



# Society, Systems and Environmental Objectives

A discussion of synergies, conflicts  
and ecological sustainability

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and ecological sustainability*

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## FOREWORD

The efforts to achieve ecological sustainability are becoming an increasingly central issue. Much time and effort is being expended on improving the environment in many countries. The Swedish parliament adopted national environmental quality objectives and accompanying sub-objectives in autumn 2001. Efforts to realise these objectives are currently in progress at various government agencies. A key element of these efforts is to monitor and evaluate their success. The Swedish Environmental Protection Agency has a particular responsibility here.

This report, which is a revised translation of the original Swedish version, provides a systematic overview and analysis of problems in achieving the national environmental quality objectives, the aim being to illustrate the key factors for achieving ecological sustainability. Conflicts between environmental objectives and other welfare aims in society represent obstacles, but environmental policy and protection is made much easier where objectives overlap. This report aims to identify problems, not to solve them. The basic approach is that of systems theory, using concepts derived both from mathematics and the social sciences.

The report is intended to be used in the ongoing process of achieving the environmental objectives. It is primarily intended for those engaged in evaluating and analysing achievement of the objectives, and may also serve as background material for research. The report may also provide others who are interested in the subject with information about obstacles and opportunities in the efforts being made to create a better environment, the achievement of which is crucial to the common good.

The report has been written by Stig Wandén. Several members of staff at the Swedish Environmental Protection Agency have contributed constructive criticism and valuable comments.

Stockholm, March 2003  
Swedish Environmental Protection Agency



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## Abstract

The purpose of this paper is to present a systematic overview and analysis of problems involved in achieving Sweden's national environmental objectives, so as to shed some light on factors essential to achievement of ecological sustainability. The thrust of the paper is to identify problems rather than solve them. The basic approach is systems analysis, including Luhmannian concepts such as communication and resonance.

The analysis assumes that management by objectives has been introduced as a principle of governance for the entire Swedish government administration, which implies that the state sector can be understood as an objective-oriented decision system. However, a number of problems arise. *Firstly*, the aims of various government activities vary widely. Thus, some objectives such as full employment and economic growth are dealt with by the government itself, whilst others either concern specific activities managed by individual agencies or encompass most or all government activities. Examples of the latter are environmental objectives and equality of the sexes. A final group of objectives are "procedural" objectives such as efficiency, transparency, and legality, all of which concern the way activities should be performed. *Secondly*, the environmental objectives are poorly structured, some dealing with emissions, others with various states of the environment, and yet others with the use of natural resources. *Thirdly*, and as a consequence of the first two factors, it is difficult to systematically identify the potential conflicts and synergies between differing government aims, including its environmental objectives. However, a systematic overview suggests that conflicting objectives are mainly caused by increases in the volume (quantity) of various activities (measured in physical or monetary terms) while synergies between objectives tend to result when activities are implemented more efficiently. There has so far been very little research into this hypothesis. It is proposed that the hypothesis be tested in specific individual cases rather than by abstract macro analyses.

**Key terms:** Environmental policy, goalconflicts, synergy, dilemma, sustainable development, system theory, management by objectives, sectoral integration.

# 1. Introduction and purpose

The efforts to achieve our environmental objectives are becoming an increasingly central issue. Many countries are devoting much time to this issue and have to varying degrees studied and evaluated various aspects of achieving environmental objectives. The aim of this paper is to more systematically discuss the interplay between environmental objectives and other societal welfare objectives: synergies, conflicts and dilemmas in the process of achieving environmental objectives. The result is a definition of the problem of whether sustainable development is possible.

Systematic discussions of the complicated issues concerning objectives from a social science perspective must have a well-structured basis. We have chosen a systems theory approach, which provides an overall view of the quantity of factors to be considered and the complicated interrelationships between them. Help can also be derived from ongoing systems research and its findings. However, this paper does not constitute an independent evaluation, nor is it intended to provide new empirical knowledge. The aim is instead to provide a new and clear picture of existing knowledge.<sup>1</sup> We have thus based our study of potential synergies and conflicts between the national objectives on a review of existing documents: government finance bills, environment bills, and reports published by the Swedish Environmental Protection Agency and other government agencies.

The overview leads to the hypothesis that conflicts between the aims of environmental policy often result because various human activities assume such proportions that they threaten the environment in various ways, whereas synergies may arise when these activities are performed more efficiently, using fewer resources. This hypothesis may be a firm basis for analysing the much-discussed issue of ecological modernisation, i.e. the extent to which it is possible without excessive sacrifice to move society in the direction of ecological sustainability: can more efficient environmental protection counter the effects of increased production and consumption?

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<sup>1</sup> The American philosopher Charles Sanders Peirce differentiates between three kinds of scientific method: deduction, whereby the mathematician draws conclusions from given premises or axioms; induction, which involves generalising on the basis of a limited number of observations; and abduction, which involves viewing known facts in a new way, from a new perspective. This paper represents a form of abduction.

The paper begins with two introductory sections dealing with governance (section 2) and also the chosen analytical method, i.e., systems theory (section 3). This is followed by two sections on national objectives, first covering the state sector as an objective-oriented system (section 4), and then focusing on environmental objectives in particular (section 5). We then discuss conflicting objectives and synergies between environmental objectives and other welfare objectives (section 6). Finally, we draw some conclusions as to issues to be examined in future evaluations (section 7).

## **2. Management of government agencies by results**

The first of the two introductory sections sets out the basis for the project, i.e. how government agencies are run. Essentially, there are two ways of presenting this. The first is to describe the formal decision-making process, based on delegation of powers by government, which relates to the state budget and the objectives laid down there. Objectives, responsibility, control, monitoring and rationality are key words here. The other approach is to describe the actual decision-making process and forms of joint operation followed by government agencies and others in practice. The key words include interests, coordination, networks and social psychology.

Both formal responsibility structures and informal forms of cooperation are needed in practice. In this background section we confine ourselves to the current formal system of governance as a basis for discussion of the national environmental objectives. Future evaluations should also examine the informal forms of cooperation.

Thus, parliament and the government have decided how government agencies are to be managed. Essentially, this means that politicians decide what should be done, while the agencies are given responsibility for detailed implementation. This is usually called “management by results”. It is thus a way of achieving democratic government in a complex society. Elected politicians indicate the direction to be taken without needing to master the difficulties of implementation. The Swedish social system,

which makes use of independent public agencies, is considered well suited to decentralised decision making of this kind.

To be precise, parliament and the government have decided that all government agencies should be managed by being given objectives, which the agencies responsible must then achieve within the constraints of the resources allocated to them. The government calls this “governance using objectives and budget constraints in an operational structure”. Hence, the state budget is divided into public spending sectors, which in turn comprise policy areas, operational areas and operational divisions. In most cases, policy areas, operational areas and operational divisions are given long-term objectives and budget constraints. Because agencies are given greater operational responsibility, they are also better able to utilise the scope for rationalising their work and using their money more efficiently. The aims of the reform allow parliament and the government to check that their intentions are being put into practice, since the activities of government agencies are monitored and evaluated. Detailed control over the activities of these agencies in the form of expense appropriations and salary appropriations is then not necessary.

The government has also emphasised that the state sector covers a large number of activities and commitments, whose purpose, character and premises vary. Management by results must therefore be adapted to meet varying requirements, or, as the government puts it, “be operationally adapted”. One interesting issue is the extent to which the criteria for management by results have been met in the case of environmental protection, and what happens when they are not.

Management by results presupposes that politicians formulate objectives – and also explain and specify them – and that agencies then implement them. The system is based on the assumption that achievement of the objectives will be monitored and evaluated. This may in turn result in new, more realistic objectives or more effective efforts to achieve the stated aims.

In the environmental field, the distinction between the role of political bodies and that of public agencies means that a distinction can be

drawn between environmental policy and environmental protection. *Environmental policy* is about striking a balance between environmental objectives and other societal goals; *environmental protection* is about the best way public agencies, municipalities and others can achieve the environmental objectives. Likewise: the introduction of new environmental instruments (environmental laws, environmental taxes and the like) determines the level of environmental ambitions and therefore forms part of environmental policy, whereas their use constitutes environmental protection. Hence, the task of the Swedish Environmental Protection Agency is environmental protection. But the government also expects the agency to examine conflicts between environmental objectives and other societal aims as a basis for political decisions.

### **3. Methods**

In the second introductory section we present the basic terminology we have used to make an analysis of the multitude of government objectives. A fruitful way of discussing objectives and governance is to use a systems approach, based on the emergent systems theory. Briefly, the theory involves describing and analysing complicated areas in their *entirety* in a *systematic* way: “whole” and “system” are thus key terms in this context. The approach appears to be rewarding, particularly in the environmental field, with its varying interconnections with society and nature, and to the formulation of political objectives, their achievement and monitoring and evaluation of it. It is also possible to make use of existing research findings in the field of systems theory when discussing key aspects of environmental policy and protection.

Much has been written about systems theory, but a schematic distinction can be drawn between two kinds of theory: mathematical systems theory and social systems theory.

### 3.1 *Mathematical systems theory*

This theory has its roots in mathematics and computer science, and forms the basis for the entire systems approach. A system consists of elements and the relationship(s) existing between them. The *state* of a system is the sum of the values of the elements and relationships at a given moment. The *development* of a system is the change in its state over time.

Systems can hardly include everything. It is therefore important to clearly delineate systems, particularly interpreted ones. This means that every system has *surroundings*. The interplay between systems and their surroundings may determine how a system works. For example, to understand how an ecosystem works, it is necessary to know how it (both the system itself and its elements: plants and animals) interacts with climate, watercourses, topography and other factors in the surroundings.

The systems, their elements and relationships may have differing characteristics. In mathematical systems theory these can often be expressed in mathematical terms. Some characteristics are essential, particularly to environmental protection and policy:

- A system is *self-organising* if it is able to change its state by itself. Example: a living ecosystem.
- A self-organising system is *resilient* insofar as it does not lose its characteristics following disruption. A further condition often added is that it should retain the quality of adaptability (learning). Note that resilience is not necessarily desirable: polluted waters and dictatorships can be resilient. But if a system is resilient in a good sense, it is said to be *sustainable*. One interesting question is whether ecosystems, for example, have one or more routes of sustainable development.
- The characteristics of a system (relationships) may be *additive*, i.e., if each element or sub-system in the system has a characteristic, the entire system may be said to possess that characteristic. For example, if all activities in a society are environmentally friendly, the entire society will be environmentally friendly. *Non-additive* characteristics only concern individual elements or sub-systems: even if all companies are profitable, the socio-economic sector as a whole cannot be said to be

profitable. Other characteristics are termed *emergent* (or *holistic*) if the system alone, but not its elements, is able to possess them, e.g., to be in a state of equilibrium.

- A system is *controllable* if an actor is able to influence it as he wishes by changing its state. Example: an economy is (at least partly) controllable, but the question is whether an ecosystem can be influenced as desired. The more an actor can influence a system, the more controllable it is.

Some emergent characteristics of systems are important to our analysis. A system may be more or less *complex*, which may be of interest, particularly for environmental protection, which strives to achieve sustainable systems. There are several definitions of this characteristic, e.g., that the complexity of a system is the length of the shortest description of that system (the longer the description, the more complex the system), or that the uncertainties in a system are a measure of its complexity, or that a system is complex if it is non-linear and unpredictable. Generally speaking, a system is less controllable the more complex it is, which thus makes it more difficult to influence using various instruments to achieve sustainability.

Another characteristic of systems is that they can often be seen on different *scales*, i.e., they can be broken down into sub-systems, which can themselves be broken down in this way. The scales may be functional, geographical and temporal. The scale on which a system is studied is important, particularly when analysing complexity and controllability. This is because the passage of time may vary from one scale to another: slow-moving structural phenomena may be combined with more rapid local ones. Systems theory emphasises the point that decentralisation may be one way of dealing with complexity, something environmental protection, in particular, makes use of.

A third important emergent characteristic is whether the system *encompasses the observer*. Thermodynamic systems, for example, do this; their characteristics sometimes depend on how they are observed (Heisenberg's uncertainty principle thus states that characteristics of particles are affected by being observed: if the velocity of particles is measured, it is not possible to state their position and if their position is measured, it is not possible to measure their velocity). In this case the observer is an important part of

the system. Another example is that an evaluator can constitute an active part of evaluated social systems; in this way the systems may be learning. In other cases an observer is of course not a part of the system, whether it can be affected (e.g., chemical processes), or cannot be affected at all (the movements of the planets in the solar system).

A fourth emergent characteristic of systems is their *orientation*. For example, *input-output systems* show how matter or energy enters the system and then leaves it. Systems are often described this way in physics. *Goal-oriented systems* state how the system is trying to achieve one or more objectives. These systems may be maximising (a company may be said to be maximising profit), determinative (with rules for how the elements should behave or be affected to result in the “best” decisions in some sense) or self-organising (an ecosystem may be said to strive to survive and achieve a balance between the species belonging to it). As we have seen, the state sector is now objective-oriented, and may be described as a goal-oriented decision system.<sup>1</sup>

### 3.2 *Social systems theory*

Social systems theory is rooted in political science, as well as such diverse fields of research as economics and structuralist linguistics. It is less often expressed in mathematical terms, but is ultimately based on the concepts of mathematical systems theory. There are parts of economic theory in particular to which these concepts apply. Examples include macroeconomic theory, which addresses the emergent characteristics of an economy: equilibrium, stability and growth. Nowadays it is popular in a number of the social sciences to describe society as a dynamic and complex system that is in a state of constant imbalance – but this is usually a general view, not the result of quantified analyses. Elsewhere in the social sciences mathematical systems theory is considered to be too narrow to encompass all characteristics of human behaviour.

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<sup>1</sup> This is not self-evident. Vedung and Román (2002) perceive the public sector as an input-output system, which may be fruitful when attempting to give a more detailed description of the way the sector works. Seeing the state as a goal-oriented system has the advantage of drawing attention to the objectives governing activities and how they work. A deeper question also arises: how should concepts such as “objectives” and “moral value”, such as “state” and “individual” be defined? But an examination of the fruitful complications resulting from a discussion of these terms lies outside the scope of this paper.

Clearly, social theories are not uniform. A common view (represented with particular clarity by Niklas Luhmann, a German political scientist) is that society consists of a large number of entirely disparate sub-systems, each possessing its own characteristics and terminology: bureaucracies, legal systems, industry, agriculture, universities... According to Luhmann, there is no uniform idea behind this profusion of differing societal sub-systems. In other words, there is no single exclusive view of society, particularly not from an ecological perspective. This is because the sub-systems are self-organising (see above), i.e. they each develop their characteristics and forms of behaviour. Luhmann considers this is because *communication*, which is the central relationship in a social system, develops differently in different sub-systems, which limits the *resonance* between them. Another explanation is that individuals behave differently in different situations and thereby create diverse social systems.

There has been much debate about the interplay between systems and actors. Systems issues currently in the spotlight are socio-economic mechanisms (where political opinions differ) and what constitutes a “fair” distribution of national and global welfare. Issues of this kind are clearly relevant to environmental policy and protection.

The part played by individuals in social systems is also an important issue, particularly in relation to environmental protection. Some Marxist theories, in common with Luhmann’s earlier theories, argued that individuals play very little part or no part at all, where sub-systems live their own lives. Hence, Marxist theories considered the relationships between the classes to be the crucial issue. But other theories ascribe individuals with great scope for influencing and changing social systems, e.g., by influencing their own behaviour and that of others by way of information and their own actions. Various forms of “social constructivism” exemplify this view. Luhmann, too, subsequently concluded that individuals play a major part. One way in which this is manifested is the fact that sub-systems are not unequivocally determined; they depend on how individuals interpret and behave in them.

The term “controllability” is naturally of interest here. It relates to actors: actors can control an activity if they can change it as they wish. A key issue

for environmental protection thus concerns the extent to which actors in various roles can ensure better fulfilment of environmental objectives. When is this possible and when do factors that are impossible or difficult to influence render it impossible?

### 3.3 *The implications for achievement of environmental objectives*

As may be seen above, many of the concepts of systems theory can be used to specify environmental problems of various kinds. This section deals with some further examples of this, before the analysis proper begins in the following sections.

In environmental policy, which involves weighing up environmental objectives with other societal goals, it is necessary to differentiate between synergies and conflicting objectives in objective-oriented social systems. *Synergy* prevails between two actions resulting in the same objective. *Conflict* prevails between two actions where one achieves an objective that is counteracted by the other.<sup>3</sup>

An example of synergy is where a company saves money by saving energy: environmental objectives and profitability go hand in hand. More generally, it is sometimes argued that better environmental technology could give Swedish industry a competitive edge.

An example of conflicting objectives is that between regional development policy (whose objective is “effective and sustainable labour market regions with a good level of service throughout the country”) and environmental policy. For geographical reasons the north of Sweden needs more energy than the rest of the country, not only for heavy industry (mining ironworks, pulp mills), but also for domestic heating and travel. There are therefore environmental reasons for energy taxes of various kinds to limit energy consumption in the north. But regional policy considerations also dictate that industry in the north should be favoured and individuals and companies encouraged to move there. And this is in fact what happens:

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<sup>3</sup> The term “conflict” is analysed in greater detail in Wandén, *Målkonflikter och styrmedel* (“Conflicting objectives and instruments”).

state transport subsidies, investment grants of various kinds and lower rate energy taxes are used to stimulate regional development. But, in their present form, these incentives can often work to the detriment of environmental objectives (one exception being grants for environmental investments). Thus, in this case the aims of regional policy have taken precedence over environmental objectives.<sup>4</sup>

Conflicts between objectives may be resolved with varying degrees of ease. Some conflicts may quite simply be due to inefficiency: a poorly designed management system or inefficient use of resources. But they can also be solved by using better technology, e.g., better treatment technology to reduce emissions or more environmentally friendly products. Conflicts that cannot be solved within a reasonable space of time with the help of improved efficiency or better technology are called true conflicts of objectives – they are thus the most difficult to resolve.

One particular form of conflict is a *dilemma*, which cannot be resolved by compromise: one must either choose one or the other objective (action). In this sense dilemmas may be said to be insoluble. One example of a dilemma is the choice between being a vegetarian and being a meat-eater. One must either renounce the idea of killing animals for food or accept it. Those who only accept the idea from time to time have rejected the first alternative. But in most cases it is normal to compromise in conflicts: part of each objective is accepted. One example is to drop the aim of full employment and accept a certain rate of inflation – if the choice is between full employment and low inflation. We use the term “conflict” below in cases of compromise (when it is a question of *more* or *less*) and “dilemma” when it is not possible to compromise (when it is a question of *either/or*). The distinction has been found to be important when considering the balance between various objectives (see section 7).

It is also necessary to differentiate between *potential* and *actual* synergies, conflicts and dilemmas. Example: a potential conflict exists between the

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<sup>4</sup> On the other hand, *Långtidsutredningen 2003*, Appendix 11: *Fördelningseffekter av miljöpolitik* (“The effects of environmental policy on wealth distribution”) gives examples of adverse effects of environmental policy measures on regional development.

various objectives of forestry policy since an area of forest can be used for either of two purposes: to maximise production or to conserve biological diversity. But sometimes environmental considerations are so limited (covering small and peripheral key biotopes) that they do not impede production, and there will then be no conflicting objectives. In other instances clear-cut areas pose a threat to biodiversity.

It is particularly when we face conflicts and dilemmas that the identity of the actors who make decisions becomes important (with synergies everyone wants the same thing and this issue is then of less importance). When is it the central, regional or local authorities that will decide how conflicts are to be resolved? State or private actors? On what scale are various environmental problems easiest to resolve? The division of responsibility and tasks in the state system occupies centre stage. As mentioned above, a precept of systems theory is that complex systems that are difficult to control should be split up into sub-systems so that decision making is decentralised.

The term “learning system” is central in this context. It is a question of the way organisations – via the actors of which they consists – are adaptive and learn, either from their own experience or from the general increase in human knowledge. Here, systems observe themselves, which enables them to become self-organising. The easier systems find it to learn and adapt to new situations, the more resilient they are. This issue is obviously important to achievement of environmental objectives, where those responsible must learn from any shortcomings and remedy them in the future. Monitoring and evaluation is a necessity for a learning organisation.

## 4. The state sector as a goal-oriented system

After the above two introductory sections, this and the following section will examine the way the systems approach can be used to analyse the approach to environmental objectives. We base our analysis on the assumption that the state sector is the relevant system. Using systems theory concepts from the two kinds of systems theory, the following applies:

- (I) the state sector comprises one system;
- (II) the system's sub-systems are activities;
- (III) the system's elements are actors;
- (IV) the system is governed by legal, social, economic, institutional and other rules;
- (V) each activity has one or more objectives (operational objectives);
- (VI) the most important relationship or driving force in the system is the actors' efforts to achieve the objectives;
- (VII) these efforts are manifested in various ways (central instruments, planning of various kinds, involvement of individual actors).

Using our delineation, the state sector has activities as sub-systems and actors as elements. The activities are the contents of the state budget. As mentioned above, they are split up into public spending areas, policy areas, operational areas and operational divisions. The actors are people, or, more accurately, people in their role as parliament, government and government agencies, amongst other things.

The "state sector" system should be seen in the light of its surroundings. The state sector is thus part of the public sector, which, together with the private sector, makes up society. Society's surroundings are the environment. A distinguishing feature of the operational objectives (including the environmental objectives) in the state sector is that they apply not only to that particular sector but often its surroundings as well. For example, the efforts to achieve the environmental objectives involves influencing the interplay between the state sector, the rest of society and the environment, whereas the aims of the legal system apply to society as a whole. Thus, the state sector often operates outside itself.

It is essential to differentiate between the volume and content of

government activities. “Volume”, i.e. the extent of activities, can be measured in money (turnover or appropriation), or in physical terms (man-hours, transported quantity/transport distance, sales volume and so on). “Content”, i.e. the way operations are run, may be expressed in various ways: in terms of their purpose, rules governing the way activities are to be conducted, approach (e.g., degree of centralisation), technical level equipment and its performance) and so on. For example, road traffic in 1999 – measured in physical terms – totalled 97.6 billion person kilometres (passenger transport) and 32.8 billion tonne kilometres (goods transport) (*volume*), whereas the objectives for the operational divisions of the National Road Administration were an accessible transport system, high-quality transport, transport safety, a good environment, positive regional development and – related to those objectives – implementation of investments and improvements in the national trunk road network, development of road traffic management and efficient operation of the national road network (*content*). Content in particular is described in considerable detail in the appropriation directive and in even greater detail in the National Road Administration’s own plans.

An overview and analysis of the extent to which many state objectives may be affected by efforts to achieve environmental objectives requires that they be broken down, which can be done in a number of ways. At first glance, it may seem appropriate to divide them up either on the basis of some aspect of their content, for example according to whether they concern people, companies, justice, environment or the like, or on the basis of their scope: society as a whole, the state, one or two sectors, municipalities and so on. But an objective breakdown of this kind faces the difficulty that many state objectives merge with one another and overlap in terms of both content and scope. Instead we have chosen a more formal, organisational basis for our breakdown, i.e., according to who is responsible for the objectives. Hence, a fruitful, albeit not mathematically exact, way of breaking down the state’s operational objectives is to split them up into *system objectives*, which are dealt with by the executive and under the state budget as a whole, *production objectives*, which are dealt with by one or a limited number of agencies, *consideration objectives*, which are dealt with by many or all agencies, and *process objectives*, which govern the way government activities are to be performed. These various objectives are outlined below.

a) *System objectives*

These essentially comprise the objectives of economic policy. They are emergent and apply to society as a whole, although not its elements. The overall aim of economic policy is full employment and increased welfare as a result of good and sustainable economic growth. According to the 2003 Finance Bill, sound public finances, stable prices and an effective wages structure are fundamental to achievement of these aims. Other economic and political objectives are intended to further these aims: fair distribution of wealth and regional development. Hence, there should be a two per cent surplus in the public finances over an economic cycle, which means that public spending must not exceed the budget cap. Spending on areas such as health and medical care, social welfare, interest rates on government bonds, foreign aid and environmental protection must therefore be restricted.

b) *Production objectives*

Each production objective is dealt with by one or a few agencies. They relate to individual activities in society, within the public sector, within the state or within the private sector. These include “traditional” objectives for areas such as *forestry* (which has both a production objective and an environmental objective), *food policy* (which is intended to bring about ecological, economic and socially sustainable food production, which should also be driven by demand: production by agricultural enterprises and food manufacturers should be determined by consumer demand), *trade and industry* (“promote sustainable economic growth and increased employment via more companies and expansion of existing ones”), *rural policy* (ecologically, economically and socially sustainable development of rural areas, including employment and growth), *consumer policy* (with the five objectives of consumer influence, good management of resources, safety, good environment and well-informed consumers), *housing policy* (essentially that everyone should have the opportunity to live in good quality housing at a reasonable cost and in a stimulating housing milieu within sustainable boundaries), *defence* (preserve the country’s peace and independence), *transport and communications* (where the aim of transport policy is to assure socio-economically efficient and sustainable supply of transport services for the people as well as trade and industry throughout the country, which

involves sub-objectives such as an accessible transport system, high-quality transport, transport safety, positive regional development and a good environment, and where each operational area, such as roads, railways and so on also has its own objectives) and *energy* (particularly “in the near and long term to assure the availability of electricity and other energy on terms that are internationally competitive”). Government agencies’ own operations further these objectives, while at the same time government policy within each area normally concerns society as a whole.

Production objectives can also be considered to include objectives for activities outside the state sector that receive funding from the state, for example in the form of foreign aid, general grants to municipalities (“good and equal potential for municipalities and county councils to achieve national objectives in various operations”), enterprise grants and tax reductions.

*c) Consideration objectives*

These are dealt with by many or all agencies and comprise objectives extending over several government (or other) areas. Examples include objectives in the policy areas of environment, occupational health and safety (including “an occupational environment with good working conditions”), equality of the sexes (“men and women should have the same opportunities, rights and obligations in all areas of life”) and integration policy (including equal rights, obligations and opportunities), a social community with social diversity as a basis, together with mutual respect and tolerance). The consideration objectives primarily concern individual operations, but if all government activities meet an objective of this kind, the state (and society) as a whole may be said to have fulfilled the objective. Consideration objectives are thus additive. Environmental objectives also form part of the production objectives of many agencies, which means that the national environmental quality objectives can be regarded as consideration objectives.

*d) Process objectives*

These concern the way government activities should essentially be conducted: efficiently, upholding the rule of law, with necessary consultations, with transparency, and using democratic forms. Process

objectives mainly concern individual government activities, but may be additive in a figurative sense, i.e. be said to be fulfilled throughout the state if they are fulfilled in each activity. These objectives also apply to the division of responsibilities between parliament, the government, central agencies and regional and local authorities. The objective of the policy area of regional social organisation is that counties should develop so that the national objectives have an impact, account also being taken of varying regional conditions and potential. Among other things, county administrative boards should have overall responsibility for regional achievement of objectives and monitoring of same, and should perform this work in a dialogue with municipalities, trade and industry and other actors. But municipalities are also independent in essential respects: they have an independent right to levy tax, budget responsibility and a planning monopoly.

Thus, our organisational breakdown of the state's objectives concerns the identity of those responsible for them, but it is fruitful insofar as it links those objectives to other characteristics. This may be seen from Table 1.

*Table 1* Various kinds of state objectives

<b>System objectives</b>	<b>Production objectives</b>	<b>Consideration objectives</b>	<b>Process objectives</b>
Parliament and the government have main responsibility	One or a few agencies are responsible	Many agencies are responsible, sometimes with an imprecise division of responsibility	Concern all agencies, which are each responsible for their own operations
To be realised by government activities as a whole	To be realised by "mature" government activities	To be realised by relatively "immature" government activities	To be realised by each government activity
Concern society as a whole, not its parts (emergence)	Concern individual operations in the system and are not normally additive	Concern individual operations in the system, but are additive	Concerns individual operations in the system, but are additive
Concern society as a whole, but normally not defined target groups	Have fairly clearly defined target groups	Have fairly imprecise target groups	The agencies themselves are the target groups
Are often formulated in terms of resources, but without budget constraints	Have budget constraints	Do not normally have budget constraints	Do not normally have budget constraints
Economic categories: the entire state budget	Economic categories: consumption and investment, as well as transfers	Economic categories: consumption and some investment, as well as a limited number of transfers	Economic categories: not relevant (concerns all categories)

The various objectives differ in more respects than the table shows. As we have suggested, system objectives are often quantifiable and can be expressed in mathematical terms, whereas production objectives relate to individual activities operating under differing conditions. In this sense they resemble Luhmann's disparate sub-systems. But as we will see, a number of agencies are also charged with the task of furthering system objectives. Consideration objectives operate differently from production objectives and therefore also exemplify the idea that there is no uniform perspective for the state as a whole. Process objectives concern the way actors at the agencies should behave (cooperate, uphold the rule of law, be clear and the like) and thereby indicate the importance of individual actors in the systems. They also concern the theoretical division of responsibility between various levels of the state administration.

There may be cause to refine or modify Table 1, which is fairly general. In section 6 we suggest how to proceed and describe various characteristics of the state's operational objectives using the concepts of the systems approach.<sup>1</sup> But before this, the way the environmental objectives have been formulated is discussed in the next section.

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<sup>1</sup> Much definition and clarification is still needed. The objectives of the legal system may seem additive (if each government activity is conducted in accordance with the law, the state as a whole can be considered to operate within the law). But it is conceivable that the objectives of the legal sector are process objectives (everything should be done in accordance with the law), whereas various sub-objectives (for the prisons service, the police service etc) are more like non-additive production objectives.

## 5. Environmental objectives

To proceed with the systems approach in relation to the environmental policy area, we discuss various characteristics of the objectives in that sub-system. Not only are there many environmental objectives (15 of them); they also focus on five factors when it comes to formulating sub-objectives. The factors, summarised in Table 2, are as follows.

*Use of natural resources:* as an example, the use of land and water should not cause any adverse consequences.

*Production of plans or action programmes:* there should be an action programme for water by 2009, for example.

*Emission levels:* One example is that waterborne nitrogen emissions south of the Åland Sea are supposed to fall by 30 per cent between 1995 and 2010. We also include introduction of plants and animals here.

*Effects on humans:* One example is that the number of people exposed to disturbing traffic noise is supposed to fall by 5 per cent between 1998 and 2010.

*Environmental state, load or concentrations:* for example, at least 12,000 hectares of wetlands and small bodies of water should be established or restored in agricultural areas by 2010, and the trend towards increased acidification of forest soils should be reversed prior to this.

*Table 2* Factors on which the sub-objectives of the various environmental quality objectives are based (*Sources: Environment Bill 2000/01:130 and Climate Bill (2001/02:55)*)

<b>Objective factors/ Environmental quality objectives</b>	<b>Use of natural resources</b>	<b>Production of plans or programmes</b>	<b>Emission levels</b>	<b>Effects on humans</b>	<b>Environmental state, load or concentrations</b>
Reduced climate impact					X
Clean air			X		X
Natural acidification only			X		X
A non-toxic environment		X		X	X
A protective ozone layer					X
A safe radiation environment		X	X	X	X
No eutrophication		X	X		
Sustainable lakes and watercourses		X	X		X
High-quality groundwater		X			X
A balance marine environment, sustainable coastal areas and archipelagos	X	X	X		X
Flourishing wetlands	X	X			X
Sustainable forests	X	X			X
A varied agricultural landscape	X	X			X
A magnificent mountain environment	X	X			X
A good urban environment	X	X		X	X

Sub-objectives such as environmental state, load or concentrations may be seen as a main objective and the other objective factors as means, or sub-objectives, on the route to achieving that objective.<sup>1</sup>

To elaborate and add some detail to the discussion of management, Table 2 can be used as a basis for classifying the sub-objectives under the national environmental quality objectives according to their part of the system (sub-systems, elements, relationships or surroundings) that they are intended to influence and change:

*Table 3* The purpose of various sub-objectives

Type of sub-objective:	Intended to change:
Use of natural resources	The interplay between activities and the surroundings
Production of plans or programmes	Instruments within the "public sector" system
Emission levels	Activities in society (production) and the behaviour of actors (consumption)
Effects on humans	The impact on humans of activities and actors (human health)
Environmental state, load or concentrations	The surroundings

This argument illustrates how environmental protection endeavours to influence and change so that the environmental objectives are achieved. The sub-objectives in the "public sector" system are designed to change its various parts and – ultimately – the surroundings. Hence, we want to change the parts of the system (activities/operations), elements (actors' behaviour) and relationships to achieve the desired results in the surroundings/environment and for that matter in the health of actors as well. The table can be used to identify the factors that make environmental protection easier and those that make it more difficult.

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<sup>1</sup> Table 2 shows that the structure of Swedish environmental objectives is unclear. It would have been more systematic to divide the objectives up so that the sub-objectives focus on the more operative factors "use of natural resources" and "emission levels", whereas "environmental state, load or concentrations" could fall under specification of the national environmental quality objectives. As may be seen, the systems approach can be used to improve the structure of the objectives.

## 6. Potential conflicts and synergies between objectives

As explained earlier, the driving force behind all goal-oriented decision-making systems is the desire to achieve the objectives. The way the objectives work and the links between the various kinds of objectives – system objectives, production objectives, consideration objectives and process objectives – should therefore be examined in greater detail to see how they can interact. Issues of interest are the main potential conflicts and synergies between measures intended to achieve the four kinds of objective – dilemmas are discussed in section 7 – and whether any pattern can be discerned. It is possible to propose a few hypotheses that are worth trying out. Note that we are discussing conflicts and synergies between environmental objectives and other societal objectives, i.e. “external conflicting objectives”. “Internal conflicting objectives” between various environmental objectives are being reviewed by the Council on Environmental Objectives. We discuss the situation for each of the four groups of state objectives in turn.

### *a) System objectives*

It should be borne in mind that these objectives fall under central government and the state budget as a whole, unlike production objectives, which are dealt with by one or a limited number of agencies, and consideration objectives, which are dealt with by many or all agencies. But as we have mentioned, individual agencies have been assigned the task of working to achieve system objectives in several instances. A production objective of trade and industry policy is to further the system objective of “sustainable economic growth” and increased employment, i.e., more enterprises and expansion of existing ones. Forestry policy is intended to further the aims of economic policy, employment policy and regional policy. Food policy and rural development policy have similarly structured objectives. The production objectives of transport policy include accessibility and high-quality transport, but there are also system objectives such as fairness, welfare, employment and regional development. Consumer policy has no explicit system objective, but the system objectives “increased welfare” and “fair distribution of wealth” can be considered to apply to consumption as

well, since disadvantaged groups in society consume relatively little. The interplay between system objectives and production objectives is discussed in further detail below.

System objectives are often weighed up against both production objectives and consideration objectives in the annual budget process. The total cost of government activities must not be too great, since this may result in socio-economic imbalance. Issues such as these are obviously central to economic policy. There is a more far-reaching potential conflict between system objectives and environmental objectives in that the general aim to achieve full employment may involve increased industrial activity, transport and waste quantities, which may make environmental protection more difficult. The question of whether economic growth and a good environment are compatible is naturally crucial, but has not yet been answered – we return to this issue in the final section. Moreover, it was pointed out about in section 3.3 that the “regional development” objective may conflict with the environmental objectives.

#### *b) Production objectives*

As shown above, these vary widely and may interrelate with environmental objectives in various ways.

There is a *first* group of production objectives that bear no relation to environmental objectives whatsoever. These include objectives in the policy areas of social care, study grants, interest rate on government bonds, socio-economic and financial administration, the EU membership fee and immigration and refugee policy – policy areas which, taken together, account for a large portion of public spending (almost 60 per cent).

A *second* group of production objectives may be compatible with the environmental objectives and support them. For example, research, training and education, along with the schools system, may improve knowledge of environmental issues, and protective measures taken by the national defence administration and foreign aid can both incorporate an environmental dimension. A good environment can also help to improve public health. Here it is thus a question of synergies between environmental objectives and other welfare objectives.

In volume terms, this group of production objectives may be on a par with the environmental objectives. Increased investment in education, training and research may benefit environmental protection. It is the other way around as regards public health objectives, which may benefit from increased investment in environmental protection. The aim of the public health policy area is to improve the health (measured as average life expectancy, mortality, ill-health and the individual's perception of his own health) of people in the poorest state of health, which means that environmental protection must further equality if synergies are to be achieved.

As has frequently been pointed out, a *third* group of production objectives encompasses potential conflicts as well as synergies with environmental objectives. Essentially, these are objectives for physical activities in trade, agriculture, industry and infrastructure. Some of most intensely debated objectives are those for the policy areas forestry policy, transport policy, trade and industry policy, regional development policy, foreign trade policy, consumer policy, energy policy, food policy, and rural development policy. The armed forces' use of military equipment and installations, and labour market policy can give rise to complications. Activities funded from the state budget, such as certain grants to municipalities and for housing, may also be mentioned. All in all, these policy areas account for up to one fifth of the state budget.

We have reviewed papers and reports produced by the government and public agencies and identified a number of important potential conflicts between environmental objectives and other operational objectives (system objectives and production objectives for the third group). In addition, conflicts have been highlighted by the media in a number of cases. For each relevant sector Table 4 shows the type of environmental objective (according to Table 3) in question, the specific environmental objective, the other objectives affected, and finally, the aspects of the activities or operations in that sector that threaten to counteract achievement of the environmental objectives: the volume or content.

*Table 4* Some important potential conflicts between environmental objectives and other objectives

<b>Policy area</b>	<b>Type of environmental objective</b>	<b>Environmental objective</b>	<b>Other objectives</b>	<b>Type of effect</b>
Forestry policy	Environmental state, load or concentrations	Preserved biodiversity (as a result of limited felling)	Economic growth, increased employment and regional balance; supporting employment in sparsely populated areas; good yield (by a faster rate of felling)	Volume (felled forest)
Forestry policy	Use of natural resources	A further 900,000 hectares of forest deserving of protection will be excluded from forestry production by 2010	As above	Volume (felled forest)
Transport policy	Emissions	Emissions of CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub> and VOCs (by reducing traffic)	High-quality transport, welfare, employment (owing to an increase in traffic)  Accessibility (by improving the road network)	Volume (transport distance/quantity of goods/number of passengers)  Content (better roads)
Transport policy	Environmental state, load or concentrations	Natural and man-made environment (by reducing traffic)	Positive regional development (owing to an increase in traffic)	Volume (transport distance/quantity of goods/number of passengers – particularly in sparsely populated areas)
Transport policy	Emissions, use of natural resources	Improved sustainability (by reducing traffic)	High-quality transport, welfare, employment (owing to an increase in traffic)	Volume (transport distance/quantity of goods/number of passengers)
Housing policy	Use of natural resources	Among other things, sub-objectives under the "reduced climate impact", "no eutrophication", "high-quality groundwater" objectives (by limiting construction)	Housing supply, balanced regional development (by more construction)	Volume (energy, employment, construction volume)
Trade and industry policy	Use of natural resources, emissions	Among other things, sub-objectives under the "reduced climate impact", "a non-toxic environment", "zero eutrophication", "natural acidification only", "high-quality groundwater" objectives (depending on the industry) (by limiting industrial development and traffic)	Economic growth and increased employment as a result of more companies and expansion of existing ones (by increased industrial development and more traffic)	Volume (mainly energy, employment, transport distance/quantity of goods/number of passengers, waste, emissions)

Policy area	Type of environmental objective	Environmental objective	Other objectives	Type of effect
Regional development policy	As above	As above	Healthy and sustainable local labour market regions with a good level of service throughout the country (by increased industrial development and more traffic)	As above
Foreign trade	As above	As above  (by limiting foreign trade)	Growth and development in Sweden by promoting free trade and removing trade barriers (by increasing trade and more traffic)	Volume (as above, particularly transport distance/ quantity of goods/number of passengers)
Consumer policy	Use of natural resources, emissions, environmental state, load or concentrations	Among other things, sub-objectives under the "reduced climate impact", "a non-toxic environment", "high-quality groundwater" objectives (by limiting consumption)	Increased welfare and fair distribution of wealth: system objectives not expressly said to apply to consumption (by increasing consumption)	Volume (production of goods, transport distance/quantity of goods/number of passengers, energy)
Energy policy	Use of natural resources	Among other things, sub-objectives under the "reduced climate impact", "a non-toxic environment", "zero eutrophication", "natural acidification only", "high-quality groundwater" objectives (by limiting energy production and use)	Secure energy supply in the near and long term (by increasing energy production and use)	Volume (energy)
Food policy, Rural development policy	Use of natural resources, emissions, environmental state, load or concentrations	Sub-objectives mainly under the "varied agricultural landscape", "flourishing wetlands", "no eutrophication", as well as "sustainable lakes and watercourses", "high-quality groundwater", "balanced marine environment" "non-toxic environment" and "magnificent mountain landscape" objectives.  (Meadows, grazing lands, small biotopes, landscape features reflecting rural cultural heritage (by limiting activities in rural areas)	Secure food supply (Swedish Rail, National Food Administration), safeguard consumer interests (National Food Administration), balanced regional development, reindeer husbandry, long-term fisheries yield  (by increasing activities in rural areas)	Volume (area of cultivated land, transport distance/quantity of goods/number of passengers, energy, employment and so on)
Defence policy	Use of natural resources, emissions	Sub-objectives mainly under the "reduced climate impact" and "non-toxic environment" objectives  (by reducing activities/ operations)	Defence readiness by use of military equipment, installations, transport and ammunition (by increasing operations)	Volume (mainly transport distance/ quantity of goods/number of passengers, energy and quantity of ammunition used)

As mentioned above, the table does *not* mean that conflicting interests actually occur within this group of policy areas. We have not examined the specific consequences of the potential conflicts, or whether it is possible to avoid them by greater efficiency or better technology. But the table does provide a basis for putting forward some hypotheses.

An initial hypothesis is that *conflicting objectives in environmental policy occur largely because the volume of activities in the policy areas in question is so great that they threaten the environment in various ways*. Virtually all effects (far right column) are related to volume. This is because the activities are physical, and the more extensive these physical activities are, the greater the effects on the environment. As may be seen, activities are governed both by system objectives and by production objectives. The impression is that system objectives play a greater part, particularly since they underlie quite a few production objectives (“increased welfare”, “increased employment”), Potentially conflicting interests are sometimes less evident because the crucial system objectives are more or less “hidden” behind the production objectives.

As may be seen, the potentially conflicting objectives under the third group of production objectives largely concern the factors “use of natural resources” and “emissions”, although “environmental state, load or concentrations” are also found. In other words, potential conflicts between objectives often seem to occur because of a desire to influence the interplay between activities and surroundings, or activities in society and the behaviour of actors (according to Table 3).

Looking at synergies in conjunction with the third group of production objectives, earlier reports have shown that they often involve efficiency gains and hence are about content: operations that are better and more efficiently run save money, raw materials and energy. Some examples are given in Table 5.

*Table 5* Some important potential synergies between environmental objectives and other objectives

Policy area	Objectives of the policy area	Environmental objectives	Type of effect
Transport policy	Cheaper transport and transport supply due to more efficient automobile engines	Lower emissions of CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub> and VOCs	Content (more efficient engines)
Housing policy	Better housing supply due to denser housing development.  Cheaper housing due to energy efficiency	Lower emissions due to fewer journeys.  Lower energy consumption and hence lower emissions	Content (denser housing development, energy efficiency)
Trade and industry policy	Easier for companies, which improves the prospects of growth due to more efficient production and closed cycles (lower consumption of materials and energy)  Greater competitiveness due to better environmental technology	Lower industrial production emissions  As above	Content (more efficient production with lower input)  Content + volume (increased export)
Regional development policy	Regional development due to regional growth agreements	Regional development, involving environmental objectives	Content (shift in focus of regional development)
Consumer policy	Increased welfare due to different and cheaper diet: more vegetables and less meat.  Well-informed consumers	Less leaching of nutrients  Increased demand for environmentally friendly products	Content (changes in diet)  Content (changes in patterns of consumption)
Energy policy	Guaranteed energy supply due to more renewable energy and small-scale energy sources, greater energy efficiency	Lower emissions	Content (changes in methods of energy supply)
Agricultural policy	Safe and cheaply available foodstuffs due to more efficient agriculture	Less leaching of nutrients, among other things	Content (changes in agricultural methods)
Forestry policy	Well-managed forests	Biodiversity	Content

The examples mainly show "content" effects. True, synergies in volume terms do occur, e.g., the example mentioned above of environmental technology and competitive advantages, and also the fact that a productive,

growing forest acts as a carbon sink.<sup>1</sup> But on the whole, there is reason to elaborate the first hypothesis by adding a second, i.e. that *conflicting objectives occur mainly because various activities assume greater proportions (i.e., greater volume), whereas synergies often arise because the content of the activities is managed more efficiently and using fewer resources.*

This also sheds light on the importance of good environmental protection. After all, the idea of environmental protection is to influence the content of operations and activities so that we are better able to achieve our environmental objectives. Within central government, municipalities and trade and industry, environmental protection also aims to achieve synergies so that various activities are conducted in a more environmentally friendly way. The more serious the volume-related conflicts between objectives are, the more important this seems to be. The question whether a sustainable development is possible can then be formulated: can a more efficient environmental protection counter the effects of increased production and consumption in society?

But what or who then decides the volume of activities in the relevant policy areas? This obviously varies. Sometimes it is the state, sometimes market demand, i.e. what people want to do and have, that is the dominant factor determining volume. By and large, it is possible to break the relevant policy areas shown in Table 4 down into four groups according to the extent to which the state is directly able to control their investments and consumption (real economic categories) – as distinct from the state’s ability to influence these activities by way of regulation.

1. The state decides both consumption and investment within the policy area and thereby the volume of activities/operations. The armed forces are an example.

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<sup>1</sup> Other volume synergies are mentioned above in conjunction with the second group of production objectives, ie, when increased investment in education, training and research on the environment furthers achievement of environmental objectives and conversely, when increased investment in environmental objectives favours public health objectives. This is because these activities do not have the same physical character as the operations under the third group of production objectives, which means that volume increases do not, *per se*, give rise to any appreciable environmental degradation.

2. The state decides investments but not, essentially, consumption. Examples include transport policy and energy policy. But both areas are very much governed by corporate and consumer demand.
3. The state exercises limited influence over investments, and less over consumption. This category includes forestry policy, housing policy, trade and industry policy, regional development policy and consumer policy; the extent of all these activities in society is largely dictated by market supply and demand. EU funding also plays a part in some cases.
4. The state influences funding and hence operational volume to a considerable extent. This applies to foreign trade policy and agricultural policy, the latter being part of food policy. The EU naturally plays a key role in funding for agriculture. Both policy areas are very much governed by demand.

As may be seen, the activities or operations in question are largely governed by demand, which limits the state's freedom of action. But of course it is not only the economic aspects that are important. Other considerations also come to bear. If the government wants to reduce the volume of the activities in question to better achieve the environmental objectives, then not only the activities themselves will be affected. There is also a risk that the cuts will have unfavourable effects on wealth distribution, since some categories of people may suffer more than others as a result, which is natural enough, since one of the main purposes of the state budget is to benefit the disadvantaged in society. For example, those with limited financial resources may suffer if cuts are made in the level of consumption.

c) *Consideration objectives*

There is a clear risk of these coming into conflict with some production objectives. This risk may be exacerbated by characteristics of the consideration objectives. Hence, their organisational fluidity (no budget constraints, many agencies responsible but sometimes unclear division of responsibility, fairly imprecise target groups and relatively "immature" government activities) means that they run the risk of being subordinated to other objectives. For although environmental protection and other areas are given national objectives and various forms of legislative support, this

does not mean they are automatically given priority in practical politics, even though they are usually accompanied by a considerable amount of rhetoric. On the contrary, the Swedish Environmental Protection Agency has conducted an evaluation which found that environmental objectives such as the earlier eutrophication objectives have tended to be given low priority when weighed up against other considerations: they risk becoming secondary objectives or restrictions.<sup>2</sup> Other consideration objectives also come up against difficulties, and the agencies responsible often seem to find it difficult to assert their objectives in the face of other interests. Without going into details, it may be mentioned that a substantial number of companies and agencies do not pursue a systematic *occupational health and safety policy* or draw up *equal opportunities plans*, notwithstanding the provisions of the Work Environment Act and the Equal Opportunities Act. The Office of the Equal Opportunities Ombudsman has emphasised that equal opportunities is not “regarded as a priority area” by public and private employers. Salary differentials between the sexes endure. The National Audit Office has also complained that many public authorities do not ensure that the equal opportunities dimension is reflected in their activities vis-à-vis the outside world. There are also a sizeable number of companies that do not prepare the prescribed plans to counter *ethnic discrimination*.

There has been much discussion as to why it is so difficult to gain acceptance for consideration objectives in other policy areas. An explanation commonly given is that “economic realities” force various areas to concentrate their resources on their own tasks when there is a shortage of resources and there are no synergies to be gained. Others name system problems; according to Luhmann, failings in communication hinder ecological disturbance from attracting attention in modern society; they acquire insufficient “resonance”, as he puts it.<sup>3</sup> A third explanation, given by Guattari, a French philosopher, is that the answer lies rather at the actor level: it is the actor’s mentality that hinders proper consideration of the environmental dimension.<sup>4</sup>

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<sup>2</sup> *Övergödningen – ett styrproblem* (“Eutrophication – a management problem”) Swedish EPA Report 5213, 2002.

<sup>3</sup> See Luhmann *Ecological Communication* (1989), particularly chapter 17.

<sup>4</sup> See Guattari *Les trois écologies* (“*The three ecologies*”) (1989), where he distinguishes between environmental, social and mental ecology, the last of which he considers to be the most important.

Both Luhmann and Guattari argue that a new environmental ethic is needed if more attention is to be paid to the environmental dimension.

Whatever the case, it is essential in the shorter perspective to consider practical ways of ensuring that consideration objectives, and particularly environmental objectives, have more impact at the institutional level. For example, it may be impossible, and perhaps not even desirable, to set budget constraints for the individual environmental objectives. But on the other hand, this may make it difficult to say whether enough money is being spent on environmental objectives and whether it is being used efficiently. Other ways of ensuring this must then be considered, e.g., by improving monitoring and evaluation of environmental protection and the proportion of resources allocated to it.

*d) Process objectives*

These concern local participation in decision-making processes and local involvement in environmental protection, as well as the rights and freedom of movement of the individual. They thus relate to actors' ability to influence the system (see section 3.2). As often pointed out, one of the reasons for the need to decentralise is the growing complexity of society and not least of environmental protection. The central government is less able to survey the possibilities and needs at regional and local level. The tasks of the regional and local authorities are set out in the latest environment bill, which states that county administrative boards have overall responsibility for formulating and monitoring achievement of regional objectives, whereas municipalities are to identify environmental problems and adapt the national environmental quality objectives to meet local needs. County administrative boards should support municipalities in their efforts to formulate local objectives and action plans so that national and local objectives are coordinated.

The know-how, skills and participation of municipalities, companies and individuals are naturally an asset to environmental protection. But the existence of goal conflicts poses a problem. The actors sometimes have to strike a balance between environmental objectives and their other wishes and interests: municipalities normally want to have low unemployment

and economic development; companies want to make a reasonable profit; individuals are frequently keener on consuming and travelling than caring for the environment – even though everyone would of course like to have a good environment. Consequently, there may be a conflict between the desire for local participation and self-determination and the need for a better environment.

As far as the individual is concerned, the “legal system” policy area lays down the objective of “the legal rights of the individual and the rule of law”. This means that general interests such as environmental protection cannot simply take precedence over individual interests such as the right to own and use property. National environmental objectives may clash with individual and group interests as a result.

The executive has made use of three methods of dealing with these problems. Two of them involve influencing operational areas (sub-systems): management by results, which applies to the entire state administration, and sectoral integration, which concerns environmental protection. The third method is to influence actors (elements of the system).

*Management by results*, which was presented in section 2, is a way of dividing responsibility and powers between central, regional and local government. But it has sparked debate. There are critics who argue that management by results has weakened political control over government activities so that it is sometimes difficult to specify separate objectives for different operations, since different objectives may be interlinked: complement each other (synergies) or counteract each other (conflicting objectives).

This risk is growing because of the large number of objectives relating to the many policy areas and operational areas covered by the state budget. For example, the employment objective and the regional balance objective have much in common, but together they may clash with the objective of conserving natural resources such as forests and watercourses. A further criticism is that the objectives are frequently unclear – their attainment is difficult to monitor or evaluate, which makes it difficult to determine who is responsible for their non-achievement.

For example, there has not been a thorough discussion in the context of management by results of how various objectives may be interrelated by

complementing or conflicting with one another. This applies particularly to environmental objectives, whose interplay with other objectives needs to be clearly described. Nor has it been clearly stated how priorities should be decided between various objectives.

This threatens to obscure the distinction between politicians who set the objectives and civil servants who realise them. Unless politicians openly declare which objectives are most important, civil servants at various levels will be obliged to deal with conflicts between objectives by deciding whether their own production objectives or environmental objectives should come first. And perhaps this is the most reasonable approach – that the objectives should be weighed up against one another “at the sharp end”. As emphasised in section 2, formal procedures and the actual approach do not always accord with each other.

*Sectoral integration* is intended manage the division of powers within the field of environmental protection. Although the Swedish Environmental Protection Agency has overall responsibility in this area, all sectors of society must accept their environmental responsibility and incorporate the environmental dimension in their day-to-day activities. This is called sectoral integration.<sup>5</sup> It means that many agencies are responsible for the environment within their operational areas. In other words, there is no *single* agency responsible for the environment. This arrangement makes it necessary to coordinate environmental protection, the Swedish EPA having no formal powers to decide the form this joint approach should take.

Another result of sectoral integration is that the environmental objectives have not been given a budget as was originally intended when the executive decided to introduce “management by results and budget frameworks”. As indicated budget constraints of this kind may not be possible, and

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<sup>5</sup> To be exact, there are nine agencies responsible for one or more of the fifteen national environmental quality objectives (environmental quality agencies) and 24 agencies with particular responsibility for the environment within their sector (sectoral agencies). The Public Agencies Ordinance also contains a provision requiring all heads of public authorities (about 250) to take account of the demands placed on their operations by the objective of achieving an ecologically sustainable society.

perhaps not even desirable, in the environmental field.<sup>6</sup> Instead, sectoral agencies are to fund their environmental work from their own budgets, which do not normally include any money earmarked for environmental purposes. Nor is the Swedish EPA allocated money in terms of environmental objectives; it receives an overall appropriation, mainly for the agency itself, for environmental monitoring, for measures to conserve biodiversity, for remediation and restoration of contaminated sites, for environmental research, for information on climate and for investment in a better climate and ecological sustainability. It is also difficult to specify how much each environmental objective is allowed to cost in practice is also difficult, since many measures serve a number of objectives simultaneously and it may sometimes be unclear whether action is being taken in pursuit of an environmental objective or for some other objective.

But even though management by results and sectoral integration have their problems, it is not easy to see any reasonable alternatives. A return to the old detailed "management by budget appropriation" system is hardly feasible, and allowing agencies to decide their own objectives within given budget constraints is not compatible with democratic government. Nor can the Swedish EPA become involved in the details of other agencies' operations. One controversial suggestion is that the current somewhat hierarchical system of management by results should become more of a process involving negotiation and networks "with a less clearly defined division of responsibilities and more planning during the process itself than before".<sup>7</sup> On the other hand, this process might obscure democratic responsibility: whose fault is it if things do not go as they should?

But discussing and evaluating management of government activities falls outside the scope of this paper, and we would merely point out that issues concerning division of responsibility and management by results have not been finally resolved.

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<sup>6</sup> Another system is used for research, which alongside its own policy area, is funded by ear-marked appropriations with several other policy areas, including environmental policy.

<sup>7</sup> *Integrering av kommunaltekniska system* ("Integration of municipal technical systems"), Swedish EPA Report 5160, page 23, where additional references to literature are made.

There are many ways of *influencing actors*. The means used in environmental protection to influence consumers and companies are usually divided into administrative, economic, informative and research and development. Apart from doubts as to their effect on the environment, the problem with using compulsory instruments is that, as mentioned earlier, they may threaten central aims of the legal system, viz., to protect the rights of the individual and uphold the rule of law. Every individual is essentially entitled to freedom of movement, and the individual right of ownership allows people, within certain limits, to do what they want with their property. But travel and transport, particular road traffic, often threaten the environment, and uncontrolled emission of pollutants from homes and companies is obviously unreasonable.

The present array of instruments, which is intended to strike the necessary balance between environmental considerations and the rule of law, provides scope for both views about the part played by the actors as mentioned in section 3.2: on the one hand that the structures are the important thing, not the individual actors; on the other hand that the actors play a crucial part. Hence, legal and economic instruments exist to influence the rules of play in society, not primarily individual actors, and new technology alters the physical functions of society (“moves the transformation curve outwards”, to use the language of economics). On the other hand, information and education are means to persuade individuals to act in a more environmentally friendly way. It is also natural for parliament and the government to be more interested in using every conceivable method than in adopting a standpoint on problems in principle in the relationship between society and individuals. But the risk of conflicts between environmental considerations and individual freedoms remains.

Looking particularly at dissemination of information, e.g., in the form of information campaigns about the environment, the question is whether the information should be disseminated top-down, or whether it should be in the form of a dialogue between environmental experts and the public. One argument for the former is that the content of environmental protection and policy is often extensive and not readily accessible, which means that expert knowledge is required to communicate it. A factor in favour of the

latter approach is the need to clarify and gain support for the inevitable setting of priorities and sacrifices to be made by the public, who in any case will ultimately have to realise the environmental objectives: we must not risk a “democratic deficit”. In other words, should the emphasis be on the didactic approach or on dialogue?

## 7. Conclusions

This paper has shown that the systems approach can shed new light on facts about environmental policy that are actually already well known. The approach makes it possible to give a structured and tangible picture of the complicated ramifications of the interplay between environmental protection and other government activities. One observation is that the lack of coordination between various sectors of society may be due to peoples’ Luhmannian inability to communicate with one another and familiarise themselves with objectives other than their own.

The state’s system objectives must be seen in the light of the overall objectives for the environment as a whole, particularly the desire to achieve ecological balance or, to be more precise, resilience. Essentially, it is necessary to have an idea of the kind of society and the kind of environment we want in order to strike a proper balance between the wishes expressed from various quarters. There is also intense debate about the general workings of the two huge systems society and nature. There are many opinions on this, but two main views can be discerned: some believe in balance and harmony, others in imbalance and conflict, in society as well as the environment.

The *first* perspective presupposes that technical developments and changes in our current wasteful lifestyle in the industrialised world can save the environment. “Ecological modernisation” is possible, i.e., industry and transport can be made so environmentally friendly that the structure of

society and the economic system will not need to change.<sup>1</sup> Economic growth can be decoupled from environmental degradation. The government has advocated a similar view in its environmental bills, as has a Confederation of Swedish Enterprise futures study (see references). In that case, a discussion of conflicting objectives is of no great interest; at most it may serve as an indicator of areas on which environmental protection should concentrate. Environmental policy will become essentially uncontroversial, since consultation and technical solutions will become more important than political conflicts.

The *second* perspective is based on the supposition that nature is genuinely threatened by the growth of industrial societies so that serious environmental damage is inevitable. Society and our lifestyle must then change radically, and the idea of ecological modernisation only serves as a way of concealing this necessity. In that case, Table 4 is not merely a useful indicator for environmental protection; it is a fateful forecast of serious threats. The analysis of conflicting objectives then occupies centre stage in the debate. Environmental policy becomes difficult and controversial.

But of course we know very little about these important general issues. We do not know whether the overall system objectives of full employment, economic growth and fair distribution of welfare are compatible with the environmental objectives. There are also arguments suggesting that these issues are so abstract and couched in such general terms that it is hardly worth searching for general answers. These arguments are both empirical and theoretical.

The *empirical* argument for dealing with more tangible issues instead of abstract arguments is the difficulty in proving that growth and environmental protection are compatible. A recent resource efficiency report shows that general research has not yielded any definite answer,

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<sup>1</sup> Ecological modernisation is discussed in Lundqvist, *Capacity-building or social reconstruction. Explaining Sweden's shift towards ecological modernisation* (2000) and Sverrisson, *Miljöfrågans pragmatisering och ekologiskt entreprenörskap* ("A pragmatic approach to the environment and ecological entrepreneurship") (2002).

which has also been confirmed by other studies.<sup>2</sup> Quite simply, there are no unequivocal findings as to whether it will eventually be possible to reduce total resources consumed and emissions more than the extent to which production and consumption increase: we do not know whether, generally speaking, “decoupling” will be possible. We must instead resort to solving limited problems individually and hence to being content with knowledge as to how to act in individual instances (waste management, treatment of heavy metals, carbon dioxide emissions etc). The *theoretical* argument presupposes that the desire for an unequivocal truth about society, about the environment, is an expression of an outmoded view on the potential of our knowledge. The age of philosophical systems is past.<sup>3</sup> There are no longer any “great narratives” telling us which social system is preferable or which environmental state we should strive to achieve. We must be content to examine the philosophical premises on which various perspectives are based and accept that these views differ. Proponents of this view believe it is fruitless trying to find objective grounds for one or the other perspective.<sup>4</sup>

The alternative way is to approach the problem from the bottom up, i.e. to study conditions in each part of society in greater detail before attempting to generalise about each sector and then tentatively as to whether society as a whole can combine environmental considerations with the desire for economic growth. The systems should be studied on a small scale, with clearly delineated sub-systems. In other words, the starting point is policy

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<sup>2</sup> Effektiv användning av naturresurser (“Efficient Use of Natural Resources” (Swedish Government Official Report 2001:2). See also articles by Opschoor, Hinterberger/Luks and Kadekodi/Agarwal, among others in the bibliography.

<sup>3</sup> A classic work in this sceptical post-modernistic school is Lyotard, *La Condition postmoderne*, published in 1979. Among the large number of books and articles pursuing this tradition may be mentioned Rorty, *Habermas, Derrida, and the Functions of Philosophy* (1998), which deals with the difficulties in defining “the large lines” in social development, and Kirkman, *Skeptical Environmentalism – The Limits of Philosophy and Science* (2002), on similar difficulties in the field of ecology.

<sup>4</sup> One interesting complication is that our own conceptual framework of systems theory focusing on conflicts and synergies is not the only conceivable one. Like a great deal of economic environmental research, one alternative is to choose equilibrium models for both ecology and economy and thereby concentrate on equilibrium solutions, not on conflicts. The choice of method may thus sometimes affect the sort of result achieved: you get the answer you’re looking for.

areas, perhaps even individual decision-making situations in policy areas – road-building, bridge-building, rifle range, forest felling, agricultural methods etc, - and try to forecast potential lines of development in each case, bearing in mind the routes that technical development might take. A bottom-up approach is therefore useful in practical environmental protection, and may help to assess the weight of the conflicts between objectives that occur. This will then shed light on the abstract problems of growth and environment.

One way of examining the issue of how to choose between environmental objectives and other welfare objectives is to consider whether the choice reflects conflicts or dilemmas, i.e., whether it is possible to compromise or it is necessary to choose one or the other. We do not always know. A dilemma arises when critical limits (bifurcations) are faced, when a limit value must be achieved to save the ecosystem, or for that matter to avoid unemployment, in a region. When the limit value is not fully achieved, the ecosystem or community dies. We then face a dilemma: to save the ecosystem or the community by achieving the limit value, or to let them die. Other times there are conflicts that can be resolved by compromise: we choose to allow slightly higher emissions or slightly higher unemployment as a result of a compromise whose consequences are not so disastrous whatever we choose to do.

Where there is a dilemma in which the survival of an ecosystem or endangered species is at stake, concern for the environment may carry greater weight, precisely because we lose so much if we renounce it. Long-term economic considerations may play a more central role in cases of conflict. But a complicating factor is that we often do not know whether we face a bifurcation. Here, it is a matter of risk assessment; how much weight should then be given to the precautionary principle? Is the risk of losing an ecosystem more important than the jobs that will be lost in a sparsely populated area, jobs that will be difficult to replace?

The inference to be drawn from the above argument is that it is necessary in such cases to study sub-systems on a smaller scale. Large-scale solutions are generally less realistic. It is necessary to consider the more practical studies needed as a tool in future environmental protection.

This also means that the hypotheses put forward in section 6 should be considered in relation to individual environmental problems in various sectors. It is of particular interest to see the part played by the volume and content of the activities that are to be affected by environmental protection. Is it right that the volume of activities is often critical, whereas their content can more easily be shaped to reflect environmental considerations? What are the potential synergies and conflicting objectives?

There are various methods of ascertaining whether a synergy or conflict will occur. One way is to ask the actors concerned whether one or the other exists in a given instance (a qualitative method). It may add weight when dealing with wealth distribution issues if quantitative methods are also used to determine the implications of environmental policy for various actors, either by analysing those implications in the annual accounts or by seeking to identify links between employment levels and environmental costs.

Another observation is that the structure of state objectives should be made more transparent. It has been seen above how difficult it is to gain an overview of conflicting objectives and synergies. Of course there are several factors governing the structure of objectives. They are primarily intended to reflect political priorities, which our society determines via its politicians in parliament and the government. Their judgments are almost by definition that which is of political interest. Environmental objectives are also supposed to reflect scientifically relevant dimensions. This report expresses no views as to the relevance of the 15 national environmental quality objectives.

But a third factor is that the structure of objectives should be clear and easy to understand, and something can be said here about this technical issue of communication.

The structures of objectives vary from one state activity to another. There may be good reason for this, and most probably each policy area has well-considered and clear objectives. But a clear line should be drawn in all policy areas between system objectives (which the entire state budget is intended to help achieve) and production objectives (which are dealt with

within the operational areas and divisions in question). In other words, anyone reading the state budget should recognise the structure and not need to familiarise themselves with a new arrangement for each policy area. It may be appropriate to adhere to the breakdown into system objectives – production objectives – consideration objectives – process objectives in each area of policy. When discussing environmental objectives, which are a particular kind of consideration objectives, it is useful to distinguish between volume problems and content problems.

The very structure of environmental objectives could also be clearer, since the sub-objectives for the 15 national environmental quality objectives differ. If account is taken of Tables 2 and 3, sub-objectives such as “use of natural resources” and “emissions” can be emphasised, while “production of plans and programmes” serve more of an auxiliary purpose. Sub-objectives such as “state of the environment, load or concentrations” serve rather to specify the national environmental quality objectives than as measure-oriented objectives. This also applies to “effects on human health”.

To sum up, we do not know much about the complex systems comprising state, society and environment. But if we want to influence and change the interplay between these systems, including all their actors, operations, activities and relationships, we will have to learn more about the way they work.

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# Society, Systems and Environmental Objectives

This report presents a systematic overview and analysis of problems involved in the efforts to achieve Sweden's national environmental objectives, so as to show which factors are essential to achieve ecological sustainability. The thrust of the report is to identify problems rather than solve them.

The report is primarily intended for those engaged in evaluating and analysing the efforts to achieve the objectives, and can also serve as background material for research. It may also interest all those who want to know about obstacles and opportunities to reach the environmental objectives.

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