 1989).

Another basic assumption of the theory is that the factors which influence the implementation process do not operate in isolation of each other (cf. Renate Mayntz, 1983). The influence of the various factors cannot be simply added up. A factor that exercises a positive influence under certain circumstances, may exercise no influence, or indeed a negative influence, under other circumstances. The way in which these processes develop must therefore be explained on the basis of combinations of the values of the various distinctive factors. This means, that hypotheses on the relationship between the dependent variable and only one independent variable at the time, with a `ceteris paribus' assumption regarding other independent variables, are regarded as unproductive.

Though this basic assumption is undoubtedly more realistic, it creates severe complexity problems for theory formulation. In fact, if one assumes 15 independent variables to be important to the development and results of the implementation process, than even if one treats these variables as dichotomies, no less than 32.768 combinations of circumstances or `settings' can occur. Because many of the relevant variables cannot validly be operationalized as quantitative measures computerized modeling provides no escape.

Instead this complexity is made `manageable' by discerning two sets to independent variables. These factors are divided into `core circumstances' (i.e. factors that have a direct influence on the development of the processes) and external circumstances (i.e. factors that have an indirect influence via their influence on the core circumstances). The applied policy instruments can also be counted among these `external circumstances'. The theory indicates how the core

circumstances jointly determine the development and results of a process. External circumstances, including characteristics of the policy instruments that are to be implemented, are taken into consideration when estimating the value of the core circumstances. In this way many circumstances can be taken into account without increasing exponentially the complexity of the theory. The number of settings remains limited as they are determined by a limited number of central circumstances. These central circumstances are the goals, information and sources of power of the actors involved (cf. Chapter 4).

Likelihood of implementation

The policy implementation process is typically characterized by the interactions between the government and the target group of the policy. The application of a certain policy instrument often takes up a less prominent place in this process than one would be led to expect on the basis of official procedures. The actual granting of permits to those members of the target group who are required to hold permits, the actual imposition of levies, the application of sanctions when regulations are violated: none of these can be taken for granted in the practical process. The first result of the implementation process can therefore be indicated as the possibility that the instrument will be applied at all. Sometimes this result may have the side-effect of undermining the credibility of the policy, particularly if implementation fails to get off the ground.

It is quite conceivable that not only the members of the target group but also the government body responsible for implementation attach little importance to the application of the instrument. Implementers have values and interests of their own, which may not coincide which the activities involved or even the policy as such. The Dutch Nuisance Act, for instance, has been typified as a symbolic act, because for years no one lifted a finger to put it into practice. In fact, it is even open to question whether the policy-makers ever intended it to be implemented (Aalders, 1984). So the first group of factors which determines the possibility that the policy instruments are applied consists of the objectives of the implementers and the target group. To put it more specifically, the central question is whether the actual application of the instrument will contribute to the achievement of their own objectives.

The successful application of policy instruments also depends on whether those involved have sufficient information. The first question to ask in this connection is whether the policy implementers know who makes up the target group. Do they know, for instance, which companies are obliged to have a permit or which ones qualify for a subsidy? If the target group itself stands to gain from the application of the instrument, e.g. in the case of subsidies, then information available to the members of the target group may also greatly help increase the possibility of application. This concerns information about the way in which they can benefit from the instrument.

The third group of factors that determines the development of the implementation process is the distribution of power between the implementers and the members of the target group. First of all, who is empowered to apply the instrument and how far does this power go? The power may rest exclusively with the implementers. But in some cases, e.g. subsidies, the instrument can only be applied at the request of the members of the target group. The target group then enjoys an extremely strong position if it is not in favour of the application of the instrument. Other forms of power may derive from formal sources (e.g.

opportunities to appeal) and informal sources (e.g. dependence on other party for the achievement of other objectives).

The combination of circumstances (values of the various factors) determines the kind of interaction that will occur between the government and the target group in the policy implementation process. The theory makes a distinction between three types of interaction: partnership, cooperation and resistance. Partnership occurs when both parties share a common goal. We speak of cooperation when one of the parties adopts a relatively passive attitude which neither hinders nor stimulates the application of the policy instrument. Resistance, of course, speaks for itself. There are also situations in which there will be no interaction at all between the government and the target group. In this case the possibility that the instrument will be applied is very remote indeed.

Diagram 1 gives an overview of the circumstances in the implementation process and the types of interaction and results to be expected from the application of instruments in these circumstances. The flow chart rests on nine theorems that in the space of this section cannot be elaborated upon.

[diagram 1: one page]

Degree of correct implementation

The mere application of a policy instrument does not automatically lead to the envisaged change in the consequences of the behavioral alternatives of the target group. The application may not be up to standard; for instance, levies may be lower than originally intended, or permits may not specify restrictive regulations, or grants may not be accompanied by the intended conditions. The question in such cases is not whether the policy implementers themselves are breaking the law or other regulations, nor whether they deviate from the instrument-as-intended as such. Empirical implementation research has shown that deviations can actually be motivated by concern for goal-attainment by the implementers. The dependent variable here is, whether the impact of the instrument on the consequences of the behavioral alternatives of the target group is less far-reaching than originally envisaged by the policy-makers.

The factors that determine the character of the interaction process between government and target group on this point are virtually identical to those mentioned earlier: objectives, information and power. Nevertheless, we still need a separate analysis diagram as the factors may take on very different values and the types of interaction are more complex than those that occur in respect of the possibility of application. For instance, the members of the target group may well favor the application of a subsidy in itself, but oppose correct application as this would bind them to all sorts of regulations. Or, in another situation, implementers may have sufficient information to identify those members of the target group who require permits, but have insufficient information to know what regulations should and can be applied to the companies in question.

The types of interaction that may occur in respect of correct application are to a certain extent different from those in respect of the possibility of application. This is because the degree of correct application involves a much larger number of aspects. The degree of correct application, for instance, not only concerns the question whether a company required to hold a permit will indeed obtain one, but also whether that permit will be adequate, i.e. contain all regulations necessary to achieve the policy objective. It is precisely the formulation of these regulations that is the most difficult part of the negotiations between government and industry. Furthermore, the concept `degree of correct application' assumes that a certain degree of application takes place. If the instruments are not applied, the degree of correct application lacks all significance. The application of policy instruments almost necessarily leads to interaction, so it will be impossible for the result to be `no' interaction, as in diagram 1. A distinction is made between constructive, but also obstructive partnership, constructive and obstructive cooperation, negotiation and conflict. Obstructive partnership occurs in situations where both companies stand to gain from incorrect application. The same phenomenon may occur with cooperation when one or both parties have an interest in the application of the instrument - e.g. because non-application would be rather too obvious to higher authorities -but not in the correct application of the instrument. In view of the many aspects involved in the correct application of the instrument, it is useful to subdivide the interaction type `resistance' into negotiation and conflict. In the case of negotiations, the parties do their utmost to realize as many of their own objectives as possible by reaching a compromise. In the case of conflict, the target group usually breaks the lines of communication and confronts the other party with a negative use of power. In the latter case, the target group will generally

question the legality of the instrument. Finally, with some combinations of circumstances the interaction type and result are highly uncertain.

Diagram 2 gives an overview of the situations and predicted interaction types and results in respect of the degree of correct application of the instrument. This flow chart rests on eleven theorems, that cannot be elaborated upon in the context of this section.

[diagram 2: one page]

The implementation of a policy may involve the deployment of more than one instrument. In fact, different instruments are frequently applied at different stages of implementation. For instance, the first step in applying a permit system will be to issue permits specifying certain regulations; the second step will be to enforce these regulations. Therefore, to generate a comprehensive explanation of the results of the policy implementation processes, the parts of the theory described here will often have to be applied several times.

Appendix 2

Criteria for case selection

The criteria for case selection are mentioned as a second deliverable and an appendix in the first report (page 18). In this appendix we present the criteria that evolved from the logic of the study and the discussions the research team has had in Barcelona and Lausanne.

Continue: XYZ

Appendix 3

Case study protocol

In the first Annex to the Description of Work (October 15, 1999) we mention a list of indicators for the variables we are measuring as a part of the first deliverable. In the second Annex we mention that the case studies will follow not only the operationalisation of the central concepts that evolves from the elaboration of the theoretical framework, but also 'regular state of the art case study methodology' (Yin, 1994) and elements of a case study protocol that many of the partners used before in an EU sponsored project (Waste facilities siting; Dente, Fareri & Ligteringen, 1998).

Of course not all elements of the latter two references apply here. Where there is some discongruence between the EUWARENESS set-up and the background and purpose of these mentioned literature, the EUWARENESS set-up should be applied. The same holds for the definitions presented in Dente, Fareri & Ligteringen. One should be aware of the fact that this protocol was not meant to analyse regime changes and their effect on resource use, but to analyse decision making processes on large investments with directs effects on local environmental quality. An important aspect of this case study protocol however is the three phases that are discerned (Dente, Fareri & Ligteringen, 1998: 214):

- the construction of the chronology;
- the analysis of the actors involved;
- the analysis of the patterns of interaction and the definition of the success factors.

Our suggestion is that also the EUWARENESS case studies begin with a historical description of the case first, followed by a more systematic assessment of the key variables and concluded by an analysis of the relations that are represented by the hypotheses (cf. chapters 7-11 of Ligteringen, 1999).

A list of key variables in the EUWARENESS case studies is the following:

1. The five elements of governance (see section 3.2 for their description).
2. The four elements of property rights (see chapter 4 for their description).
3. External change agents and their differentiating of integrating character.
4. The sequence of change through the regime elements (see below for an operationalisation of these patterns).
5. The three mechanisms of value adaptation, integration of interpretation frameworks and resources dependencies and exchange (see section 3.3 and below for an operationalisation of these mechanisms).
6. The resulting level of complexity (preferably per element of the regime; see chapters 5 and 7 for an operationalisation of this concept).
7. The resulting level of integration (preferably per element of the regime; see chapters 5 and 7 for an operationalisation of this concept).
8. The instrumental validity and completeness of the 'policy theory' of the resource regime (see chapter 7 for a short elaboration).

9. The level of adequacy of implementation of the strategies in the resource regime (if possibly insufficient than try to explain with the help of 'instrumentation theory' and its variables; see appendix 1).
10. Indications for negative and/or positive side effects of regime elements on the effects of other regime elements.
11. The indications for more or less sustainable resource use (see for the description of (un-)sustainable resource use chapter 2).

Additional variables are connected with hypothesis 2 on regime change (on the relation between the characteristics of the changes and the initial balances in the regime elements, e.g. powerful target groups protecting their interests). Also other variables are related to the co-efficacy of property rights and government intervention (see chapter 6) and on the relation between the level of integration and the quality of implementation (see chapter 7, hypotheses 3 and 4 on regime effects).

The relationships between the various elements of governance and the mechanisms that explain them are elaborated more fully and systematically in the following pages. These could be used as a source of reference to compare developments in the cases with. Mind that when we speak of 'resources' here the resources and organisation of the implementation are meant.

'Top-down' influences: relations in the stated order of governance elements

The 'continuation' and 'logical order' relations between the elements of the governance model will not be further elaborated. In fact, the perspectives of continuation and logical order (each previous element forms logically restricts the degrees of freedom of the following one) are the basis of these relations. This is less obvious with the relations discussed below. The arrows indicate that the first named element in this relation has an influence on the second named element.

Level → Problem and ambition
From the value perspective we can expect that the sort of values that characterize a certain level of administration will work through in the perception of the problem and the policy ambition. Many values are not peculiar to a particular administrative level, but the administrative level provides an indication of the level at which equality or balance is sought.
From the cognitive perspective (interpretation frameworks) the problem will be perceived at the level from which it is viewed. The problem of waste, for example, looks different at the national level (e.g. safe processing) than at the local level (e.g. impact of waste processing plants).
From the perspective of resources the dominant level, as 'owner' of the problem, will tend to conduct the debate about the problem and policy ambition as it affects that level. If there are other levels that have a strong position this may lead to fragmentation of the perception of the problem and policy ambition. In the end, the composition of aspects that play a role in the perception of the problem and policy ambition will be partly determined by the status of the various levels.

Level → Strategies
From the perspective of values, there are not many values linked to the selection of the administrative level, except the values held at the level at which a balance is desired (equality). The choice of strategy will reflect this.
From the cognitive perspective, strategies will be developed primarily for dealing with the problem at the level at which the policy is being developed or at least from which there is a clear view of the problem. If governance is divided between a number of levels, policy strategies will be developed at more than one level.
From the resources/dominance perspective there will be a tendency to select policy strategies that do not threaten the distribution of responsibilities for developing policy at the various levels. In the end, we see here, too, that the characteristics of the chosen strategies will to a certain extent reflect the distribution of responsibilities between the various levels.

Level → Resources
This concerns a big leap over the more stepwise relationships between these two elements. This means that there may not be much left for a direct influence of one element over the other.
From the values perspective an attempt will be made to create a certain balance, not only in the way the problem is tackled but also in the allocation of resources between the various subareas of the administrative levels.
From the cognitive perspective the allocation of resources will mainly reflect what the problem is perceived to be, but this is an indirect relation via the problem perception.
From the resources perspective, the resources distributed will mainly be those that are available at the level concerned.

Network → Strategies
Here the 'network–instrumentation model' is relevant (Bressers 1993; Bressers & O'Toole 1999; Ligteringen 1999), which deals with aspects of objectives, information/approachability and power/resources.
From the values perspective strategies will be selected that are appropriate to the degree of consistency between the values held by the actors.
From the cognitive perspective it is important whether the government and target groups (representatives) develop an interpretation framework through a process of negotiation or that there are 'difficult to reach' target groups.
From the resources perspective what is important is the question of the extent to which the party conducting policy is dominant or is strongly dependent on the cooperation of other actors.

Network → Resources
From the values perspective and from the cognitive perspective the influence of the composition of the network will probably be transmitted via the problem perception and policy ambitions.
From the resources perspective the distribution of resources is primarily influenced by the network because people tend to help others in their own or allied organizations. This leads to 'who gets what' games, irrespective of the resources needed for certain strategies.

Problem and ambition → Resources
From the values perspective we can expect – irrespective of the objective resource requirements for the chosen instruments, which is, after all, the line of 'logical order' – that resources will be allocated to those objectives related to the problem that are perceived to be the most serious (a form of symbolic allocation). In the world of politics you often see that 'extra money is provided for solving the problem of waiting lists in the health service' without it being clear what that money can be used for.
From the cognitive perspective we can expect something similar, but this time based on the choice of intervention points within the policy field: changeable causes or symptoms of the problem. Here, too, there is no need of a direct relation with the activities for which the resources are needed.
From the resources perspective we can expect the global effect that the more serious the problem and the higher the level of ambition, the total willingness to acquire the resources will increase.

'Bottom-up' influences: influences along the feedback flows

In this section the arrows in the headings represent a tendency for the second named element to adjust to the first named element. In this case, though, the influences discussed are in the reverse order to the one defined in the 'logical order'. For example, the division of resources influences the (further elaboration of) the strategies instead of the selected strategies influencing the (distribution of) resources.

Resources → Strategies
From the values perspective we can expect that the method of implementing policy strategies will be linked to the question of whether sufficient resources have been made available for the intended implementation. If this is not the case and resources have to be removed from other tasks to compensate, then value conflicts will arise, and these will be resolved by not fully implementing the strategy concerned. In effect, this means changing the strategy.
From a cognitive perspective we can expect that the way the strategy and instruments are interpreted will be influenced by the resources that are made available. If these resources appear to push the implementation in a certain direction or influence the effort put into implementing the policy the conception of what the strategies and instruments are will be adapted to meet these effects. Because 'what is believed to be real is real in its consequences' the strategy will actually be changed.
From a resources (and power) perspective we can expect that the resources made available (and other features of the implementation situation) will be taken by those executing the strategy as the starting point when determining how people deal with the strategies and instruments in practice, in many cases in an attempt to retain as much as possible of the original purpose (bottom-up argument).

Resources → Problem and ambition

From a values perspective we can expect that the policy ambitions will be measured partly against the resources made available. If there is a discrepancy, and, as a result, resources have to be taken away from other problems, value conflicts will arise and these will be resolved by not attempting to fulfil the relevant policy ambitions in their entirety. In effect, the policy ambitions will be changed.
From a cognitive perspective we can expect that the way the perception of the problem and the policy ambition are interpreted by those executing the policy will be influenced by the available resources. If these resources appear to push the implementation in a certain direction or influence the effort put into implementing the policy, the conception of what the primary issue is and what the actual policy ambitions are will be adjusted. Because 'what is believed to be real is real in its consequences' this will in effect mean a change in the emphasis placed on aspects of the problem and the ambition of the policy.
From a resources (and power) perspective we can expect that that the resources made available can also strengthen or weaken the importance of the position held by those executing the policy with respect to the perception of the problem and the selection of policy ambitions, and this may influence later choices. What this all means is that the policy ambitions are extended or pruned back to fit the available resources.

Resources → Network
From a values perspective we can expect that frustration or satisfaction with the distribution of resources will influence the motives of the actors in the network.
From the cognitive perspective we can expect that the actors that have received most resources will be seen to be the most important actors in the network, or may even enter the network because they are provided with resources by other actors for the application of the strategies and instruments.
From a resources (and power) perspective we can expect that the actors in the network, under the influence of the distribution of resources, will seek to form coalitions that match this distribution, and may seek to co-operate with actors that possess resources they do not have and vice versa.

Resources → Level
From a values perspective we can expect the administrative level that receives the most resources to (continue to) feel most responsibility for the problem.
From a cognitive perspective we can expect the administrative level receiving the most resources to strengthen its own interpretation of the problem as one belonging primarily to that administrative level.
From a resources perspective we can expect that the administrative level receiving the most resources will, partly as a result of this, retain the strongest position.

Strategies → Problem and policy ambition
From a values perspective we can expect that those aspects of the problem that come over most clearly as an object of intervention in the selected strategy will be considered most important.
From a cognitive perspective we can expect that the presence of a certain strategy will make those aspects of the problem most noticeable that are the clearest objects of intervention.

From a resources perspective we can expect that the selected strategy will strengthen the position of certain parts of the problem in the debate and strengthen the position of certain policy ambitions. All in all, there are signs here of what is referred to in the literature as ‘solutions in search of a problem’.

Strategies → Network
From a values perspective we can expect that the strategies and instruments allocate certain responsibilities to actors, as a result of which these actors will redefine their responsibilities and will then set out to achieve other goals (compare the gradual influence of the allocation of water quality tasks on the environmental awareness of the water authorities).
From a cognitive perspective we can expect the features of the chosen strategies to influence the perception of the way individuals in the network deal with one another and of who belongs in the network and who does not. A tough enforcement strategy based on deterrence may lead to a perception that relations within part of the network are more strained. Consensual management strategies may bring about the opposite.
From a resources (and power) perspective we can expect that the importance of the role that actors play in the implementation also more generally influences their relative importance in the network.

Strategies → Level
From a values perspective we can expect that the division of responsibilities between administrative levels associated with a particular strategy influences what people think about who should have these responsibilities, also concerning administrative level.
From a cognitive perspective we can expect that the strategy raises the level of knowledge of the problem and the possible responses mostly in the administrative level that has most to do.
From a resources perspective we can expect that the position of the administrative levels that have a more important role in the selected strategy will be strengthened relative to other levels. All these phenomena appear to be present in the Netherlands because of the rise of the target group approach, which has strengthened the national level (at which most covenants are agreed) with respect to the provincial and local levels (where most of the licenses are issued and which carry out most of the enforcement duties).

Problem and policy ambition → Network
From a values perspective we can expect that a multifaceted problem perception may lead to responsibilities being assigned to, and accepted by, more actors than in the case of a one-dimensional problem perception.
From a cognitive perspective we can expect that a problem perception in which many actors are viewed to be involved in the problem can lead to more actors that have the idea that it concerns them than when the problem is regarded as only the business of a special group.
From a resources perspective we can expect that a problem perception and policy ambition that are found to be a positive or a negative factor by certain actors will also assign a special position in the network to these same actors. All in all we can state that simple problem perceptions can lead to a more closed network than more fragmented, multifaceted problem perceptions. Such

influences were ascertained in the concluding analysis of the ‘white book’, in which shifts in the network were related to the challenges put before the network by the incorporation of the environmental issue and the question of government funding.

Problem and policy ambition → Level
From a values perspective we can expect that the way in which the problem is described has implications for the administrative level that ought to feel most responsible for the problem.
From a cognitive perspective we can expect a similar effect to occur regarding the question of what is considered to be the most suitable administrative level in the dominant paradigm, given the scale of the problems.
From a resources perspective we can expect that, for a particular problem, a certain paradigm will strengthen or weaken the relative position of administrative levels in relation to the others.

Network → Level
From a values perspective we can expect that the dominant values of the actors in the network (as opposed to their own interests) can be relevant for the distribution of governance over the various levels.
From a cognitive perspective we can expect that the dominant policy vision of the actors in the network can be relevant for the distribution of governance over the various levels.
From a resources perspective we can expect that the dominant actors in the network will also influence the distribution of governance between the administrative levels and that this distribution will be a reflection of the relative position of the dominant actors.

References

Allison, Graham T. (1971), *Essence of decision: Explaining the Cuban missile crisis*, Boston: Little, Brown and Co.

Arbetman, Marina and Jacek Kugler. (1997). *Political Capacity and Economic Behavior*. Boulder: Westview Press.

Arentsen, M.J. (1991), *Beleidsorganisatie en beleidsuitvoering*, Enschede: Universiteit Twente.

Arentsen, Maarten J., Hans Th.A. Bressers and Laurence J. O'Toole, Jr. (2000), Institutional and policy responses to uncertainty in environmental policy, in: *Policy Studies Journal*, Fall 2000 (forthcoming).

Axelrod, Robert (Ed.) (1976), *Structure of decision: The cognitive maps of political elites*, Princeton: Princeton University Press.

Barzel, Yoram. (1989). *Economic Analysis of Property Rights*. Cambridge: Cambridge University Press.

Baumgartner, Frank R., & Bryan D. Jones (1993), *Agendas and instability in American politics*, Chicago: University of Chicago Press.

Berkes, Fikret. (1996). "Social Systems, Ecological Systems, and Property Rights." in Hanna et al. *Rights to Nature*. Washington, D.C.: Island Press.

Brand, E.L.M., K.I. Hanf, and J. Lipman (1998), Policy Framework - European Union, in: G.J.I. Schrama (ed.) (1998), *Drinking water supply and agricultural pollution: Preventive action by the water supply sector in the European Union and the United States*, Kluwer Academic, Dordrecht/Boston/London, pp. 45-72.

Braybrooke, David & Charles E. Lindblom (1970 (1st ed. 1963) *A strategy of decision*, New York: Free Press.

Bressers, Hans. (1998), The choice of policy instruments in policy networks, in: B. Guy peters & Frans K.M. van Nispen (Eds.), *Public policy instruments: Evaluating the tools of public administration*, Cheltenham: Edward Elgar, pp. 85-105.

Bressers, Hans. (1993), Beleidsnetwerken en instrumentenkeuze, in: *Beleidswetenschap*, jrg. 7, nr. 4, pp. 309-330.

Bressers, Hans. (1983), *Beleidseffectiviteit en waterkwaliteitsbeleid*, Enschede: Universiteit Twente.

Bressers, Hans & Mac Honigh (1986), A comparative approach to the explanation of policy effects, in: *International Social Science Journal*, Vol. 37, No. 2, pp. 267-288.

Bressers, Hans, Dave Huitema & Stefan Kuks (1994), Policy networks in Dutch water policy, in: *Environmental Politics*, Vol. 3, No. 4, pp. 24-51.

Bressers, Hans, and Pieter Jan Klok (1988), Fundamentals for a theory of policy instruments, in: *International journal of Social Economics*, Vol. 15, No. ¾, pp. 22-41.

Bressers, Hans, en Pieter Jan Klok (1987), Grondslagen voor een instrumententheorie, in: *Beleidswetenschap*, Vol. 1, No. 1, pp. 77-97.

Bressers, Hans & Pieter Jan Klok (1987), *Een voorlopige instrumententheorie van het milieubeleid*, 's-Gravenhage: Staatsuitgeverij/DOP.

Bressers, Hans, Pieter Jan Klok, Stefan Kuks & Kris Lulofs (1988), *Handleiding instrumententheorie*, 's-Gravenhage: Staatsuitgeverij/DOP.

Bressers, Hans, Pieter Jan Klok and Laurence O'Toole (2000), *Explaining policy action: A deductive but realistic theory*, Quebec City: paper IPSA World Congress, August 2000.

Bressers, Hans & Stefan Kuks (1992), *The agricultural policy network and environmental policy*, paper presented at the European Group of Public Administration Conference 1992, Pisa.

Bressers, Hans, Stefan Kuks & Josee Ligteringen (1998), Participation at the local level in the context of environmental governance, in: Frans H.J.M. Coenen, Dave Huitema & Laurence J.O'Toole (Eds.), *Participation and the quality of environmental decision making*, Dordrecht: Kluwer, pp. 47-60.

Bressers, Hans, & Laurence O'Toole, jr. (1998), The selection of policy instruments: A network-based perspective, in: *Journal of Public Policy*, Vol. 3, No. 3, pp. 213-239.

Bressers, Hans, & Laurence O'Toole, jr. (1995), Networks and water policy: conclusions and implications for research, in: Hans Bressers, Laurence J. O'Toole, Jr. & Jeremy Richardson Eds.), *Networks for water policy: A comparative perspective*, London: Frank Cass, pp.197-217.

Bressers, Hans, Laurence O'Toole, Jr. & Jeremy Richardson (1994), Networks as models of analysis: Water policy in a comparative perspective, in: *Environmental Politics*, Vol. 3, No. 4, pp. 1-23.

Bressers, Hans, and Arthur Ringeling (1995), Policy implementation, in: Walter J.M. Kickert and Frans A. van Vught, *Public policy & administration sciences in the Netherlands*, London: Prentice hall / Harvester Wheatsheaf, pp. 125-146.

Cahn, M.A. (1995), *Environmental deceptions: the tension between liberalism and environmental policymaking in the United States*. Albany NY: State University of New York Press.

Clark, C.W. (1973). "The Economics of Overexploitation." *Science* 181:630-634.

Coase, R..(1960). "The Problem of Social Cost." *The Journal of Law and Economics* 3:1-44.

Coenen, F.H.J.M. (1996), *De effectiviteit van gemeentelijke milieubeleidspanning*, Enschede: Universiteit Twente.

Cohen, Michael, James March & Johan Olsen (1972), A garbage can model of organizational choice, in: *Administrative Science Quarterly*, Vol. 17, March 1972, pp. 1-25.

Davis, and J.P. Lester (eds.) (1989), *Environmental politics and policy: theories and evidence*. Durham NC, London: Duke University Press.

Deacon, Robert T. (1995). “Assessing the Relationship between Government Policy and Deforestation.” *Journal of Environmental Economics and Management* 28: 1-18.

Deacon, Robert T. (1994). "Deforestation, Investment and Ownership Security." Unpublished Work.

DeLeon, Peter (1999), The stages approach to the policy process, in: Paul A. Sabatier (Ed.), *Theories of the policy process*, Boulder: Westview, pp. 19-34.

Demsetz, Harold. (1975). "Toward a Theory of Property Rights." In Henry Manne (ed.) The Economics of Legal Relationships*. St. Paul: West Publishing Company*.

Dente, Bruno, Paolo Fareri, and Josee Ligteringen (1998), A theoretical framework for case study analysis, in: Bruno Dente, Paolo Fareri, and Josee Ligteringen (Eds.), *The waste and the backyard*, Dordtrecht: Kluwer, pp. 197-223.

Devlin, Rose Anne, and Quentin Grafton. (1998). *Economic Rights and Environmental Wrongs. Property Rights for the Common Good*. Cheltenham: Elgar.

Dror, Yezekel (1971), *Design for policy sciences*, New York: Elsevier.

Dryzek, John S. (1987), *Rational ecology: Environment and political economy*, Oxford: Basil Blackwell.

Dryzek, John S. (1997), *The politics of the Earth: Environmental discourses*, New York: Oxford University Press.

Ensminger, Jean, and Andrew Rutten. (1991). "The Political Economy of Changing Property Rights: Dismantling a Pastoral Commons." *American Ethnologist* 18(4): 41-57.

Etzioni, Amitai (1967), Mixed scanning: A ‘third’ approach to decision-making, in: *Public administration review*, Vol. 27, pp. 385-392.

Feeny, David. (1988).“The Development of Property Rights in Land: A Comparative Study.” In Robert H. Bates. *Toward a Political Economy of Development. A Rational Choice Perspective*. Berkeley, Los Angeles, and London: University of California Press.

Feeny, David, Fikret Berkes, Bonnie J. McCay, and James M. Acheson. (1990). "The Tragedy of the Commons: Twenty-Two Years Later." *Human Ecology* 18(1):1-18.

Fenger, H.J.M. & P-J. Klok (1998), *Interdependency, beliefs and coalition behaviour: A contribution to the advocacy coalition framework*, paper presented at University of Twente workshop, November 1998.

Fisher, Frank (1995), *Evaluating public policy*, Chicago: Nelson-Hall.

Fisher, Frank (1985), *Critical evaluation of public policy: A methodological case study*, paper IPSA World congress, Paris.

Fisher, Frank, & John Forrester (Ed.) (1993), *The argumentative turn in policy analysis and planning*, Durham: Duke University Press.

Fuchs, Doris Andrea. (1997). “Property Rights: What They Can and Cannot Do for Sustainable Development.” Paper delivered at the Annual Meeting of the American Political Science Association, Washington, D.C., August-September 1997.

Fuchs, Doris Andrea. (1996). "Economic Growth and Environmental Quality: Political, Economic, and Social Determinants of a Complex Relationship." Dissertation, the Claremont Graduate University, Claremont, California.

Furubotn, Eirik, and Svetozar Pejovich. (1975). "Property Rights and Economic Theory: A Survey of Recent Literature." In Manne (ed.). *The Economics of Legal Relationships. Readings in the Theory of Property Rights*. St. Paul: West Publishing Company.

Gordon, Scott H. (1954). “The Economic Theory of a Common-Property Resource: the Fishery.” *Journal of Political Economy* 62: 124-42.

Haigh, N. (1992), Manual of Environmental Policy: the EC and Britain. Harlow (Essex, UK): Longman.

Hanna, Susan, Carl Folke, and Karl-Goran Maler. (1996). "Property Rights and the Natural Environment." in Hanna et al. *Rights to Nature*. Washington, D.C.: Island Press.

Hardin, Garrett. (1968). "The Tragedy of the Commons." *Science* 162: 1243-1248.

Heilman, John, G. (1992), Some thoughts on using a rule-based conceptual framework for institutional analysis in water policy research, in: Hans Th.A. Bressers & Laurence J. O’Toole, Jr., (Eds.), *International comparative policy research*, Enschede: University of Twente, 1992, pp. 59-84.

Honigh, M. (1985), *Doeltreffend beleid*, Assen: Van Gorcum.

Hoogerwerf, A. (1998), Beleid, processen en effecten, in: A. Hoogerwerf & M. Herweijer (red.), *Overheidsbeleid*, Alphen aan den Rijn: Samsom, pp. 17-35.

Hoogerwerf, A. (1990), Reconstruction policy theory, in: *Evaluation and program planning*, Vol. 13, No. 3, pp. 285-291.

Hoppe, R. (1999), *De broosheid van het debat en argumentatieve beleidsanalyse*, Enschede: Universiteit Twente.

Kasper, Wolfgang, and Manfred Streit. (1998). *Institutional Economics. Social Order and Public Policy*. Cheltenham: Edgar.

Keohane, Robert and Elinor Ostrom. (1995). *Local Commons and Global Interdependence*. Thousand Oaks: SAGE.

Kingdon, John (1995 (1st ed. 1984), Agendas, alternatives and public policies, New York: Harper Collins.

Kiser, Larry, & Elinor Ostrom (1982), The three worlds of action, in: Elinor Ostrom (Ed.), *Strategies of political inquiry*, Beverly Hills: Sage, pp. 179-222.

Klok, Pieter Jan. (1991), *Een instrumententheorie voor milieubeleid*, Enschede: Universiteit Twente.

Knoepfel, Peter (1995), New institutional arragements for a new generation of enviromental policy instruments: Intra- and interpolicy cooperation, in: Bruno Dente (Ed.), *Environmental policy in search of new instruments*, Dordtrecht: Kluwer, pp. 197-233.

Kuks, Stefan. (1998), Control capacity in the Netherlands, in: Geerten J.I. Schrama (Ed.), *Drinking water supply and agricultural pollution*, Dordrecht: Kluwer, pp. 190-230.

Kuks, Stefan M.M. (1998), Policy framework in the Netherlands, in: Geerten J.I. Schrama (Ed.), *Drinking water supply and agricultural pollution*, Dordrecht: Kluwer, pp. 149-190.

Kuks, Stefan. (1987), Instrumententheorie voor effectiever milieubeleid, in: *Bestuur*, No. 8, pp. 238-241.

Libecap, Gary (ed.) . (1993). *New Learning on Entrepreneurship*. Greenwhich, Connecticut: JAI Press.

Ligteringen, Josee. (1999), *The feasibility of Dutch environmental policy instruments*, Enschede: Twente University Press.

Ligteringen, Josee. (1998 / 1996), The effects of public policies on household metabolism, in: Klaas Jan Noorman & Ton Schoot Uiterkamp (Eds.), *Green households?: Domestic consumers, environment and sustainability*, London: Earthscan, 1998, pp. 212-235 (previously paper for The Ecological State, Seville, 1996).

Lindblom, Charles E. (1959), The science of 'muddling trough', in: *Public administration Review*, pp. 74-88.

Martin, Fenton. (1992). *Common Pool Resources and Collective Action: A Bibliography*. Vol. 2. Bloomington: Indiana University.

Milbrath, Lester W. (1993), The world is relearning its story about how the world works, in: Sheldon Kamieniecki (Ed.), *Environmental politics in the international arena*, Albany: SUNY.

North, Douglass. (1989). "Institutions and Economic Growth: An Historical Introduction." *World Development* 17(9): 1319-1332.

Olson, Mancur. (1965). *The Logic of Collective Action*. Cambridge: Harvard University Press.

Organski, A.F.K, and Jacek Kugler. (1980). *The War Ledger*. Chicago: University of Chicago Press.

Ostrom, Elinor (1999), Institutional rational choice: An assessment of the institutional analysis and development framework, in: Paul A. Sabatier (Ed.), *Theories of the policy process*, Boulder: Westview, pp. 35-72.

Ostrom, Elinor. (1998). "A Behavioral Approach to the Rational Choice Theory of Collective Action." *American Political Science Review* 92(1): 1-22.

Ostrom, Elinor. (1990). *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

Pejovich, Svetozar. (1975). "Towards an Economic Theory of the Creation and Specification of Property Rights." In Henry G. Manne (ed.). *The Economics of Legal Relationships. Readings in the Theory of Property Rights*. St. Paul, New York, a.o.: West Publishing Company. pp. 37-52.

Portney, K.E. (1992), *Controversial issues in environmental policy: science vs. economics vs. politics*. Newbury Park CA , London, New Dehli: Sage Publications.

Ridley, S. (1988),*The State of the States 1987: report of the Renew America Project*. Washington DC: Fund for Renewable Energy and Environment.

Rosenbaum, W.A. (1995),*Environmental politics and policy*. Washington DC: Congressional Quaterly Press, third edition.

Sabatier, Paul A. (1999), The need for better theories, in: Paul A. Sabatier (Ed.), *Theories of the policy process*, Boulder: Westview, pp. 3-17.

Sabatier, Paul A. (1991), Toward better theories of the policy process, in: *Political Science and Politics*, June 1991, pp. 147-156.

Sabatier, Paul (1988), An Advocacy Coalition framework of policy change and the role of policy-oriented learning therein, in: *Policy Sciences*, Vol. 21, fall, pp. 129-168.

Sabatier, Paul A. & Hank C. Jenkins-Smith (1999), The advocacy coalition framework: An assesment, in: Paul A. Sabatier (Ed.), *Theories of the policy process*, Boulder: Westview, pp. 117-168.

Sabatier, Paul A. & Hank C. Jenkins-Smith (1993), Policy change and learning: An advocacy coalition approach, Boulder: Westview.

Sandler, Todd. (1992). *Collective Action. Theory and Applications*. Ann Arbor: The University of Michigan Press.

Scharf, Fritz W. (1997), *Games real actors play: Actor-centred institutionalism in policy research*, Boulder: Westview.

Schlager, Edella, and Elinor Ostrom. (1992). "Property-Rights Regimes and Natural Resources: A Conceptual Analysis." *Land Economics* 68(30: 249-62.

Schön, Donald A. (1983), *The reflective practitioner: How professionals think in action*, New York: Basic books.

Schön, Donald A., & Martin Rein (1994), *Frame reflection: Toward the resolution of intractable policy controversies*, New York: Basic Books.

Schrama, Geerten J.I. (ed.) (1998), *Drinking water supply and agricultural pollution*, Dordrecht: Kluwer.

Schwarz, Michiel, & Michael Thompson (1990), *Divided we stand: redefining politics, technology and social choice*, New York: Harvester Wheatsheaf.

Simon, Herbert A. (1997 / 1st ed. 1945), *Administrative behaviour*, New York: Free Press).

Stubblebine, W. Craig. (1975). "On Property Rights and Institutions." In Henry G. Manne (ed.) *The Economics of Legal Relationships. Readings in the Theory of Property Rights*. St. Paul, New York, a.o.: West Publishing Company. pp. 11-22.

Thompson, Michael, Richard Ellis & Aaron Wildavsky (1990), *Cultural theory*, Boulder: Westview Press.

Vries, Michael S., Het idee van beleidsgeneraties, in: *Beleidswetenschap*, Vol. 13, No. 3, pp. 207-231.

Williams, B. A., and A.R. Matheny (1995), *Democracy, Dialogue, and Environmental Disputes. The Contested Languages of Social Regulation.* New Haven and London: Yale University Press.

Windrum, Paul, and Chris Birchenhall. (1998). “Is Product Life Cycle Theory a Special Case? Dominant Designs and the Emergence of Market Niches through Coevolutionary-Learning.” *Structural Change and Economic Dynamics* 9: 109-134.

Yin, R.K. (1994), Case study research: design and methods, Thousand Oaks: Sage.

Zahariadis, Nikolaos (1999), Ambiguity, time, and multiple streams, in: Paul A. Sabatier (Ed.), *Theories of the policy process*, Boulder: Westview, pp. 73-93.