Cross-objective analysis of the environmental objectives

Background report for the 2015 in-depth evaluation of the environmental objectives

This report analyses the environmental work based on key instruments and their effects, cost-effectiveness and various types of gaps to objective fulfilment. The report also looks at a number of issues of relevance to the development of the follow-up.

The conclusions highlight the need for a stronger focus on driving forces and behaviour in the environmental work, and that more advanced analyses of instruments and measures along with more transparent monitoring can improve the framework conditions for the establishment of clearer priorities within the environmental work.

This report is one of the background reports for the 2015 in-depth evaluation of the environmental objectives. The analysis is primarily based on the 16 in-depth evaluations of the environmental quality objectives.
Cross-objective analysis of the environmental objectives

Background report for the 2015 in-depth evaluation of the environmental objectives
Preface

On 20 February 2014, the Environmental Protection Agency was commissioned by the Government to present an in-depth evaluation by 1 September 2015 of the scope to achieve the environmental quality objectives and the generational goal. The evaluation must include analyses for each of the environmental objectives, in addition to a cross-objective analysis. The analyses must also cover national, international and EU-related factors, along with Sweden’s scope and proposals for adjustments to instruments and initiatives at national level or within the EU. The assignment is to be carried out in partnership with other government agencies which have responsibilities within the environmental objective system.

The in-depth evaluation forms part of a systematic and regular follow-up of environmental policy and the environmental quality objectives, which is to provide the foundations for strategic measures. It provides the basis for the Government’s policies and priorities and for public debate, and support the long-term planning and priorities of government agencies, so that they can develop the environmental work. It will also provide a basis for dialogue between actors in the development and implementation of instruments and measures, as well as guidance for the environmental work of actors.

This report presents a cross-objective analysis prepared by the Environmental Protection Agency as a basis for the report on the government assignment. The analysis is based on the evaluations of each of the 16 objectives and the key problems, instruments and measures that have been identified by the competent government agencies. The analyses are based on the priorities that were established in the background reports. The reports prepared within the focus areas of Sustainable consumption, Sustainable cities and the Environmental work of industry have also augmented certain aspects of the analysis.

In this context, “cross-objective” means causes, instruments and measures which are relevant to a number of objectives simultaneously. These can differ from those that are relevant to individual objectives. The cross-objective analysis was based on a system analysis perspective, i.e. to dissect a problem, understand links, assess how the structure is linked together and identify key factors and properties in the system.

The report describes relevant causes, perspectives and patterns which occur. It considers the environmental work through an analysis of key instruments and their effects, cost-effectiveness and different types of gaps to fulfilment of the objectives. The report also looks at a number of issues of relevance to the development of the follow-up.

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4 Naturvårdsverket (2015a) Miljö- och klimatarbete i näringslivet En översikt med fokus på drivkrafter och klimat.
5 Read more at http://www.iiasa.ac.at/ 20150910.
The Environmental Protection Agency is responsible for conducting the cross-objective analysis. The competent government agencies contributed to the task through providing background reports and reviewing factual aspects of the report. The Environmental Protection Agency is solely responsible for the content of this report. Within the Agency, the analysis was conducted by Anna Lundmark Essen, Marie Wiktorsson and Hördur Haraldsson of the Evaluation Unit.

Stockholm, October 2015

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1. Summary discussion and conclusions

As a basis for the 2015 in-depth evaluation, the Environmental Protection Agency carried out the following cross-objective analysis of the framework conditions and barriers to achievement of the objectives.

The analysis is primarily based on the in-depth evaluations of each of the 16 objectives and to some extent the reports which were prepared within the focus areas of Sustainable consumption, Sustainable cities and the Environmental work of industry.

To facilitate cause and effect analyses, the competent government agencies were asked to analyse the objective on the basis of the key problems that the objective is intended to solve. The emphasis in the analyses is therefore placed on a certain type of environmental impact and certain instruments and measures. Not all aspects of the objectives have therefore been analysed from a cross-objective perspective.

The results and effects of instruments and measures which are referred to in the background reports are summarised from a cross-objective perspective. Relevant causes, perspectives and patterns are described. The environmental work is considered through an analysis of key instruments and their effects, cost-effectiveness and various types of gaps.

Changes to cross-objective initiatives at national, EU and international level that are key to achieving the generational goal and the environmental quality objectives are highlighted.

In the long term, the following general conclusions could improve the effectiveness of the environmental work:

A holistic approach with a focus on driving forces and behaviours is essential.

More initiatives within the environmental work which are targeted at driving forces and behaviours which impose a burden on the environment and give rise to environmental problems.

Develop more instruments and adjust and improve existing instruments on the basis of this perspective.

Review the effectiveness of instruments and measures within each area and draw up proposals for changes where necessary. The areas of agriculture, forestry, industrial production, road transport, energy production, mining, waste, construction/planning, import of pollutants and climate changes all have a major impact on most objectives and affect many sectors of society. The competent government agencies and relevant public and private sector actors should be involved in the work.

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9 Naturvårdsverket (2015a) Miljö- och klimatarbete i näringslivet En översikt med fokus på drivkrafter och klimat.
The tools that are must be fine-tuned to facilitate better prioritisation of the environmental work.

A continuing focus on evaluations of instruments and measures is required, particularly from a cross-objective perspective, i.e. based on the effects of instruments on a number of objectives. A spotlight should be placed on the analysis of overlapping instruments which need to be coordinated with each other, e.g. the Environmental Code, the Forestry Act and the Planning and Building Act. There is also a strong need for socio-economic analysis in the environmental work.

Greater clarity and transparency in the follow-up is needed to ensure that the environmental objectives provide better support in the prioritisation of the environmental work. We also propose that a stronger focus be placed on the rate of change and trends in the analysis and assessment of the environmental objectives.

To determine whether or not the societal transition is heading in the right direction on an ongoing basis, the work relating to specific transition-relevant indicators based on the generational goal should continue.

1.1. Has the situation for the environmental objectives improved since the previous in-depth evaluation?

This cross-objective analysis further develops the conclusions from 2012 and deepens the analysis within certain areas. The spotlight has been placed on evaluating various aspects of inadequate objective fulfilment and analysing aspects of the environmental work.\(^{10}\)

The 2012 in-depth evaluation concluded that the reasons why the objectives were not being achieved differed between the objectives, and the gap to achievement of the objectives also varied considerably. The deficiencies in the effectiveness and application of the instruments varied strongly between the environmental quality objectives.

The reasons why the objectives are not being achieved can be summarised under the following five headings:

A. Uncertainty in assessing the adequacy of the framework conditions when the natural environment takes a long time to recover
B. Most of the environmental quality objectives cannot be achieved in Sweden
C. Negative impact or competition from other areas or sectors
D. Instruments are lacking (nationally and/or internationally)
E. Implementation of the instruments is inadequate (including inadequate measures as a result of the instrument and insufficient resources for implementation)

One of the main conclusions is that there was a considerable shortfall in implementation in the environmental work. “Shortfall in implementation” means that although many instruments were in place, measures were not being implemented, and that competition and objective-related conflicts with other policy areas and

\(^{10}\) Naturvårdsverket (2012a) Steg på vägen Fördjupad utvärdering av miljömålen 2012.
competing perspectives in society had a major impact. A shortage of resources is also a known cause. It is also noted that it would be beneficial to analyse the problem of implementation further, i.e. that political decisions do not always have the intended effects. A stronger focus on analysing instruments and their effects was therefore an important aspect of the 2015 in-depth evaluation, as a basis for the in-depth evaluations of each objective, in the work being carried out within the focus areas and in this cross-objective analysis.

At a cross-objective level, it is clear that the assessments of objective achievement have barely changed since 2012 and that the overarching reasons which gave rise to the assessments then are still in existence now. A cross-objective analysis of the environmental objectives indicates that a stronger focus on the actors and activities that give rise to environmental problems is needed in the environmental work and the instruments. The areas that are obviously affected by a number of objectives and where it is particularly important to establish good framework conditions in the environmental work are agriculture, forestry, industrial production, road transport, energy production, mining, waste, construction/planning, import of pollutants and climate changes.

It is also clear that the current instruments and measures focus on the symptoms that arise as a result of an excessive burden on the environment, i.e. the effects that the consumption of natural resources or pollutants, for example, have on the quality of the environment. In order to bring about the societal transition that is needed in order to get closer to achieving the environmental quality that we have established as an objective, more effective instruments are needed to counter the underlying driving forces which give rise to this burden. These could be standards, values, consumption and financial incentives.

The cross-objective analysis also indicates that a number of instruments are key to several environmental quality objectives. These include the Environmental Code, the Forestry Act and the Planning and Building Act. These play an important role, but their effects are not considered to be sufficient to achieve the environmental objectives in the long term. To reinforce the effects of the instruments, instruments must be developed based on a cross-objective perspective. The Cross-objective analysis of the environmental objectives also indicates that a further reason why the instruments and measures are considered to be inadequate is a lack of understanding of their effects on the state of the environment. This could relate to the absence of clear levels at which values are to be achieved, or the fact that changes in the environment take place so slowly that the effects are difficult to measure. In order to form a picture of the progress being made in the environmental work, it may be appropriate to analyse trends and directions in the effects of the environmental work, considered in relation to the state of the environment.

**Visionary objectives represent a challenge for analysis**

A major factor behind the challenge of conducting cross-objective analyses lies in the substantial differences between the objectives. A structured approach is needed in order to analyse the extensive and complex background information contained in an in-depth evaluation. All environmental objectives are visionary in their description. Some are clearly linked to objectives concerning the state of the environment. Others contain aspects that are linked more to the efforts of society.
In this in-depth evaluation, a spotlight was placed on cause and effect analyses concerning the key problems that the objectives are intended to solve in the in-depth evaluation of each objective. By clarifying the key aspects of the objectives, the environmental work can be focussed on areas where the best effects can be achieved, and can hopefully have positive indirect effects on other aspects of the objective. With the support of cause and effect analyses, the environmental work can be analysed in each step; from the approval of instruments to administration and implementation in the management process and on to impacts on actors and their behaviour, as well as activities to ultimately bring about a positive impact on the state of the environment. These analyses are based on the intervention chain, which was introduced in the 2012 in-depth evaluation. See Figure 8 in section 6.1 later in this report.

According to the basis for the assessment, the government agencies responsible for the objectives must assess the framework conditions for the achievement of environmental quality, i.e. they must assess whether all instruments and measures for each clarification and for the objective as a whole are sufficient. This is a complex task which will require a comprehensive knowledge base. Much of this basis is still lacking and will require substantial resources to develop.

1.2. Framework conditions and obstacles, and development of the environmental work

The generational goal indicates the societal transition that will be required in order to achieve the environmental objectives. In order to bring about this societal transition, the underlying framework conditions for such a transition need to be strengthened. This includes clarifying the driving forces and behaviours which have a positive or negative impact on the state of the environment, and in order to establish instruments which reinforce or weaken them. In turn, driving forces and behaviour impact on processes and activities in society. The cause and effect analyses in the in-depth evaluations for each objective revealed a number of areas within which activities and processes have a major impact on most of the environmental objectives. A step in the right direction towards the transition would be to improve resource-effectiveness within these areas.

As regards the framework conditions, obstacles and development of the environmental work, we can see that the initiatives that will be required to achieve the environmental objectives need to be targeted for each area, based on where in the environment the environmental impact is occurring.

Environmental work within areas – support for better objective fulfilment

Based on the conclusion from the 2012 in-depth evaluation that one of the most obvious reasons why the objectives are not being achieved is competition and objective-related conflicts with other policy areas and a competitive perspective within society, the approach in the 2015 in-depth evaluation has been to further investigate how this competition manifests itself and what it consists of. Based on a systematic overview of each objective with a focus on the actors and activities that trigger the key environmental problems, a number of areas become apparent
at a cross-objective level which have a major impact. These areas are agriculture, forestry, industrial production, road transport, energy production, mining, waste, construction/planning, import of pollutants and climate changes. In order to bring about the necessary societal transition and the environmental quality expressed through the environmental objectives, changes in activities and framework conditions within these areas will be necessary. The cross-objective perspective needs to be reinforced in order to provide a better overview of the initiatives that are required.

In this cross-objective analysis, we have studied the proposals which are presented in the in-depth evaluations of each objectives and grouped them in accordance with the area structure. The proposals for initiatives in the in-depth evaluations for each objective which can be linked to the areas are presented below.

The environmental challenge for the agriculture and forestry sectors is to find a balance between utilisation and consideration. In the case of agriculture, corrections to the Rural Development Programme’s environmental payments, the greening of the farm payments and greater consideration in accordance with the Environmental Code are key. Initiatives to reduce the nitrogen load from the agricultural sector are also highlighted. Within the forestry area, adaptation and coordination between laws, particularly the Forestry Act and the Environmental Code, will be vital.

Industrial production and energy production give rise to similar challenges for the environment, as both areas cause discharges into the atmosphere and aquatic environment. Energy production also results in the exploitation of land and water. In order to reduce the environmental burden caused by industrial production, the work being conducted by Sweden at EU and international level is key. Among other things, this concerns the National Emission Ceilings Directive and the trading of emission permits. Research and development in order to reduce Swedish process emissions, which are high compared with many other countries, is also important. Within the area of energy production, adjustments and strengthening of instruments and measures with the aim of limiting emissions and the use of alternative energy sources will be key, as well as the optimisation of energy consumption. The Ecodesign Directive and stricter requirements concerning the rational use of energy in buildings are also highlighted.

Mining operations, and thereby the pressure to exploit ore-rich areas in Sweden, are expected to expand. The proposals that are formulated are measures which are aimed at obtaining a picture of the demand for land and water in mountain areas amongst various actors, including mining and energy production. The need for support for research and development in order to reduce discharges/emissions from mining is highlighted.

Changes within the area of waste are one aspect of a societal transition towards a circular economy. Material cycles must be non-toxic and resource-efficient, and waste quantities need to be reduced. This means that consumption also needs to be cut. The coordination of chemical, product and waste legislation needs to be developed.

Spatial planning is about prioritising land use and requiring extensive knowledge concerning the consequences that decisions will have on the framework conditions, both for natural environments and ecosystems, and for human health and living conditions. The Planning and Building Act plays an important role, as does the need to strengthen many planning measures.
The transition in the transport sector comprises four parallel aspects: development towards a more low-transport society, transition to more energy-efficient transport modes, energy efficiency improvements to vehicles, and the use of renewable fuels. The carbon dioxide tax and EU emission requirements on new cars and light goods vehicles are two instruments which are highlighted, as is the need to plan cities taking into account walking, cycling and public transport as transport modes.

A significant proportion of the pollutants that give rise to environmental problems in Sweden originates from activities which take place in other countries. As regards the import of pollutants, causes of emissions are international shipping, industrial production, energy production, waste treatment, etc. These sources are situated outside our borders. The proposals have a strong international link, and the initiatives will therefore require Sweden to continue to play an active role both within the EU and internationally. This will be necessary in order to drive forward the work to reduce discharges into the atmosphere and aquatic environment, e.g. through the National Emission Ceilings Directive. This also applies to the import of chemicals. The area of climate changes will necessitate both national initiatives and active efforts within the EU. Efforts at international level are also of considerable importance, as is the integration of climate policy in all policy areas. The altered climate is also resulting in a need for initiatives aimed at bringing about adaptation.

1.3. Effects of instruments

In the case of 14 out of the 16 objectives, the effects of the instruments and measures are not considered to be sufficient to achieve the objectives. Based on all the in-depth evaluations of the environmental quality objectives, it is clear that the reasons behind the lack of effects can be explained on the basis of two perspectives. One relates to the instruments and the measures; these are both inadequate in relation to the context in which they operate. The other is the nature of the environmental objectives themselves. They are long term and visionary in nature.

From a cross-objective perspective, many instruments have a substantial impact on the achievement of the objectives. Amongst these are some which are highlighted more frequently than others in the analyses for each of the objectives and are described as being key to the environmental work. The Environmental Code in its entirety is considered to be central to all objectives. In this in-depth evaluation, specific examples linked to the following sections are highlighted: Chapters 2, 5, 6, 12 and 26 and the chapters which concern permits and appraisal. Other key instruments are the Forestry Act, the Planning and Building Act, the farm payments and the Rural Development Programme’s environmental payments, state measures (e.g. land acquisitions and the local nature conservation initiative LONA), the UN’s Convention on Long-Range Transboundary Air Pollution and its protocols, as well as the National Emission Ceilings Directive.

Although it is difficult to determine the direct impacts of instruments on the achievement of the various objectives, one conclusion is that changes and improvements to the abovementioned instruments will have effects on the environmental work.
**Contexts where the effects of key instruments can increase**
The environmental perspective must be taken into account in all sectors of society. One important instrument where this needs to be expressed is in the spatial planning process, e.g. in comprehensive spatial plans prepared pursuant to the Planning and Building Act.

Difficulties arise in carrying out assessments when several areas of legislation are applied simultaneously. The application of different legislative acts in relation to each other needs to be clear, and it must also be clear which legislation should be applied and when, e.g. as regards the rules of consideration in the Environmental Code and the Forestry Act. The rules must be clarified, and practice must be developed. Legislative compliance as regards environmental considerations also needs to be improved.

In some contexts, the measures that are needed must be implemented at a faster rate, e.g. within area protection and green inspections.

Sweden should play an active role in exerting influence in contexts where progress in the environmental work depends on how well other countries succeed in their environmental work. Examples of this can be found in the work relating to the UN’s Convention on Long-Range Transboundary Air and the National Emission Ceilings Directive.

**Spotlight on driving forces and behaviour**
In order to make progress in the environmental work and get closer to the desired state of the environment, instruments and measures must address both behaviour and driving forces to a greater extent than at present. Measures and instruments which have direct effects on the state of the environment remain important, but a stronger focus must be placed on the underlying causes of environmental problems, i.e. on the core of the problem, rather than on the symptoms of them. Placing a stronger spotlight on underlying driving forces and behaviour such as standards, values, financial incentives and consumption, highlights the basis on which priorities must be established and forms the core of conflicts between objectives. Instruments and measures which address driving forces and behaviour are also needed in order to facilitate societal transition towards the generational goal. An important conclusion from the sustainable consumption focus area is that only a few of the mechanisms which control our behaviour can be resolved through environmental policy measures and instruments, as they require broader anchoring and a political vision which encompasses all policy areas, government agencies at various levels, industry and civil society.

**Cost-effectiveness of the environmental work**
A cost-effective environmental policy imposes requirements on the formulation of both individual instruments and measures, and the way in which these are combined. Cost-effectiveness also presupposes that society weighs up the benefits and costs of the instruments in order to achieve the desired objective, and it cannot be assumed that more instruments and more measures will necessarily lead to a more effective transition or more environmental improvements.
The structure of our society is complex, and indirect changes and compromises in other areas are often needed in order to chisel out the ideal instrument for achieving a desired environmental objective with a high degree of cost-effectiveness. The instruments that are adopted are often the result of compromises. It is important for decision-makers to know which aspects of a proposed instrument can be varied or negotiated without compromising the purpose or accuracy of the instrument.

There is much evidence to suggest that there is scope to improve the level of cost-effectiveness. Some work remains to be done in order to further analyse whether the right instruments are in the right places, i.e. how instruments address different types of environmentally harmful behaviour and its underlying driving forces. Combinations of instruments must be analysed further so that we can understand how instruments complement each other and avoid ineffective double management where two instruments address the same behaviour. We need to improve our understanding as regards all environmental objectives. However, as with all balances, knowledge acquisition should only be carried out when the benefits of the knowledge are considered to outweigh the cost to society.

One conclusion is that, in order to make the work relating to the environmental objectives more cost-effective, it will be important to avoid deviations from the polluter pays principle.

An example of an area where there is a need to review the instruments currently in use is agriculture, which could hold polluters more accountable for the environmental costs of agricultural production, e.g. through the imposition of a tax on phosphorous and nitrogen in commercial fertilisers.

The Environmental Code constitutes framework legislation which in many areas is based around the establishment of practice. The 16 years that have passed since the establishment of the environmental objectives have not yet seen the establishment of any clear practice as regards the balancing principles in Chapters 2:7 and 11:6, i.e. how the costs incurred by enterprises must be balanced against the benefits accruing to society through a measure (not only to reduce discharges into the atmosphere and aquatic environment, but also where applicable benefits for biodiversity and other collective benefits). One consequence of this lack of clarity in practice is that enterprises are permitted to carry out activities which have negative environmental impacts without implementing any measures if they are able to demonstrate that the necessary measures would be expensive, irrespective of the costs that would be incurred as a result of the resultant environmental damage. It takes time for a practice to become established. Guidance from the Environmental Protection Agency could clarify established balancing methods.

There is also a need for clearer management by objectives, particularly linked to voluntary undertakings in the provisions of the Forestry Act. To further improve the cost-effectiveness, the competent government agencies should be urged to investigate the consequences of better application and compliance in the event that the sections of the Forestry Act concerning the environment are implemented in the Environmental Code. The polluter pays principle needs to be reviewed if it is to be applied more clearly in the current forestry policy. For example, this applies to the determination of the areas within which it would be effective to continue with voluntary agreements and within which areas instruments are necessary. Forests with a
high continuity value should be mapped and habitat protection reviewed. As regards thinning in continuity forests and objects of natural value, the benefits of introducing a duty of notification appear to outweigh the disadvantages. The consequences of the current view of ownership rights and the Forest Agency’s practice concerning the limitation of encroachment also need to be investigated. In summary, it can be stated that, in order to boost cost-effectiveness, it will be important to require and facilitate clearer management. This management must not solely be based on voluntary undertakings by forest and land owners. It should be profitable for an ambitious commercial forester to do what will benefit the whole of society.

An example of an area where the framework conditions necessary to reap coordination gains are in place is spatial planning. It is important to improve the framework conditions for a consensus between planning and environmental issues in order to avoid expensive lock-in effects. A stronger focus on activities that are environmentally harmful, where the major environmental gains can be made and the decisions and choices which cause environmental damage, would make it easier to show how priorities should be established in the transition towards the environmental objective A good built environment. There are also existing instruments in place within the area of clean air which overlap each other. To achieve the objective concerning Clean air, emissions of nitrogen oxides and other gases must be cut. The nitrogen oxide tax and the issuing of permits for emission ceilings are two instruments which are used to cut nitrogen oxide emissions from point sources, i.e. permanent incineration plants. A high proportion of the major incineration plants in Sweden have an emissions ceiling for nitrogen oxides, which is imposed through permit appraisal. These sources are also covered by the nitrogen oxide tax system. However, both instruments regulate the same emissions, and therefore the same choices and behaviour. This results in double management. This causes problems. As both instruments correct the same externality, at least one is superfluous. Only one instrument governs emissions. However, both instruments consume administrative resources. Double management is more expensive, but will not result in more management than if only one of the instruments regulated emissions.

The UN’s Convention on Long-Range Transboundary Air Pollution and the EU’s Ecodesign Directive are currently being negotiated. They could pave the way for new, nationally formulated instruments. Instruments could perhaps be formulated for particulates and nitrogen oxides from road traffic, ground-level ozone in confined street spaces, the use of windshield washer liquids and other household solvent use, as well as for emissions from solid fuel stoves. When these instruments are developed, it is important that they are sufficiently accurate to ensure that the driving forces behind the various emission problems are investigated and that attempts are made to utilise the instrument options which best overcome separate problems. Each secondary objective and secondary problem requires its own solution. Economic instruments may be the most accurate in some cases, while in others, planning tools can help to overcome more geographically associated situations. A central instrument may perhaps need to be indirectly linked to other instruments, and perhaps also to separate compensatory measures, in order to ensure that a new instrument is accepted. To bring about socio-economically cost-effective management by objectives as regards regional and national atmospheric emissions (which
in a socio-economic sense consists of externalities which the socio-economy needs to internalise), it is desirable that any compromises which are established retain the incentive structure which promotes the polluter pays principle.

**Steps towards objective fulfilment**

Although we know little about the effects of instruments, it is often concluded that instruments and measures are inadequate. Environmental objectives are visionary in nature. Defining the objective levels which need to be achieved and clarifying the cause and effect between initiatives and objectives improves the chances of assessing the effects of instruments and measures on the state of the environment. In the next step, this will help to make the environmental work more effective.

The environmental work is being carried out in an ever-changing world. It can take a long time before positive or negative effects on the state of the environment become apparent in the environment. Achievement of the environmental quality objectives is therefore subject to considerable uncertainty, which in turn impacts on the assessment. How the rate of change in the objectives can be influenced, to what extent it can be influenced, which aspects of the objective are influenced and when the impact occurs are all questions which could help to establish priorities between different aspects of the environmental work.
2. Framework conditions for societal transition

**THE AIM OF THIS CHAPTER IS TO SHED LIGHT ON** the framework conditions for the societal transition that will be needed to ensure that the environmental objectives are achieved. This is done on the basis of the generational goal’s bullet points, which describe the state of, the use of, and the impact on the natural environment, and the impact of the natural environment on human health. These, together with the portal description, can be said to cover both permits (environmental and health), and processes and driving forces, and show the direction of the transition for three interacting systems (biophysical, societal and social systems).

In this chapter, it is stated that, in order to bring about a societal transition towards the established environmental objectives, the necessary framework conditions for such a transition must be enhanced. This involves clarifying the driving forces and behaviour which have a positive or negative impact on the state of the environment, and steering a course either against or with these forces to a greater extent when establishing instruments. In turn, driving forces and behaviour impact on processes and activities in society. The cause and effect analyses for the in-depth evaluations for each objective revealed a number of areas within which activities and processes have a major impact on most of the environmental objectives. One step that can be taken towards the transition that is necessary is to improve resource-effectiveness within these areas. One of the strongest driving forces behind activities which have an impact on the environment is consumption. Consumption is the generational goal’s bullet point which is influenced by most megatrends, and the ecological footprint of consumption by Swedes is incompatible with long-term sustainable development globally. Sweden must therefore take greater responsibility for the environmental and health impacts that our consumption generates in Sweden and elsewhere.

### 2.1 The generational goal and sustainable development

“The overall goal of Swedish environmental policy is to hand over to the next generation a society in which the major environmental problems have been solved, without causing increased environmental and health problems outside the borders of Sweden.”

The generational goal is a general objective for environmental policy. The objective provides guidance concerning the values that must be assured and the societal transition that is necessary in order to achieve the desired environmental quality. The generational objective provides guidance for the environmental work that is being conducted at every level of society and also characterises the content of the ecological dimension of sustainable development.

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Sustainable development links together ecosystem sustainability and social and economic sustainability. They form an entirety with clear cause and effect relationships and mutual dependency. The ecological dimension is essential for both social and economic sustainability, while the social dimension establishes the framework for the economic dimension. Ecological sustainability in the long term is dependent on social and economic sustainability.

Figure 1 below shows the relationship between three systems, or framework conditions, for the three sustainability dimensions: the biophysical, the supporting societal system and the social system. The biophysical system encompasses the natural environment, the supporting societal system concerns the political, institutional and economic framework, and physical infrastructure, and the social system concerns people and culture, standards and values. The relationships between the three systems illustrated in the figure are based on the extent to which resources in the natural environment are consumed. The scope and impact of the consumption on the natural environment will then depend on the formulation and driving forces of the societal system and the social systems, e.g. financial incentives, the relocation of people, standards and values. The supporting societal system forms the link between the natural environment and humans. A transition to a sustainable society entails changes within and between all three systems.

Figure 1: Systems which create the framework conditions necessary for sustainable development. The figure was inspired by Koca, D. et al. (2013) and others.

Comprehensive societal changes will be needed in order to tackle and overcome the environmental problems that we face. Different countries have adopted different approaches as regards how the societal transitions should be defined and brought about. Regardless of whether it is an environmental objective or an innovation programme that is to direct and drive the transition, very complex systems will be involved, with many actors at all levels and different driving forces involved.
2.1.1 The generational goal's aspects

Within the environmental objective system, the generational goal is intended to set out the direction of the transition that will be necessary. The seven bullet points of the generational goal indicate that environmental policy should focus on ensuring that:

1. **Ecosystems** have recovered, or are on the way to recovering, and their ability to generate ecosystem services in the long-term has been safeguarded;
2. **Biological diversity** and the natural and cultural environment is conserved, promoted and utilised sustainably;
3. Human **health** is exposed to minimal adverse environmental impact, while the positive impact of the environment on human health is promoted;
4. **Material cycles** are resource-efficient and free from hazardous substances insofar as is possible;
5. **Natural resources** are conserved appropriately;
6. The share of **renewable energy** is increasing and use of energy is efficient, with minimal impact on the environment.
7. **Patterns of consumption** of goods and services cause the least possible problems for the environment and human health.

The bullet points describe the state of, the use of and the impact on the natural environment, as well as the impact of the natural environment on human health. These, together with the portal statement, can be said to cover states (environmental and health-related), processes and driving forces. They indicate the direction of the transition in relation to the three systems (biophysical, societal and social systems) with the natural environment as a starting and focal point. The bullet points include points which concern ecosystems and ecosystem services, biodiversity, human health and natural resources, particularly state-oriented (even if the state is influenced by driving forces and processes/activities in society). The bullet points concerning resource-efficient cycles and energy use are primarily process-linked. The bullet point concerning patterns of consumption are primarily driving force-oriented. However, like the environmental quality objectives, they have many cause and effect relationships and mutual dependencies, as they operate within a complex system with different levels. Figure 2 below illustrates the generational goal based on the concepts of driving force, process and state).

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**Figure 2: The generational goal illustrated as driving forces, processes, environmental state.**
2.1.2 Driving forces for the societal transition

In this in-depth evaluation, three focus areas have been analysed specifically: Sustainable consumption, Environmental work of industry and Sustainable cities. These focus areas were chosen in consultation with many actors and competent government agencies. These focus areas and associated actors, activities and effects have a major impact on the scope to achieve the environmental objectives. Within all three focus areas, it is emphasised that driving forces are vital in determining the degree of environmental impact to which activities and processes give rise. Taking into account, countering or exploiting these driving forces when formulating instruments will be vital in order to utilise positive driving forces in the best possible way and alter the framework conditions for driving forces which work against the achievement of the objectives.

CONSUMPTION AS AN IMPACT FACTOR

The generational goal’s bullet point concerning the impact of patterns of consumption on the environment and health is the point which has the clearest link to the driving forces and trends which impact on society. Consumption is an impact factor for activities which impact on the environment. That consumption impacts on the scope to achieve most of the environmental quality objectives and the generational goal was one of three messages in the 2012 in-depth evaluation of the environmental objectives (Steg på vägen – Fördjupad utvärdering av miljömålen 2012).

Today, the ecological footprint of consumption amongst Swedes is growing and has now reached a level that is incompatible with long-term sustainable development globally. Individuals may find it hard to adjust what, how and why they consume, i.e. their patterns of consumption. Many different structural mechanisms govern consumption. These are partly linked to social norms and expectations, values and habits, psychological factors, time and private finances. Double signals from governments and government agencies, as well as infrastructure and urban planning, also influence the way in which we consume. The report on the focus area Sustainable consumption describes these mechanisms with the aid of examples.

The major opportunity for transition is concentrated amongst all the actors in society, and will entail changes for both consumers and producers alike. To bring about environmentally sustainable patterns of consumption, measures to promote changes in supply still need to be developed. Initiatives and measures are also needed in the trade sector to promote environmentally sustainable consumption. In this context, the importance of other factors such as media, advertising and influences via social media will also play a role, and can be expected to have a major influence on the consumption of private individuals. At the same time, it can be noted that instruments for reducing the environmental impact of consumption rarely have a direct chain of effects. The impact of products and services on the

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environment and health can also often be separated in terms of both time and space from where they are consumed, which complicates the direct feedback as regards behavioural changes.\textsuperscript{16}

**THE FUNCTION OF SPATIAL PLANNING**

The function of spatial planning is to control and steer spatial developments in the direction of the objectives which have been established for society. This means that different societal goals and policy areas must be balanced against each other, and sometimes also against different environmental quality objectives. In a report on the focus area Sustainable cities, it is stated that a key reason why existing spatial planning instruments will not be sufficient to achieve the environmental quality objectives is that they do not impact on the driving forces behind urban development. Another reason is that planning processes and environmental work take place in different paradigms, and that environmental aspects are not given sufficient status but are eliminated through negotiations. The development of instruments therefore needs to be based on, or targeted at, the driving forces which are leading to rural depopulation and increases in urban density. Examples of underlying driving forces which are highlighted are: the impact and driving of spatial planning due to initiatives to bring about growth, the capital gains taxation which is preventing the effective utilisation of the existing housing stock and the travel allowance.\textsuperscript{17}

**DRIVING FORCES IN THE ENVIRONMENTAL WORK OF INDUSTRY**

Driving forces which are highlighted in the focus area “Environmental work of industry” include cost minimisation and trademark protection. A credible trademark generates interest and loyalty amongst customers, which in turn generates profitability. Another key driving force behind transition and environmental product development is customer requirements, e.g. in connection with public sector procurement. Active actors in the form of enterprises and public sector actors which impose strict environmental requirements on their suppliers is one of the most important forces for change. For innovative and proactive enterprises, stricter regulation can present opportunities to win market share from competitors which are less resource-efficient, for example. Behind various market-related requirements, there can often be some form of instrument in the form of regulations or taxes, for example. However, the opposite is also true of course, i.e. behind legislative requirements, there is often ultimately a requirement on the market. Personal engagement also plays a part in determining how committed enterprises of different sizes are in their efforts relating to the environment.\textsuperscript{18} When formulating instruments, it is important to utilise the driving forces that incentivise enterprises into carrying out more extensive environmental work.

\textsuperscript{17} Naturvårdsverket (2015b) Mot en hållbar stadsutveckling – Med fokus på miljömålen i planeringsprocessen.
\textsuperscript{18} Naturvårdsverket (2015a) Miljö- och klimatarbete i näringslivet En översikt med fokus på drivkrafter och klimat p. 82 f.
2.1.3 Processes which must be influenced can be brought together in areas
At a cross-objective level, it becomes clear that the reasons that lie behind the negative impact on the objectives can be summarised within a number of areas. These areas are defined partly by activities which are taking place within a particular area in Sweden and partly by the type of impact from the outside. It is these activities and circumstances which must be changed if we are to get closer to achieving the environmental status that is expressed by the environmental quality objectives within a generation, i.e. it is here that the key environmental problems that are now relevant can be found.19

The areas also encompass activities which have a positive impact on the environmental quality objectives. These occur to a lesser extent than the negative impacts.

These areas are:

<table>
<thead>
<tr>
<th>a) Agriculture</th>
<th>f) Mining</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Forestry</td>
<td>g) Waste</td>
</tr>
<tr>
<td>c) Industrial production</td>
<td>h) Construction/planning</td>
</tr>
<tr>
<td>d) Road transport</td>
<td>i) Import of pollutants</td>
</tr>
<tr>
<td>e) Energy production</td>
<td>j) Climate change</td>
</tr>
</tbody>
</table>

In some cases, the areas coincide with branches or sectors in society where the actors are easy to identify. In other cases, the areas are defined more according to the type of environmental impact on the environmental objectives that are involved. Areas (a)–(h) are characterised by activities which physically take place in Sweden. Area (i) (import of pollutants) is the impact on the state of the environment in Sweden which takes place as a result of activities in other countries. These are energy production, industrial production, treatment works, shipping etc. Area (j) covers the consequences for other environmental objectives to which the altered climate gives rise.

The driving forces and behaviours which are described above, such as consumption, financial profitability, migration, urbanisation, values and the polarisation of power, change the way and the extent to which the activities that the areas cover. In turn, the activities impact on the state of the environment and thereby the scope to achieve the environmental objectives.

Figure 3 shows the relationship between driving forces and the areas and their associated activities/processing which impact on the state of the environment. The focus in the figure is placed on the cause and effect direction indicated by the arrows, but there are also interactions and reverse cause and effect relationships within and between the various levels in the figure.

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19 This is based on ongoing work by the Environmental Protection Agency (Naturvårdsverket (07396-13) Modellering av miljömålen i ett dynamiskt perspektiv – En identifiering och analys av de nyckelfaktorer och effekter som enskilt eller gemensamt förstämmer och/eller motverkar måluppfyllelsen av miljömålen).
Figure 3: Activities which impact on most of the environmental objectives, broken down between areas, underlying driving forces and impacts on the state of the environment.

In-depth discussions concerning the areas and their impacts on the environmental objectives, the goals that are affected and why are presented in Chapter 3.

2.2 Resource efficiency linked to the state of the natural environment and activities in society

Resource efficiency measures the relationship between the burden on nature caused by society in the form of the extraction of resources from the natural environment, pollutants in the natural environment and the pressure on ecosystems – and the rate of economic growth. Improving resource efficiency is about changing driving forces and social activities and is an important aspect of a societal transition towards the desired state of the environment. Improving resource efficiency is a key part of the EU’s ten-year strategy for growth and jobs. The efforts being made relating to resource efficiency encompass not only the identification of new ways of reducing the consumption of resource inputs, optimising production processes and improving the management of resource reserves, but also the development of new energy-efficient products and services, waste prevention and changing patterns of consumption.

The impact that the areas described above have on the environmental quality objectives can be linked to the resource efficiency aspects: ecosystem framework conditions, the consumption of natural resources and the pollution of the natural environment. The impacts on the environment based on these components must be limited if the desired state of the environment for the environmental quality

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objectives is to be achieved. The transition in how we utilise the natural environment will be essential in solving the major environmental problems in Sweden without causing more environmental and health-related problems outside Sweden’s borders.

Within each area are impacts on resource efficiency linked to the Swedish environmental objectives. Some of them (energy production and agriculture) impact on all three aspects, while others (climate changes) impact on one of them. The question of what limits can be considered reasonable must be discussed.

*Ecosystems* can be defined as “a dynamic complex of plant, animal and microorganism communities and their non-living environment which interact as a functional unit.”23 The areas impact on the framework conditions of ecosystems, particularly through the extractions that are made from them. Extractions also lead to fragmentation of the landscape. Examples include forest roads for the forestry sector and the impact of hydroelectric power. The construction of roads for transport and construction purposes, and municipal planning are other activities which are contributing to the fragmentation of the landscape. Agriculture does not only have a negative impact on ecosystems. Depending on the type of agriculture, it may also create the right conditions for the maintenance of ecosystems and biodiversity through land management, for example. Climate changes with changes in temperature and precipitation have a major impact on the framework conditions of ecosystems.

Management and measures to maintain and support green infrastructure can help to counter fragmentation. Green infrastructure can be defined as “structures in the landscape and the use thereof which ensures the long-term survival of habitats and species, by safeguarding opportunities for spreading and thereby maintaining the ability of ecosystems to provide key ecosystem services.”24 In order to strengthen the development of green infrastructure, overarching comprehensive spatial planning of the landscape will be necessary, along with instruments which help to protect, manage and (re)create key structures in the landscape.25

Minerals, oil, gas and coal are not renewable natural resources; they are currently used as materials and energy sources in a way which depletes the Earth’s resources. The time span for how long the reserves will last can be extended either through re-use or through the more efficient use of the resources.26 Agriculture, forestry, energy production and mining are all areas which consist of, or are dependent on, the extraction of natural resources, both renewable and non-renewable. Today, the inhabitants of Europe are consuming more natural resources per capita than in most other parts of the world. Research indicates that a future sustainable lifestyle would entail the average consumption of materials per person being reduced to around a quarter of current levels.

An *ecosystem service* can be defined as “the direct and indirect contributions of ecosystems to human well-being”. They encompass processes and functions in ecosystems and their species which contribute to biodiversity and the production of

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benefits/goods. All areas are dependent on the extraction and utilisation of ecosystem services, which can be categorised according to their characteristics, such as supplying, regulating, maintaining and cultural. Examples of supplying ecosystems are food such as grain and meat from domesticated land animals within the area of agriculture, and timber and bioenergy within the area of forestry. Pollination and global climate regulation are examples of very important regulating/maintaining ecosystem services which are affected by activities within the agriculture and forestry sectors, among other things. Examples of cultural ecosystem services are outdoor recreation and natural heritage, which are affected by the exploitation of land for different purposes.

Over-extraction and other human impacts can put stress on the underlying functions and processes of ecosystems, with the result that the ecosystem changes. The consequence may then be that some ecosystem services can no longer be produced. The ability of ecosystems to cope with interference is called ‘resilience’ and partly depends on the biodiversity in an ecosystem. In this way, diversity represents an insurance policy which ensures more scope to maintain functions and processes following disruption. We often take it for granted that the Earth’s natural systems will ensure the regrowth, replenishment and cleaning of the renewable resources.

Many activities give rise to pollutants. Discharges into the aquatic environment, land and the atmosphere of eutrophying and acidic substances, air pollutants, carbon dioxide and toxins occur to varying degrees in all areas.

2.3 Sweden’s role in the global environmental impact

Per capita, Swedish society causes a substantial impact on the environment globally. In 2014, Sweden had the tenth largest ecological footprint per capita in the world. Environmental and health-related impacts in other countries caused by consumption by Swedes is part of this, as a high proportion of the products we consume are manufactured in other countries. Environmental impacts take place both locally and globally. Such impacts occur during raw material extraction, manufacture, transport and disposal of the waste. The causes of the environmental problems which the environmental objectives are intended to solve originate from production in Sweden (discharges and impacts locally), Swedes’ consumption and lifestyles (discharges from production processes in other countries and travel by Swedes, e.g. air travel),

as well as the discharges which occur in other countries which are not caused by Swedes’ consumption and lifestyles. These three factors are linked to each other and cannot be completely separated, but can still be described at a general level as illustrated in Figure 4 below.

Figure 4: Different types of impact on the Swedish environmental objectives – a geographical perspective.

A) Activities in Sweden which impact on the state of the environment in Sweden nationally and globally.

B) Swedish consumption as a basis for activities which impact on the environment in other countries, i.e. global impacts.

C) Activities in other countries (independent of Swedish consumption) which impact on the global state of the environment.

A) Activities in Sweden which impact on the state of the environment in Sweden nationally (all environmental quality objectives) and globally (Clean air, Reduced climate impact, A protective ozone layer, A balanced marine environment, flourishing coastal areas and archipelagos, A non-toxic environment, Zero eutrophication, Natural acidification only).

B) Swedish consumption as a basis for activities which impact on the environment in other countries, i.e. global impacts (including Clean air, Reduced climate impact, A protective ozone layer, A balanced marine environment, flourishing coastal areas and archipelagos, A non-toxic environment, Zero eutrophication, Natural acidification only).
C) Activities in other countries (independent of Swedish consumption) which impact on the global state of the environment (including Clean air, Reduced climate impact, A protective ozone layer, A balanced marine environment, flourishing coastal areas and archipelagos, A non-toxic environment, Zero eutrophication, Natural acidification only).

The generational goal is affected by all three flows. It is difficult to know at the present time how much these flows and causes impact on the framework conditions for the achievement of the environmental quality objectives. This is because of the structure of the global economy and the difficulty of measuring environmental impacts and discharges linked to it. Consumption and its environmental impacts form a key aspect of the generational goal. In the in-depth evaluations of the environmental quality objectives, consumption patterns are identified as a barrier to the achievement of certain objectives, such as Reduced climate impact, Clean air and A non-toxic environment. The work carried out within the focus area has also defined links between consumption and environmental impacts for the environmental objectives A balanced marine environment, flourishing coastal areas and archipelagos and A good built environment.31

2.3.1 The impact of global trends on the Swedish environmental objectives

In the same way as behaviour and activities which occur in Sweden impact on the state of the environment both in and outside Sweden’s borders, behaviour and activities at global level also impacts on the state of the Swedish environmental objectives and the direction and rate of the necessary societal transition which the generational goal stakes out. The European Environment Agency (EEA) has developed eleven global megatrends32, each of which describes the changes in societal development at global level which impacts on the societal transition taking place in Sweden and Europe. The eleven megatrends described by EEA impact on Sweden to varying degrees.

A study of the impact of these megatrends on the Swedish environmental objectives indicates that the generational goal and its bullet points are affected to varying degrees. The megatrends describe the development of global phenomena linked to state (climate changes) or behaviour (urbanisation) which have a global manifestation. The common factor for the megatrends is that they are driven by small systems at local level, such as a population increase which becomes apparent at global level in the form of overpopulation and migration. In these contexts, it will be important to identify the driving forces behind each megatrend and observe how they impact on the national level. Global driving forces affect Sweden to varying degrees, and the feedback to the global level takes place through the local and national activities (such as the follow-up of global agreements, etc.). Sweden is both affected by the outside world and affects it (albeit to a small degree).

The eleven global megatrends have both positive and negative impacts on the bullet points, but the impacts vary in scope depending on the bullet points and trends concerned. For example, “green” bullet points (1, 2 and 5), and health (3) all have a strongly negative impact. This relates to the link to the global processes of climate change, unsustainable burden on the environment and depletion of natural resources. The bullet points that are affected positively by the global megatrends are the technology-related megatrends: material cycles (4) and renewable energy (6). “Consumption” (7) is the only bullet point which is affected both positively and negatively.

As Figure 5 below shows, the global megatrends developed by the EEA impact on the bullet points of the generational goal to varying degrees. Of the seven bullet points, only material cycles and renewable energy are affected positively by the trends. Biodiversity, health and ecosystems are negatively affected. Consumption and natural resources are both positively and negatively affected. The scale shows a relative impact.

Figure 5: The impact of the megatrends on success for the bullet points of the generational goal. Source: Lorenz and Haraldsson 2014
Two of the study’s general conclusions are that tougher global competition for natural resources encourages technological advances and that the scope for alternative solutions for efficiency improvements is improved through international environmental regulations. Consumption and biodiversity are the bullet points which are affected by the most trends. Consumption is a large area and represents a burden for the environment, but global competition for natural resources and global environmental regulations create positive driving forces for the initiation of sustainable consumption.33

33 Lorenz and Haraldsson (2014) Impact assessment of global megatrends Two case studies connecting global megatrends to regional topics.
3. The environmental work could be developed within areas

The purpose of this chapter is to address the framework conditions for, and the barriers to, the environmental work and the way in which this work can be developed further. This is done on the basis of the cause and effect analyses which were carried out in the in-depth evaluations for each of the objectives. Among other things, the cause and effect analyses identify the activities that give rise to environmental problems which run counter to the desired state of the environment for many of the objectives. These activities can be found in the areas which were presented in the previous chapter. In turn, the areas provide a basis for an analysis of the framework conditions and barriers in the environmental work.

The chapter describes the areas based on the environmental problems to which they give rise and the scope for improvements to the state of the environment which they encompass. It is apparent that an analysis of the environmental problems and the environmental work with the areas as a starting point clarifies the changes in activities that will be needed in order to get closer to the desired state of the environment for many of the environmental quality objectives.

3.1. Description of the areas and how they impact on the environmental quality objectives

Because of its discharges into the aquatic environment and atmosphere, the area of agriculture impacts on many objectives. Agricultural activity is also a fundamental prerequisite for the management and maintenance of land and thereby safeguards biodiversity, protects cultural environments and promotes outdoor recreation. An increase in the number of farms is essential if the objective for a varied agricultural landscape is to be achieved.

Environmental impacts partly take place through nutrient inputs into land and the aquatic environment. Nitrogen and phosphorous have a eutrophying effect on lakes, watercourses, land and marine areas. Nitrogen is converted to nitrous oxide and therefore has a major impact on the ozone layer and the climate objective. Agricultural activity can impact on the status of groundwater through discharges of nutrients, bacteria and pesticides, and through the extraction of irrigation water. Biodiversity is affected both positively and negatively by agricultural activity. The use of pesticides impacts on living organisms, lakes, watercourses, land and marine areas. Ammonia has an acidifying effect.

Forestry can have an acidifying and eutrophying effect on land and water, depending on how the forestry is practised. The way in which forestry is practised also impacts on the framework conditions for biodiversity (favourable conservation status, etc.) and for outdoor recreation and cultural environments. Forests as a renewable resource have a role to play in the climate-related transition.

Waste management is vital for a good built environment. Part of the objective relates to the need to ensure that waste management is sustainable, i.e. the volumes
and the hazardousness of waste must be reduced and resources must be safeguarded. The presence of hazardous substances in waste complicates the recycling of materials, a point which is noted in the in-depth evaluation of *A non-toxic environment*. The incorrect incineration of insulating materials as waste is contributing to the depletion of the ozone layer. Many toxins from products end up in natural cycles, e.g. medicines, cosmetic products and materials. Emissions from the incineration of waste have a negative impact on both the climate and air quality, and affect living organisms, land and water.

Mining involves the exploitation of land with many negative consequences for biodiversity, the conservation of cultural environments, good water status in lakes and watercourses, groundwater status, etc. Quarrying causes emissions of hazardous substances. The development of infrastructure (roads, power lines, etc.) and the use of adjacent land for storage purposes, enrichment plants, etc. all fragment the landscape. The visual impact can be considerable. Hydrological status is affected.

Industrial production primarily causes discharges into the atmosphere and aquatic environment in the form of nitrogen oxide, ammonia, sulphur dioxide, phosphorous and carbon dioxide. The production of energy also causes discharges into the atmosphere and aquatic environment, primarily in the form of discharges of nitrogen and sulphur but also in the form of hazardous substances. Some of the environmental problems associated with energy production relates to the exploitation that it causes in connection with wind and hydroelectric power and the associated infrastructure (new roads) that is required. Peat extraction impacts on the surrounding land and risks disturbing ancient monuments adjacent to wetlands. The visual impact can be considerable. The impacts vary between the types of energy production.

Both energy production and industrial production have a eutrophying and acidifying impact on water and the land. Emissions impact on the climate and all “air-related objectives”. Land use impacts on many “green objectives”.

The way in which the environmental perspective is handled in land use planning and spatial planning processes under the Planning and Building Act impacts on many environmental objectives. This handling concerns the municipal responsibility for the planning of land and aquatic areas within the boundaries of the municipality, including traffic planning in urban areas. The way in which urban areas are planned and the areas that are taken into use, increases in urban density and urbanisation also impact on the achievement of many objectives, including *A rich diversity of plant and animal life*, *Clean air* and *A good built environment*. Increases in urban density also impact on the availability of green areas for outdoor recreation in urban areas (*A rich diversity of plant and animal life* and *A good built environment*). The planning of aquatic areas in municipalities and the consideration that is given to occurrences of water in planning processes, etc. impact on *Good-quality groundwater*. The environmental impact of construction relates to waste and property management, as well as the environmental impact that is caused by the construction process. Construction materials can contain hazardous substances, which is of relevance to the achievement of the objectives *A good built environment* and *A non-toxic environment*. Household energy use impacts on the climate, and energy efficiency is an important aspect of the generational goal.
‘Road transport’ covers both road construction (exploitation) and emissions from vehicular traffic on the roads. Discharges take place into the atmosphere, land and aquatic environment. Exploitation impacts on the landscape by causing fragmentation, which adversely affects the framework conditions for green infrastructure and the conservation of biodiversity. Noise impacts are often substantial.

A significant proportion of the pollutants that give rise to environmental problems in Sweden originates from activities which take place in other countries. The area “import of pollutants” includes acidifying and eutrophying substances in the air or water, as well as toxins in the air, water and marine environment, and marine litter. The causes of emissions are international shipping, industrial production, energy production, waste treatment, etc. and the sources are situated outside our borders.

Climate changes give rise to changes in temperature, circulation patterns, air chemistry, etc. They impact on many environmental objectives, as changes in conditions lead to changes in living conditions for humans, plants and animals.

3.1.1. Which environmental quality objectives are affected by which areas?
The activity being carried out in the areas has an impact on all environmental objectives, as shown in the table below. The following review presents a simplified and cross-objective picture of the environmental impacts linked to the areas.

In addition to the areas mentioned above, individual objectives or, in some cases, two to three objectives may be affected. Those referred to here are particularly apparent in the background reports. Off-road driving has a major impact on **A magnificent mountain landscape** and **Flourishing wetlands**. Dredging operations impact on **A balanced marine environment, flourishing coastal areas and archipelagos**, while fisheries impact on **Flourishing lakes and streams**, **A balanced marine environment, flourishing coastal areas and archipelagos** and **A magnificent mountain landscape**. Individual wastewater discharges impact on **Flourishing lakes and streams**, **Zero eutrophication** and **Good-quality groundwater**.
Table a. Impact of the areas on the objectives based on the cause and effect analysis described in the in-depth evaluation of each objective, in addition to Safe radiation environment.  

<table>
<thead>
<tr>
<th>Objective Description</th>
<th>Agriculture</th>
<th>Forestry</th>
<th>Industrial prod.</th>
<th>Energy prod.</th>
<th>Mining operations</th>
<th>Waste</th>
<th>Construction/planning</th>
<th>Road transport</th>
<th>Climate change</th>
<th>Import of pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced climate impact</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Clean air</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Natural acidification only</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A non-toxic environment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A protective ozone layer</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Zero eutrophication</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Flourishing lakes and streams</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Good-quality groundwater</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A balanced marine environment, flourishing coastal areas and archipelagos</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Flourishing wetlands</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Sustainable forests</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A varied agricultural landscape</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A magnificent mountain landscape</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A good built environment</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A rich diversity of plant and animal life</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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34 The table has been reviewed and amended based on proposals by the competent government agencies. At the time of this cross-objective analysis, the in-depth evaluation for Safe radiation environment was not available.
3.2. Scope linked to the areas

The Swedish environmental objectives have a national focus in the sense that the quality of the environment that they express must be achieved in respect of Swedish air quality, biodiversity, water quality, emissions, etc. This is also one aspect of the basis for assessment to which the objectives must be related. However, instruments and measures to solve environmental problems may exist at national, EU and international level. The way in which these instruments and measures function and the effects that they have on the state of the environment is the second aspect of the basis for assessment.

Another reason for the subdivision into areas is to clarify the scope and room for manouevre in order to remediate the environmental problems. In this context, “national scope” means that the Swedish public administration has the scope to approve instruments and measures which will eliminate the obstacles to achieving the objectives that exist. If the causes and emissions occur in Sweden, a certain type of instrument and measure will be required. If environmental problems are caused by imports from other countries or stem from problems at global level, multilateral instruments will be needed. However, scope is a complex issue. Although decision-making powers are an issue which concerns emissions at national level, the causes of environmental problems may lie at a different level, where very different instruments are needed. Agriculture is a clear example of an area where agricultural policy has been harmonised within the EU, which reduces Sweden’s scope to pursue a separate policy within the area.

The area is also exposed to considerable international competition.

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36 Read more in Naturvårdsverket (2012b) Uppföljning av generationsmålet – Underlag till den fördjupade utvärderingen av miljömålen 2012 kapitel 5.
4. Key instruments in focus

The purpose of this chapter is to describe and analyse the instruments that are key to achieving the objectives at cross-objective level. The chapter contains three parts. A discussion is first presented concerning the instruments that are relevant to many objectives, the effects that these instruments have had on the environmental objectives and the problems and obstacles that are apparent in the background reports. The effects of the instruments and measures in terms of changes to the environmental work and, in particular, the state of the environment are key in the assessment of the objectives. The instrument and measure gaps that exist today can be analysed at a cross-objective level from an objective and result management perspective. This is done in the second part of the chapter. This concerns a cross-objective analysis of where in the cause and effect change clear deficiencies in the environmental work exist. The third part presents a discussion of the way forward: Which instruments and measures should be introduced or revised in order to accelerate the environmental work?

The effects of the instruments and measures are not considered to be sufficient to achieve the objectives in the case of 14 out of 16 of the objectives. Based on all the in-depth evaluations of the environmental quality objectives, it is clear that the reasons behind the lack of effects can be explained on the basis of two perspectives. One is that the instruments and measures are not sufficient in relation to the context in which they operate. The other perspective relates to the time aspects and nature of the objectives. The environmental quality objectives have long deadlines and are visionary by nature.

The results from this chapter indicate that many instruments have a substantial impact on the achievement of the objectives. The Environmental Code in its entirety is considered to be central to all objectives. This in-depth evaluation specifically highlights examples linked to the following parts: Chapters 2, 5, 6, 12 and 26, as well as the chapters which concern permits and appraisal. Other key instruments are the Forestry Act, the Planning and Building Act, the farm payments and the Rural Development Programme’s environmental payments, state measures (e.g. land acquisitions and the LONA local nature conservation initiative), and the UN’s Convention on Long-Range Transboundary Air Pollution and its protocols, as well as the National Emission Ceilings Directive. One conclusion is that changes and improvements to the abovementioned instruments will impact on the environmental work.

4.1. Analysis of instruments and measures is key in the monitoring of the environmental objectives

The assessment of objective fulfilment in accordance with the Government Bill *Svenska miljömål – för ett effektivare miljöarbete*[^37] [The Swedish environmental objectives – for more effective environmental work] contains two aspects: the

government agencies must assess whether the state of the environment which the environmental quality objective describes will be achieved by the target year, and they must also decide whether the necessary framework conditions are in place in order for the environmental quality objective to be achieved. The necessary framework conditions for achieving the objective must be deemed to be in place if national and international instruments have been approved, with the consequence that sufficient measures will be implemented before 2020/2050 in order to enable the environmental quality or the state that the environmental quality objective describes to be achieved at a later date. The basis for assessment requires extensive knowledge concerning both the conditions in the state of the environment and the actual effects of the instruments and measures on the state of the environment.

4.2. What are the key instruments for achieving the environmental objectives?

In order to change an activity, a change in the behaviour of an actor will be necessary. The task of instruments is to create an incentive to bring about such a change. If it is targeted accurately, an economic instrument such as a tax can trigger a more or less immediate change in behaviour. Administrative instruments must usually follow a longer path through the administrative process (administration, planning and implementation of administrative measures) before they lead to changes in activities. There may be a lag in the effects on the environment, regardless of the type of instrument. In the same way as there numerous areas with various activities which have a substantial impact on most of the environmental quality objectives, a number of instruments are also key to achieving the objectives at a cross-objective level.

The in-depth evaluations of the environmental quality objectives conducted by the government agencies included an analysis of the causes of, and instruments for, solving the key environmental problems behind the objectives. A general conclusion is that the instruments aimed at achieving the environmental objectives will not be sufficient. The majority of the instruments which the competent government agencies have cited are expected to steer developments towards achievement of the objectives. Many instruments are highlighted and analysed in the in-depth evaluation of the environmental quality objectives. Most of them are relevant to several objectives.

There are several possible answers to the question of which instruments are key to the environmental work. This could be instruments which impact on most objectives, instruments which are aimed at remediying the most serious or urgent environmental problems, instruments which are most effective for bringing about change in the environment, and so on. Answering this question will be an important challenge in future in-depth evaluations.

As the importance for objective fulfilment and the actual effects of instruments cannot be assessed on a cross-objective basis, the occurrence of instruments in the objectives’ cause and effect analyses is one way of identifying which instruments are
key to the environmental work. This section is primarily based on Chapter 2 of the in-depth evaluations for each of the objectives: *Analysis of the framework conditions and causes of the situation for the objective.*

### 4.2.1. Which instruments are important for many objectives?

The general picture is that six instruments occur more frequently than others in the in-depth evaluations of the environmental quality objectives. These instruments are:

- Environmental Code (certain parts in particular, see section 4.3.1 below)
- Forest Act
- Planning and Building Act
- The farm payments and the Rural Development Programme’s environmental payments
- State measures such as land protection, local water management projects (LOVA), LONA
- UN’s Convention on Long-Range Transboundary Air Pollution (CLRTAP) and its protocols, as well as the National Emission Ceilings Directive

Insufficient information is currently available concerning the importance of each instrument for each objective, i.e. the extent to which changes to an instrument would close the gap to achievement of the objective. In addition to these six instruments, the competent government agencies have highlighted around twenty instruments in the in-depth evaluations of the environmental quality objectives.

#### Table 2: Instruments which are identified as being prioritised in the in-depth evaluations of a number of environmental quality objectives.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Environmental Code (certain parts in particular, see section 4.3.1 below)</th>
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<tr>
<td>Forest Act</td>
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<tr>
<td>Planning and Building Act</td>
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<tr>
<td>The farm payments and the Rural Development Programme’s environmental payments</td>
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<tr>
<td>State measures such as land protection, local water management projects (LOVA), LONA</td>
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<tr>
<td>UN’s Convention on Long-Range Transboundary Air Pollution (CLRTAP) and its protocols, as well as the National Emission Ceilings Directive</td>
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38 See the evaluation of the respective objectives in Naturvårdsverket (2015c), Mål i sikte. Analys och bedömning av de 16 miljökvalitetsmålen i fördjupad utvärdering 2015 Volym 1 och 2.

39 The background information was taken from the in-depth evaluation for the respective objectives, Chapters 2 and 5. This background information was based on an evaluation of the competent government agencies’ descriptions in the text. See Naturvårdsverket (2015c Mål i sikte. Analys och bedömning av de 16 miljökvalitetsmålen i fördjupad utvärdering 2015 Volym 1 och 2.
4.3. Instruments with considerable relevance for the environmental objectives and their effects

This section contains an overview of the effects of, and barriers linked to, the six instruments which occur for a number of objectives: certain sections of the Environmental Code, the Rural Development Programme’s environmental payments, the Planning and Building Act, the Forest Act, the UN’s Convention on Long-Range Transboundary Air Pollution and its protocols, the National Emission Ceiling Emissions Directive and state measures.

Based on the in-depth evaluations of the respective environmental quality objectives, we can obtain an indication of whether or not the instruments are effective, the problems that are linked to instruments, etc., but we do not know the role that they play in closing the gap to achievement of the objectives. A general picture is that these instruments are of fundamental importance for the environmental objectives and that many of them are making a positive contribution towards achievement of the objectives, yet there is also considerable potential for development.

4.3.1. Environmental Code (SFS 1998:808)

The Environmental Code is key to achieving the environmental objectives. The aspects that present particular challenges for the environmental work presented in this evaluation are:

- The general rules of consideration
- Provisions concerning environmental impact assessments and other strategic environmental assessments
- Permits and appraisals
- Inspections

Many of the 16 in-depth evaluations of the environmental quality objectives and the three focus area reports raise questions concerning the Environmental Code or the application of the Code. In a few cases, it is concluded that the Environmental Code is proving to be effective in overcoming the environmental problem concerned. In most cases, there is some form of shortfall or other difficulty in implementing the provisions of the Environmental Code. These deficiencies concern, among other things, complicated or difficult to interpret rules, conflicts between laws (Swedish laws or EU laws), deficiencies in the formulation of laws, poorly developed practice and a lack of resources or competence. More background information concerning the problems associated with the Environmental Code as an instrument is presented in Appendix 3.

4.3.2. The Rural Development Programme’s environmental payments and the farm payments

The Rural Development Programme’s environmental payments and the farm payments are highlighted as key instruments for Reduced climate impact, Zero eutrophication, Flourishing lakes and streams, Good-quality groundwater, A rich diversity of

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40 The Environmental Code is very important for all the environmental quality objectives and a number of chapters in it are highlighted in the government agencies’ in-depth evaluations of the environmental quality objectives.
plant and animal life, A varied agricultural landscape, Flourishing wetlands, Natural acidification only, A balanced marine environment, flourishing coastal areas and archipelagos and Sustainable forests.

In the in-depth evaluation of A varied agricultural landscape, it is stated that the farm payments help to keep extensive areas of agricultural land in use. The aid has positive effects on its own environmental objective, but it is also noted that the aid can have negative effects on other environmental objectives, such as Zero eutrophication. The environmental payments of the Rural Development Programme also help to keep large areas of grazing land in use and is the most important targeted economic instrument. The aid is considered to be socio-economically profitable, although its effects are the subject of some discussion. The in-depth evaluation of Zero eutrophication gives examples of evaluations of the Rural Development Programme, where it is stated that although the programme has been effective in reducing nutrient leaching, more targeted measures may be more appropriate. Overall, it is concluded that the Rural Development Programme's environmental payments and the Focus on nutrients aid programme have had a modest effect on reducing the impact of agriculture on eutrophication. The instability of the programme has made it more difficult for farmers to draw up long-term plans. This is claimed to be one reason why it has not been possible to make full use of the funding.

The in-depth evaluation of Reduced climate impact states that the Rural Development Programme has helped to reduce fossil fuel use in the agricultural industry. The Rural Development Programme has also contributed to important initiatives aimed at preserving and managing wetlands. The Rural Development Programme has furthermore been of considerable importance in promoting and conserving natural and cultural environments, as well as support for the work relating to threatened species, which has positive effects on A rich diversity of plant and animal life. Many forest aid initiatives also fall within the scope of the Rural Development Programme, such as the aid for competence development and direct measures (environmental investments) which have had a positive impact on Sustainable forests.

The in-depth evaluations for a number of the environmental quality objectives note that the Rural Development Programme and the farm payments may have more impact on the environment if fewer corrections were made.

4.3.3. Forest Act (SFS 1979:429)
The Forestry Act is identified as an important instrument for Thriving wetlands, Sustainable forests, A rich diversity of plant and animal life and Reduced climate impact.

The in-depth evaluation of Sustainable forests states that insufficient consideration is given to the environment in connection with regeneration felling, particularly as regards damage to ancient monuments and cultural remains, biotopes of special conservation value and watercourses. The evaluation also proposes a comprehensive analysis of the forestry policy instruments linked to the clarifications in Sustainable forests. The in-depth evaluation of A rich diversity of plant and animal life states that the consideration that is given to the environment in the forestry
sector has not improved noticeably during the past ten years. There have been improvements in some areas of consideration, but deterioration has also occurred in others. Similar conclusions are drawn in the in-depth evaluation of

Flourishing wetlands. Inspections concerning regulatory compliance are also currently inadequate. This is due to a lack of resources. The in-depth evaluation of A rich diversity of plant and animal life refers to problems relating to the way in which the provisions of the Forest Act and the general rules of consideration in the Environmental Code relate to each other.

4.3.4. Planning and Building Act (SFS 2010:900)

The Planning and Building Act is highlighted as a key instrument for the objectives A good built environment, Good-quality groundwater, A balanced marine environment, flourishing coastal areas and archipelagos, A rich diversity of plant and animal life, A protective ozone layer, Reduced climate impact and the focus area Sustainable cities.

Spatial planning in accordance with the Planning and Building Act represents a vital instrument in the efforts being made to achieve a number of objectives, including A rich diversity of plant and animal life. This is because spatial planning has a major impact on the use of land and water. Spatial planning at municipal and regional level is a decisive instrument in the work to improve the green infrastructure from a landscape perspective, and thereby improve the long-term survival rates of species and habitats.41 The spatial planning process is currently not functioning satisfactorily.

The in-depth evaluation of Good-quality groundwater notes that there is too little awareness of groundwater and that the planning instruments that are available need to be made more effective. At present, few comprehensive spatial plans include water protection areas, water supply plans and material supply to an adequate extent.

In the in-depth evaluation of A good built environment, monitoring indicates that the environmental quality objectives have been fully integrated in just 10 percent of comprehensive spatial plans at municipal level (a requirement under Section 5:4 of the Planning and Building Act). The evaluation also states that the Environmental Code and the Planning and Building Act combined provide the necessary tools.

Applying the Planning and Building Act is proving to be difficult as municipalities must take into account, and establish a balance between, many different societal objectives. The evaluation also states that the work to implement the Planning and Building Act within municipalities is experiencing problems, partly as regards the way in which the county administrative boards support the municipalities when striking a balance between municipal and national interests in comprehensive spatial plans. Lack of clarity in the allocation of responsibility is claimed to be one explanation.

The in-depth evaluation of A protective ozone layer states that despite the tightening of the provisions of the Planning and Building Act concerning the national rules for the demolition of construction waste and alterations, it is considered that

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41 Naturvårdsverket (2013) Grön infrastruktur, redovisning av regeringsuppdrag.
90 percent of chlorofluorocarbons (CFC) in building insulation materials from demolitions is not being dealt with in an environmentally friendly way. The primary reason for this is a lack of knowledge.

The in-depth evaluation of *A balanced marine environment* and *flourishing coastal areas and archipelagos* states that the Planning and Building Act has considerable potential as an instrument to contribute to the sustainable utilisation of shallow coastal areas, but has not had the desired effect, partly as a result of short-term considerations relating to the finances of municipalities, a lack of awareness of the effects of exploitation of aquatic environments, etc.

In the focus area *Sustainable cities*, it is stated that existing instruments for spatial planning will not be sufficient to achieve the environmental quality objectives. This is apparent from the qualitative assessment in the evaluations carried out as part of the focus area’s work. A key part of the explanation for this lies in the fact that the driving forces behind building development are not sufficiently influenced by the instruments. Another reason is that the environmental and planning processes are carried out in two completely different paradigms. It is apparent that the environmental aspects are not given sufficient status in the planning process and are eliminated through negotiations. There are clear indications that Swedish planning officers are not applying the guidance of the Swedish Environmental Protection Agency and EU case law as regards what are considered to be important environmental impacts, which is contrary to the environmental quality objectives.

### 4.3.5. State measures such as the protection of land, LOVA, LONA, etc.

State measures, i.e. various types of initiatives where the state intervenes and restores or compensates, are a key element of much of the environmental work. This work is of particular importance for the following objectives: *Zero eutrophication*, *Flourishing wetlands*, *Sustainable forests*, *A magnificent mountain environment* and *A rich diversity of plant and animal life*.

There are a number of different forms of aid, programmes, investment grants, etc. where the state contributes, either directly or indirectly, to the implementation of nature conservation measures. LONA, LOVA, the EU LIFE grant, Support for natural and cultural environment conservation measures in forests (Nokås), etc. are all examples of such programmes which are highlighted in this in-depth evaluation. These programmes are not generally considered to be cost-effective, but help to stimulate interest amongst municipalities and volunteers in contributing to the nature conservation work themselves. Programmes of measures relating to threatened species have increased the level of competence relating to nature conservation amongst the county administrative boards, and helped to promote nature conservation initiatives being carried out as a partnership between a number of actors. “LONA is considered to be an effective instrument for ensuring that sites with natural values that are close to urban areas are protected and can thereby be used by many people in their everyday lives.”

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The acquisition of land, measures relating to valuable nature and funding for voluntary appropriations are other key aspects. The government agencies consider that, although the measures have been important, they have not been sufficient to enable the objectives to be achieved. “Among other things, more and more land, freshwater and marine areas are being protected, but the current rate of protection of natural environments is not sufficient. There are no specific targets concerning the protection of biodiversity in the agricultural landscape.”

The in-depth evaluation of *Sustainable forests* states that areas of protected forests and existing initiatives are unevenly distributed across the country and that there are deficiencies in connectivity and representativeness in the protection work. More forests need to be conserved in the long term. There has been a decrease in additional areas being covered by the ordinary protection work. Higher timber prices and the 25 percent surcharge on the encroachment fee are noted as causes. The results of the Comet Programme show both positive and negative effects, with the clearest positive effect being the greater interest being shown amongst many landowners in nature conservation and the incorporation of previously unknown sites of special interest with regard to forest biology.

The conclusions that are drawn in the in-depth evaluation of *A rich diversity of plant and animal life* concerning protection and management measures are also relevant for *Flourishing wetlands*. The need for resources at county administrative board level if the work is to be effective is also highlighted in the evaluation of this objective.

**4.3.6. The UN’s Convention on Long-Range Transboundary Air Pollution and its protocols, as well as the National Emission Ceilings Directive**

For many environmental problems with an environmental context, instruments will be needed at international level. One of the most obvious of these is the UN’s Convention on Long-Range Transboundary Air Pollution or CLRTAP and its protocols. This instrument has eight protocols and regulates most of the substances which are relevant to *Clean air, A non-toxic environment, Zero eutrophication, A protective ozone layer and Natural acidification only*. The EU’s National Emission Ceilings Directive acts as an additional instrument within the EU, although the EU is also a signatory to the UN’s Convention on Long-Range Transboundary Air Pollution.

The in-depth evaluation for *A non-toxic environment* states that the persistent organic pollutants (POP) protocol has helped to reduce the load of POP substances, while the metals protocol has helped to significantly reduce emissions and the use of mercury, cadmium and lead in the EU and North America. It is also stated that the legislation that has been introduced is not being applied adequately. Enterprises must raise the level of their ambitions, and the inspections must be improved to a satisfactory level. Economic instability within the EU has resulted in a reduction in the initiatives and ambitions of many countries relating to chemicals and the environment.

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The in-depth evaluation for *Natural acidification only* states that the UN’s Convention on Long-Range Transboundary Air has been a success, as a result of the close international collaboration between decision-makers and researchers and the fact that innovative tools have been developed for calculating burden-sharing between countries... The EU’s National Emission Ceilings Directive is an important instrument that is linked to the UN’s Convention on Long-Range Transboundary Air and its protocols. In the Environmental Protection Agency’s evaluation of the proposal for a revised National Emission Ceilings Directive, it is concluded that the level of ambition behind the emission limits on European countries, including Sweden, through to 2030 is too low to enable Sweden to achieve the environmental quality objective *Natural acidification only*.

The instrument fulfils a function that is primarily linked to PM 2.5 ozone and corrosion according to the in-depth evaluation for Clean air. This has led to a reduction in PM 2.5 concentrations due to a reduction in the inward transport of polluted air from the rest of Europe. Atmospheric nitrogen deposition is still causing eutrophication across much of Europe. The Gothenburg Protocol under the UN Convention on Long-Range Transboundary Air has been revised with the aim of further limiting emissions of nitrogen oxide, sulphur oxide, ammonia, volatile organic substances and particulates, among other things.

### 4.4. Instrument and measure gaps

The instrument and measure gaps that exist today can be analysed at a cross-objective level from an objective and result management perspective. This section presents a cross-objective analysis of where in the cause and effect chain clear deficiencies in the environmental work exist. The section is based on the in-depth evaluation of the respective environmental objectives in Chapter 2 – *Analysis of the framework conditions and causes of the situation for the objective* and Chapter 3 – *Assessment of whether the objective is being achieved*. Gap analyses as part of the monitoring of the environmental objectives is a developing area which was initiated in this in-depth evaluation and is described in more detail in Chapter 6. In the 2015 in-depth evaluation, the analyses for each objective focused on various key aspects of the respective objectives. The objectives highlighted in this section must therefore be seen as examples, as no overall cross-objective picture is available.

The results of the analyses of the instrument and measure gaps show that the instruments are considered to be insufficient (a score of 2 is given for most objectives, on a scale from 1 to 5, where 5 corresponds to “Framework conditions in place” and 1 corresponds to “We do not know enough to assess whether the instruments are sufficient”). The uncertainties surrounding the effects of the instruments concern the uncertainty over whether they will lead to the desired changes in the state of the environment. A general conclusion from the in-depth evaluations of the

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environmental quality objectives is that few evaluations of instruments linked to the objectives have been reported. Our understanding of the effects that the instruments have remains considerable, and the deficiencies that were identified in the 2012 in-depth evaluation therefore remain.\footnote{Naturvårdsverket (2012) Steg på vägen Fördjupad utvärdering av miljömålen 2012 p. 57–58.}

As regards the effects of the measures, the assessment is much the same as for the instruments. The conclusion for many objectives is that the measures are not sufficient to achieve the desired state of the environment in the long term. For most objectives, a score of 2 is awarded on a scale from 1–5, where 5 corresponds to the requirements laid down in the basis for the assessment.

In summary, it is clear that considerable instrument and measure gaps remain at an overarching level, and that it does not appear that our understanding of the instruments has improved compared with the results of the 2012 in-depth evaluation.

The analysis of the instrument and measure gaps which formed the basis for the conclusions in this section is presented below.

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**Different types of gaps**

The intervention chain shows the cause and effect from the introduction of an instrument until a change occurs in the state of the environment. Through the chain, we can identify different gaps, including instrument gaps, measure gaps, state gaps and knowledge gaps. A description is presented below of various types of gaps.

*An instrument gap* is the effect of an instrument in relation to changed activities which alter the state of the environment. It is defined by whether or not the instrument’s effects are sufficient, i.e. whether the instrument leads to changes in activities (measures) which alter the state of the environment in a positive direction. It may also concern the absence of instruments. The various types of effects which are anticipated are administrative effects (changes in the activity and behaviour of public sector actors), societal effects (changes in the activity/behaviour of non-public sector actors) and environmental effects (changes in the state of the environment). The reasons why an instrument is not having the anticipated effects could be a lack of political will or prioritisation (when instruments are lacking), a lack of knowledge (incorrect design of the instrument) or other impact factors (incorrect design or insufficiently sharp instrument).

*A measure gap* is defined by whether or not the implementation and effects of the measures are sufficient, i.e. whether the measures have the capacity to change the state of the environment in the right direction. According to the basis for the assessment, it is partly a question of whether the measures will be implemented and partly whether the effects of the measures will be sufficient.
As in the case of instrument gaps, anticipated effects concern administrative effects (changes in the activity/behaviour of public sector actors), societal effects (changes in the activity/behaviour of non-public sector actors) and environmental effects (changes in the state of the environment). The possible reasons behind measure gaps include inadequate planning and/or prioritisation of resources, external/other impact factors and the behaviour and/or valuation of actors.

Instrument and measure gaps describe how the environmental work is progressing relative to the objectives. In order to describe the gap, and thereby see how the environmental work is proceeding in relation to the politically established objectives, specific and transparent objective levels are needed.

A state gap concerns the distance between the current state of the environment (in 2015) and the anticipated state in 2020/2050. The anticipated or desired state of the environment is defined in the environmental objectives’ objective levels. The timing of the environmental objectives is determined on the basis of what is known as the anticipated state in 2020/2050. As the state of the environment for each objective varies and changes in different ways over time depending on the environmental problems and underlying driving forces concerned, it is important to observe feedbacks and development trends.

The development trend, i.e. the change which occurs over time (the rate of change), provides important information concerning how far we are from achieving the objective. In turn, analysing trends and developing a forecast for the objective provides us with important information which will enable us to develop relevant instruments and measures linked to the rate of change and delay effects. The causes behind the state gap are directly linked to the rate of change and can be attributed to instrument gaps, measure gaps, knowledge gaps and political objectives which are accorded a higher priority and/or the time it takes for the natural environment to recover.

A knowledge gap concerns uncertainties and knowledge windows which reinforce instrument gaps, measure gaps and state gaps. The causes behind knowledge gaps include prioritisation, resources and the time delay before changes in the state of the environment occur.

4.4.1. Instrument gaps related to the basis for the assessment

The environmental quality objectives are assessed on the basis of state (environmental quality or the state described by the clarification) and/or the effects of the instruments and measures, i.e. that the state will be achieved by 2020/2050 and/or that instruments have now been adopted which will enable sufficient measures to be implemented before 2020 to enable the environmental quality objective to be achieved in the long term. Figure 6 below presents an overview of the effects that (key) instruments are considered to have as regards the environmental quality objectives. As mentioned above, the combined aspects of an objective make up the
objective as a whole, and indicate its system boundaries. These aspects have sometimes been defined as the objective’s clarifications, and sometimes on the basis of the objective’s key problems. For each aspect of each objective, there should be a specified objective level and associated central indicator in order to enable the degree of objective fulfilment to be measured. Some objectives have only one indicator per aspect, while others have several. The assessments of the effects of instruments are taken from the in-depth evaluations of the respective objectives. The columns in Figure 6 correspond to the level of the key instruments’ effects in relation to the desired state of the environment on a scale from 1 to 5:

1. we do not know enough to assess whether the key instruments that have been adopted will be sufficient to achieve the desired state of the environment in the long term
2. the instruments that have been approved to date are expected to steer developments in the direction of the objective, but will not be sufficient in the long term to...
3. the instruments that have been approved but not yet implemented are expected to be sufficient in the long term to...
4. the instruments that have been approved and implemented are expected to be sufficient in the long term to...
5. the instruments that have been approved to date will be sufficient in the long term to...

From left to right on the scale, our understanding of the effects of the measures on the state of the environment thus improves. Step 5 corresponds to the requirement in the basis for the assessment for the framework conditions to be in place, i.e. the objective has been assessed as a YES.

In the work relating to the in-depth evaluation, it proved to be difficult to distinguish between categories 4 and 5. We have therefore decided to merge these two categories in further work.

That instruments have been implemented means that they have been administered, e.g. through information, guidance and methodological development. This task is primarily carried out by national and regional competent government agencies. Many instruments and measures are important in achieving an objective.

Figure 6 below presents an overall picture of whether or not the approved instruments will be sufficient to achieve the environmental objectives. From a cross-objective perspective, this indicates that the instruments are widely considered to be insufficient to enable the environmental objectives to be achieved (column 2). The figure thus shows the focal point in the assessment of the instruments’ effects for the objectives collectively, but not the individual focal points for each of the objectives.

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47 See the separate table at the end of each objective evaluation, “The key aspects of the assessment as to whether the environmental quality objective is achieved” in Naturvårdsverket (2015c) Mål i sikte. Analys och bedömning av de 16 miljökvalitetsmålen i fördjupad utvärdering 2015.

48 The background information for Figure 6 is presented in Appendix 2.
We do not know enough to assess whether the instruments are sufficient.

The instruments are expected to steer developments in the direction of the objective, but are not sufficient.

The as yet non-implemented instruments are expected to be sufficient.

Implemented instruments are expected to be or are sufficient.

Figure 6: An overall picture of whether or not approved instruments are sufficient to achieve the environmental objectives. The figure does not present a complete picture for all instruments. It indicates where the focal point for the objectives collectively lies.

For most objectives, the environmental work has progressed to varying degrees, and one objective may be represented in several columns. This is because some instruments may be sufficient to steer the environmental work towards the environmental objective, while others may be insufficient. Specific examples are presented below from the in-depth evaluations of individual objectives.

INSTRUMENTS THAT ARE EXPECTED TO STEER DEVELOPMENTS IN THE DIRECTION OF THE OBJECTIVE, BUT ARE NOT SUFFICIENT

The reasons why an instrument is not expected to be sufficient can vary. It could for example be that the instrument in itself is not sufficient, regardless of the context, that it is not sufficiently accurately targeted or that it is not sufficiently ‘sharp’. It may also be that other policy areas are being given priority, that other trends are stronger or that other instruments are having the opposite effect. Some examples are given below from objectives where the majority of the approved key instruments are steering developments towards the objectives, but will not be sufficient to achieve the desired state of the environment in the long term.

In order to achieve a non-toxic environment, important EU legislation, including REACH, is in place, but there remains a strong and comprehensive need for effective and complementary instruments, as the existing instruments are not sufficient. There is for example a need to develop instruments relating to risks associated with chemicals in products, nanomaterials, endocrine-disrupters and combination effects, as well as chemical legislation which affords better protection for children, drinking water and food products. In the case of Zero eutrophication, the environmental payments of the Rural Development Programme, including the information instrument ‘Focus on Nutrients’, are key instruments which are being implemented and steering developments in the right direction, but whose effects are not proving to be sufficient in themselves. One reason for this is that the environmental payments are largely based on voluntary measures, which among other things means that they do not steer developments towards the most cost-effective measures. In the case of Flourishing lakes and streams, the effects of the key instruments on the key environ-
mental problem, i.e. the physical impact of hydroelectric power, are considered to be insufficient as a whole. Three chapters of the Environmental Code (Chapter 11 Water activities, Chapter 24 Re-appraisal and revocation, Chapter 26 Inspections) are stated as being existing key instruments which will solve the key environmental problem. The effects are considered to be modest as regards both changes in activities in society and changes in the state of the environment. The reasons why they are not sufficient include the limitations of the appraisal process and conflicts between objectives in the socio-economic assessment. As regards A varied agricultural landscape, the key instruments (particularly the Rural Development Programme and the farm payments) are steering developments in the right direction and having effects. The problem is that there is too few farms at which to target the instruments. The key instruments are not impacting on the general trend of a declining number of farms in society. Their effects are therefore insufficient.

INSTRUMENTS WHICH HAVE NOT YET BEEN IMPLEMENTED BUT WHICH ARE EXPECTED TO BE SUFFICIENT
The third column contains as many aspects of objectives, but fewer objectives are represented than in the fourth column. The difference between the columns is that the instruments in the fourth column have been not only approved but also implemented. In the third column, where approved but not yet implemented key instruments are expected to be sufficient to achieve the desired state of the environment in the long term, there are aspects of Flourishing wetlands, for which peat extraction and other exploitation is one aspect which is considered to be of considerable importance for achieving the objective. The problem today is that permits are still being issued for peat extraction which impact on valuable wetlands. Key instruments include Act (1985:620) on certain peat deposits and the Environmental Code. These parallel legislative acts complicate the appraisal of peat extraction sites; hence good guidance is essential. There are many instruments covering land drainage (e.g. within the forestry and agricultural sectors) and environmental consideration which are expected to be sufficient, but which are not being fully utilised, which is essential if the objective is to be achieved.

INSTRUMENTS WHICH HAVE BEEN IMPLEMENTED AND ARE EITHER EXPECTED TO BE OR ARE SUFFICIENT
Columns 4 and 5, which contain the category approved and implemented key instruments which are either expected to be or are sufficient in the long term to achieve the desired state of the environment as regards either certain aspects of the objective or the objective as a whole (concerns A protective ozone layer), contain the second best represented environmental quality objectives (seven objectives). As regards Good-quality groundwater, two out of five aspects are expected to be achieved through the key instruments. The two key problems which existing and implemented key problems are expected to be sufficient to solve are “all the water management programme’s groundwater occurrences do not achieve a good chemical and quantitative status and the basis for the assessment is inadequate” and “awareness of groundwater is too low and planning instruments need to be made more
effective”49. (Chapter 7 Water protection areas, Chapters 9 and 11 Permit appraisal and good inspections and Chapter 5 Environmental quality norms and environmental quality administration), the Planning and Building Act (water supply plans and material supply plans in the comprehensive spatial planning process) and the Rural Development Programme’s requirements and advice. As regards A rich diversity of plant and animal life, the key instruments are expected to be sufficient to achieve the desired objective level for natural environments close to urban areas and alien species and genotypes. The existing key instruments, including the EU Regulation on the prevention and management of the introduction and spread of invasive alien species and the Planning and Building Act, are expected to have a major effect. These come in the form of changes to activities within society and changes in the state of the environment.

INSTRUMENTS WHERE KNOWLEDGE IS LACKING

The first column contains the aspects of a few objectives. One example here is taken from A balanced marine environment, flourishing coastal areas and archipelagos. This concerns a lack of understanding of the effects of existing key instruments as regards the physical exploitation of shallow coastal areas.

4.4.2. Measure gaps relating to the assessment basis

According to the assessment basis, the measures must be sufficient and implemented by the objective year of 2020 if the environmental quality objectives are to be deemed to have been achieved. The measures will be considered sufficient when changes in activities within society result in the desired state (the environmental quality or the state described by the clarification) being achieved in the long term. In order for a measure to be implemented, it must be planned, prioritised and ultimately carried out by the actors concerned. The are many possible reasons behind an implementation shortfall, i.e. where measures are not being implemented as anticipated. These include measures not being given priority, a shortage of resources or the measures not being carried out in the intended manner or to an adequate extent.

The columns in Figure 7 correspond to the degrees of effect of the key measures in relation to the desired state of the environment on a scale from 1 to 5:

Explanation of the scores 1–5:

(1) we lack sufficient knowledge to assess whether existing or planned measures will be sufficient in the long term to achieve the desired state of the environment,

(2) existing or planned measures are expected to steer developments towards achievement of the objective, but will not be sufficient in the long term to...

(3) planned measures are expected to be sufficient in the long term to...

(4) sufficient measures are expected to be implemented by 2020/2050 in order to achieve the following in the long term...

(5) sufficient measures will be implemented by 2020/2050 in order to achieve the following in the long term...

As in the section above, categories 4 and 5 have been combined to form a single category.

We do not know enough to assess whether the measures will be sufficient.

The measures are expected to steer developments in the direction of the objective, but are not sufficient.

Measures are planned and expected to be sufficient.

The measures are considered to be sufficient and are expected to be or will be implemented.

Figure 7: Overall picture of the implementation and effects of the measures. The figure does not present a complete picture of all measures. The figure shows the focal point for the objectives collectively, but not the focal points within each of the objectives.

Figure 7 shows a cross-objective picture of the effects that the measures are considered to have on the environmental quality objectives. As in the case of the instruments, the measures which are aimed at the various objectives have been implemented to varying degrees. The results show a cross-objective picture that is similar to that for the effects of instruments on the environmental quality objectives, i.e. that the effects of the measures will not be sufficient to achieve the desired state of the environment for the environmental quality objectives in the long term. The assessment that the measures are not sufficient almost exactly follows the anticipated effects of instruments where they are not sufficient.

The assessment of the effects of instruments and measures differs in respect of three objectives: A non-toxic environment, A varied agricultural landscape and A rich diversity of plant and animal life. In the case of A non-toxic environment, the effects of the planned measures for “Unintentionally formed substances” are expected to be sufficient, but the same does not apply to the effects of the instruments for the same aspect of the objective. The same applies to the aspect “Impact of climate changes” for A rich diversity of plant and animal life. One possible interpretation of this is that the instruments have not led to all the measures that are necessary to influence the state of the environment, but the measures that have been implemented have had an effect. As regards A varied agricultural landscape and the aspect “The production capacity of the land”, the relationship is the opposite, i.e. instruments have been implemented and are expected to be sufficient, but the effects of the measures are not expected to be sufficient.

The most obvious change in the effects of measures compared with the effects of instruments is that many aspects of the objectives are concentrated in the third column – containing measures that are planned and expected to be sufficient. This

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50 The background information for Figure 7 is presented in Appendix 2.
probably indicates that measures are being planned, but not implemented to the extent that is likely to be necessary to achieve the desired state of the environment in the long term.

THE REASONS BEHIND INADEQUATE MEASURES
The reasons why the measures are considered to be inadequate do not exclusively relate to the inadequacy of the associated instruments. The objectives *A balanced marine environment, flourishing coastal areas and archipelagos, Flourishing lakes and streams* and *Zero eutrophication* have a substantial element of the effects of both instruments and measures in order to tackle the key problems behind the objectives in the first two columns, i.e. that we do not know enough about the effects of the instruments and measures and that the effects are insufficient. The absence of background information concerning the locations of valuable areas which are in need of protection and where exploitation has already taken place is an example of the lack of knowledge referred to in the evaluation of *A balanced marine environment, flourishing coastal areas and archipelagos*. In addition, the programme of measures relating to the marine environment which is considered to be of vital importance for the achievement of the objectives will commence during 2016, and it is too early to say anything about the effects that the EU’s new fisheries policy will have on the achievement of the objectives.

In the case of *A magnificent mountain landscape*, the measures relating to most aspects of the objective are either insufficient or planned but not implemented. Inadequate planning and the absence of a holistic perspective concerning the utilisation of mountain areas means that the exploitation pressure being exerted by actors can have an adverse effect on habitats for species and ecosystems, as well as a negative impact on experience-related values for humans. These problems represent the biggest barrier to achieving the desired state of the environment for *A magnificent mountain landscape*.

4.5. National scope
One of the principal conclusions of the 2012 in-depth evaluation was that many of the environmental problems can be solved within Sweden’s borders, i.e. that there is considerable national scope to exert an influence so as to ensure that the objective can be achieved. By ‘scope’, we mean that the Swedish public administration is able to reach decisions concerning instruments and measures and allocate resources in order to eliminate the barriers which could prevent the environmental objectives from being achieved. Good-quality groundwater, Clean air and Flourishing wetlands are some of the objectives where it is clear that there is considerable national scope.

As table (c) below shows, the competent government agencies have concluded that there is considerable national scope (concerning the entire or the majority of the objective) in the case of seven of the environmental quality objectives. In the case of a further seven objectives, the government agencies have concluded that there is

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considerable national scope for a minor part of the objective. As regards *A protective ozone layer* in its entirety, the conclusion is that there is little national scope in Sweden. For *Zero eutrophication*, it is considered that there is moderate national scope in Sweden. For *A good built environment and Safe radiation environment*, no information concerning this issue is available.

<table>
<thead>
<tr>
<th>Good-quality groundwater</th>
<th>Reduced climate impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean air</td>
<td>Zero eutrophication</td>
</tr>
<tr>
<td>A rich diversity of plant and animal life</td>
<td>A varied agricultural landscape</td>
</tr>
<tr>
<td>Flourishing lakes and streams</td>
<td>A balanced marine environment, flourishing coastal areas and archipelagos</td>
</tr>
<tr>
<td>Sustainable forests</td>
<td>Natural acidification only</td>
</tr>
<tr>
<td>Flourishing wetlands</td>
<td>A non-toxic environment</td>
</tr>
<tr>
<td>A magnificent mountain landscape</td>
<td>A protective ozone layer</td>
</tr>
</tbody>
</table>

### 4.6. Proposals for instruments and measures based on impact areas

This section presents proposals for new instruments and adjustments to existing instruments, as well as needs for measures which are presented in the in-depth evaluations of the environmental quality objectives. The proposals are grouped according to the areas of impact that are defined as being key in this in-depth evaluation, as described in Chapter 3. The aim of this section is to identify, on the basis of the proposals that are highlighted in the evaluations, changes to instruments and measures, as well as needs for new instruments and measures which will improve the achievement of a number of objectives. The approach of linking the changes to instruments and the proposals to areas means that the section does not present all the proposals which are discussed in the in-depth evaluations for each of the objectives.

The section places the spotlight on proposals for new instruments and measures, or adjustments to existing instruments and measures. Existing instruments and measures which must be continued in order for the environmental work to lead to achievement of the objectives are not discussed. The background information for this can be found in the section on the effects of certain key instruments and elsewhere. All proposals referred to in the section can be found in the in-depth evaluations for the respective objectives – Chapter 5 – *Needs concerning initiatives to ensure that the objective is achieved*.

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AGRICULTURE

The Rural Development Programme is an important instrument, but the programme could be made even more effective from an environmental perspective if the payment levels were to be optimised with regard to environmental benefits. Within the area of agriculture, many proposals for adjustments are aimed at the Rural Development Programme’s environmental payments. The All Party Committee on Environmental Objectives’ report 2014:50 proposes an assignment concerning value-based environmental payments. Implementation of the proposal would mean that the environmental effects would be governing in connection with the formulation and reimbursement of measures. Some examples of the proposed changes concerning the Rural Development Programme’s environmental payments, among other things, are described below. Most concern an increase in resources.

Environmental payments currently cover 35–65 percent of the actual costs entailed in managing grazing land and hay meadows. A higher degree of cost coverage for management would result in more people registering for the payments and could reverse the negative trend relating to hay meadows and grazing land. The prioritisation of resources within the Rural Development Programme as regards measures for reducing the nutrient load on aquatic environments would impact on the environmental quality objective Zero eutrophication, and raise the level of payments for eutrophication measures in regions where additional measures are considered to be cost-effective. Environmental payments for the management and restoration of natural and cultural environments in and around arable land should be strengthened, or funded in some other way, and the Rural Development Programme should be revised in order to make it easier to fund measures which favour the species in the programme of measures targeted at threatened species.

Changes to farm payments have resulted in the cessation of the environmental investments which the county administrative boards have used to fund measures relating to threatened species in the agricultural landscape. The funding available for threatened species and habitats in the agricultural landscape must therefore be increased. If the greening of the single farm payments is to continue, Sweden should endeavour to improve the effectiveness of the requirements for the ecological focus areas in order to increase the environmental benefits of the payments.

In addition to the changes to the Rural Development Programme’s environmental payments highlighted in the in-depth evaluations for each of the objectives, the need for a better understanding of the effects of the Rural Development Programme is also noted. The reasons behind the continuing uncertainties regarding the effects of the programme include the poor quality of the background data and a lack of understanding of the effectiveness of the instruments and measures. The follow-up and development of programmes must be improved in order to determine which instruments and measures produce the desired results.

To protect wetlands with high natural values, particularly in connection with forestry and agriculture, it is proposed that more resources be allocated to inspections under the Environmental Code and the provision of advice to increase the amount of consideration given to the environment. Existing legislation must be applied to a greater extent as regards agriculture in particular, in order to strengthen the work
relating to the programme of measures concerning threatened species, and more effective advisory initiatives such as “Focus on nutrients” will be important in order to reduce the impact of eutrophication and pollutants in wetlands and aquatic environments.

In addition to the proposed initiatives concerning instruments referred to above, there are other proposals which are linked to agriculture, including a strategy for the long-term conservation of sites of special interest for biodiversity in the agricultural landscape. This strategy should have a landscape perspective, among other things, and encompass initiatives to conserve and strengthen the values of the agricultural landscape and in relation to ecosystem services and green infrastructure. The EU’s agricultural policy is of considerable importance to the development of biodiversity and ecosystems, and it is therefore important that Sweden exerts an influence over the work that is being conducted at international level. There is a need for research concerning how the problem of nitrous oxide can be overcome within agriculture and the development of agricultural methods which effectively trap the nitrogen in the ground and limit the formation of nitrous oxide. A better understanding of greenhouse gas emissions from Swedish agriculture is also needed. Consideration should be given to introducing a commercial fertiliser tax, with the revenues generated by the tax being used for measures within the agricultural sector to reduce nutrient leaching.

FORESTRY
The need for the review of the Forest Act previously announced by the Government, and proposals regarding its scope is highlighted in A rich diversity of plant and animal life and Flourishing wetlands, and elsewhere. It is for example proposed that the study analyses the effects of integrating the environmental aspects of the Forest Act in the Environmental Code. It is proposed that the review should also analyse the notification obligation to ensure that the Forestry Agency is able to prevent forestry measures which disturb valuable environments, which is a responsibility that is incumbent on landowners and operators under the forestry policy, and the way in which a clearer landscape perspective can be used in the legislation. There is a need for clarification and tightening of the forest management legislation to ensure that more consideration is given to the environment within the forestry sector, e.g. as regards protective ditching of forested areas and rules concerning the construction of forest tracks. The legislation concerning land drainage and ditch clearance needs to be reformed and adapted to the Environmental Code.

A comprehensive analysis of the forestry policy instrumented linked to the environmental quality objective Sustainable forests is sought, with the aim of determining which instruments would be most cost-effective. An analysis should also be carried out concerning the effects of other instruments and impact factors on the achievement of the objectives. Information and partnership initiatives within the forestry sector are highlighted as an important task to ensure that more consideration is given to the environment in connection with felling, among other things. For example, reference is made to the work relating to objective scenarios to ensure that sufficient consideration is given to the environment, eServices in order to prepare inventories and secure access to information concerning environmental values, a
strong partnership between all actors in order obtain a landscape perspective to ensure that an appropriate balance is established between different ecosystems and greater transparency in the voluntary appropriations, partly to increase the level of trust between the parties in the sector and enable more secure analyses of allocated areas.

Proposed initiatives aimed at reducing the acidifying impact of forestry include measures linked to ash recycling, among other things. Examples of measures include information and education initiatives concerning forest fuel extraction and ash recycling, certification of ash recycling contractors and the development of technologies and methodologies to improve the opportunities for and safeguard the quality and improve the effectiveness of ash recycling. In addition, existing methods, applications and recommendations for adapting ash recycling to the acidification sensitivity of growing sites need to be developed. Efforts must be made to increase the uptake of carbon dioxide in forests and other land areas, i.e. to increase the size of the carbon sink. The reinstatement of drained peatlands as wetlands, the provision of advice and research concerning forestry methods which facilitate good regeneration and the protection of forests to increase carbon storage are some of the proposed initiatives which are highlighted.

INDUSTRIAL PRODUCTION

A more stringent EU National Emission Ceilings Directive is providing the framework conditions for the treatment of emissions from industrial processes and industrial incineration, among other things. Analyses of cost-effectiveness for reducing sulphur dioxide emissions from industrial processes would be valuable, as such emissions are expected to be the most important source of emissions in Sweden by 2020.

The EU’s system for the trading of emission permits impacts on emissions from industry and from electricity and heat generation in Sweden. Sweden should strive to ensure that the measures proposed by the European Commission to improve the EU Emissions Trading Scheme are implemented. However, Sweden should also work to strengthen the system further through the introduction of the market stability system by 2020, and the 900 million emission permits that have been deducted should be cancelled instead and then reintroduced, or alternatively included in the market stability reserve. Swedish industry has a high proportion of process-related emissions compared with many other countries. Aid for research, development, demonstration projects concerning new process solutions and instruments for market launch are of considerable importance. State initiatives need to be reinforced, especially within the iron and steel, mining and mineral industries.

Initiatives are needed within the framework of the Montreal Protocol and the EU. This will entail efforts to reduce and eliminate emissions of HFCs (hydrofluorocarbons) and HCFCs (hydrochlorofluorocarbons), and limit the scope of exemptions and dispensations from bans on the use of ozone-depleting substances. It is also important that Sweden strives to ensure that the efforts being made to substitute hazardous chemicals within the 30 industrial sectors covered by the Industrial Emissions Directive (IED) is accorded emphasis.
ENERGY PRODUCTION
Sweden should continue to work for and develop the scope of the EU’s Ecodesign Directive and continue to tighten the requirements concerning energy management in the building regulations. Information initiatives concerning energy efficiency improvements are needed, e.g. by evaluating and establishing an information centre for issues concerning the refurbishment of buildings. Ecodesign requirements should be accelerated as regards heating equipment, as such equipment has a lifetime of around 30 years, which results in a slow replacement rate. The requirements may also need to be augmented with additional instruments, e.g. a scrapping premium. A stricter EU National Emission Ceilings Directive is providing the framework conditions for the treatment of emissions from the energy and other sectors which are considered to generate high sulphur emissions which impact on the deposition of sulphur across Sweden.

The report on the government-commissioned assignment concerning activities using or impacting on water proposes that the process for water-related activities be made more similar to that for environmentally hazardous activities (Chapter 9 of the Environmental Code). Prioritised measures include the appraisal and reappraisal of hydroelectric power stations, as many plants and operations do not comply with modern environmental requirements, and the expanded inspections of hydroelectric power stations. More resources will be needed, e.g. through the return of inspection fees to the county administrative boards. The application of the Peat Act and the Environmental Code may need to be reviewed. The scope to issue electricity certificates for electricity production which is based on peat combustion should be evaluated, and a more restrictive approach to the issuing of permits must be adopted in order to avoid the establishment of peat extraction sites in areas with high natural values.

Agricultural products can be used as a substitute for fossil fuels. Instruments in the form of the provision of information and advice concerning the establishment of perennial energy crops and the expansion of the investment support for farm biogas production are two examples of this.

MINING
As regards the objective *A magnificent mountain landscape*, a strategy with milestone targets, instruments and measures has been drawn up. One of the proposed milestone targets concerns demand for mountain areas and includes a review and preparation of proposals regarding how the needs of different interests for land and water in mountain areas can be managed. These interests include mining and energy production in mountain areas. Support for research, development, demonstration and market launch will be vital if the long-term climate objectives are to be achieved. Of particular importance are initiatives within the iron and steel, mining and mineral industries, as they account for a high proportion of emissions, and instruments which have an adverse effect of competitiveness are not desirable.

WASTE
The development of non-toxic and resource-efficient material cycles is fundamental to a societal transition towards a circular economy. Non-toxic and resource-efficient material cycles require strategies and measures at all levels. The legislation needs
to be developed, e.g. through better coordination of chemical legislation, product legislation and waste legislation. The elimination of substances of very high concern should be accelerated in the sector-based legislation and in REACH. There is a need for more research and development concerning materials which can be recycled safely. Waste prevention measures, which are given an extremely high priority in the waste hierarchy, need to be implemented and strengthened. It is a question of both reducing waste volumes and impacts on health and the environment from the handling of waste, and reducing the occurrence of hazardous substances in materials, products and waste.

Reducing food waste is an important aspect in a resource-efficient society. Producing the foods that we consume causes substantial emissions of greenhouse gases. In Sweden, around 127 kg of solid waste are generated per person per year. Households account for the majority of this. All sectors in society and every part of the food chain need help to reduce food waste. As regards the proposed milestone target, which involves cutting food waste by at least 20 percent compared with 2010 to 2020, a combined package of overarching instruments targeted at the entire food product chain and involving many actors is proposed.

To increase the disposal and destruction of residual CFCs in insulating materials, it is proposed that the municipalities review the coordination and communication between the board that is responsible for inspections under the Planning and Building Act and inspections under the Environmental Code when the construction board reaches decisions concerning the issuing of demolition permits, etc. This is essential to ensure that waste, particularly hazardous waste, is disposed of appropriately.

CONSTRUCTION AND PLANNING
Spatial planning is about prioritising and requires extensive knowledge concerning the consequences that decisions will have for the framework conditions both for natural environments and ecosystems, and for human health and living conditions. Within the objective A rich diversity of plant and animal life, reference is made to the need to investigate how spatial planning in accordance with the Planning and Building Act can be developed in order to steer developments towards the environmental quality objectives to an even greater extent, particularly the objectives linked to habitats. In particular, it is proposed that an analysis be conducted of the consequences of the municipalities’ various framework conditions as regards resources and competence within nature and environmental management, and that initiatives which create more equal framework conditions be proposed. Under the objective for A good built environment, measures are proposed which are aimed at strengthening the strategic and spatial planning processes and their link to implementation and monitoring. This will make it easier to steer developments within society on the basis of a holistic view of what constitutes a good built environment. Examples of the proposed measures include the development of a national framework for spatial planning, the establishment of regional forums for social planning, the strengthening of municipal planning preparedness and socio-economic models which assess the results of projects and plans on the basis of a holistic view.
To achieve the objective concerning *A varied agricultural landscape*, it will be vital to improve the opportunities to live and work in rural communities. Initiatives are needed within general rural development in order to drive forward agriculture, and initiatives within the agricultural sector will also be important in ensuring that rural communities survive. It is therefore important to analyse the effects that decisions and measures within specific policy areas and government agencies have on the opportunities to live and work in rural communities. The report from the study entitled *Freedom from fossil fuels on the road* identifies a number of measure areas as being particularly important. These concern planning for attractive and accessible cities with highly efficient transport provision, infrastructure measures and the replacement of transport modes and more efficient vehicles. The regional and municipal actors will be key factors in this regard.

The human impact on marine coastal areas needs to be mapped in order to provide a basis for the preparation of developed guidelines for the handling of dispensations from the shore protection regulations, permits for activities which use or impact on water and the regulation of other human activities which impact on the living conditions in shallow coastal marine areas. This will involve the mapping and analysis of physical impact pressure in coastal aquatic environments. Knowledge is needed as a basis for environmental objectives, detailed spatial plans, permit issuing and area protection. Other examples are developed guidance concerning shore protection and activities which use or impact on water.

In order to place greater emphasis on a holistic view and a landscape perspective in the utilisation and planning of mountain areas, it is proposed that the needs of different interests and demand for land and water in mountain areas be mapped. The background information could for example be used in the municipal comprehensive spatial planning process, and consultation pursuant to the Planning and Building Act can help to ensure that the intentions behind the planning process are upheld. To ensure good connectivity for wetlands and wetland species, more detailed regional analyses need to be carried out as regards green infrastructure in wetlands. The measures could be included in the regional work relating to action plans for green infrastructure. In order to facilitate planning and ensure that greater consideration is given to wetlands, it is also important that GIS tools with national elevation models are developed.

**ROAD TRANSPORT**

The transition in the transport sector comprises four parallel aspects: development towards a more low-transport society, transition to more energy-efficient transport modes, energy efficiency improvements to vehicles, and the use of renewable fuels. In the event of future changes, the carbon dioxide tax must impact on the use of fuel in the transport sector and on machinery in particular. In the ambition to price carbon dioxide emissions, it should also be an explicit aim to phase out all forms of subsidies for fossil fuels. In addition to the pricing of emissions, a raft of initiatives is proposed in the evaluations for each of the objectives for *Reduced climate impact* and *Clean air*, including a bonus-malus system for car and light goods vehicle purchases and the driving forward of the EU’s common emission requirements for new
cars and light goods vehicles. Other initiatives which are proposed include long-term regulations concerning the development of biofuels and a distance-based tax. To prevent thresholds from being exceeded in streets with heavy traffic, planning measures or other traffic reduction measures, such as a congestion tax, are needed. It is also important that the information initiative relating to studded tyres is continued, and a tax on the use of such tyres may well also be appropriate.

A societal transition which reduces the demand for transport must be stimulated. This could involve locating jobs, homes and trade in a way which minimises the need for long-distance travel and car use, and promoting public transport, cycling and walking. A review of the regulations concerning travel grants is needed. The further development of ongoing urban environment programmes is proposed in the form of measures for public transport being seen as one aspect of the development of sustainable cities, along with efforts to ensure that walking, cycling and public transport are normative in the urban planning process.

CLIMATE CHANGES
Both national initiatives and active work both within the EU and internationally are vital, as is ensuring that climate policy is integrated in all policy areas. We also need to gain a better understanding of what climate change could mean and what initiatives will be needed as a result of it. For example, studies are to be carried out concerning the way in which buildings are affected by different climate changes, along with a review of whether it will be necessary to revise the building and alteration regulations as a result of such changes. We also need to improve our understanding of the extent to which effects of climate-related disruption, such as insect attacks, storm damage, sea salt episodes and periods of drought stress, impact on the acidification status of soil and surface water.

IMPORT OF POLLUTANTS
As the National Emission Ceilings Directive forms the basis for the reduction of emissions of particulates, soot, nitrogen oxides and volatile organic substances, it is important that Sweden continues to play an active role within the EU in order to drive forward the ratification of the Gothenburg Protocol and ensure that a new National Emission Ceilings Directive is adopted. As part of the implementation of the impending National Emission Ceilings Directive, a study should be conducted to determine the most cost-effective instruments for reducing nitrogen emissions. Sweden should also work actively within the EU and internationally (the Arctic Council, HELCOM and IMO) to reduce emissions of soot and nitrogen oxides from shipping. As emissions of sulphur dioxide and nitrogen dioxide in particular have fallen sharply in Europe, the concept of critical load limit may need to be augmented with other indicators and perspectives given the low level of emissions and the high acidification impact that has accumulated in ecosystems. Specific issues which are referred to include a review of the criteria for recovery in lakes and a better understanding of carbon and sulphur dynamics when calculating acidification and exceedance of the critical load.
Within the framework of the programme of measures concerning the Marine Environment Directive, a raft of proposals has been put forward for measures, including measures relating to marine waste. There is for example an information campaign aimed at the general public concerning commonly occurring litter objects in the marine environment, their negative impact and the link to consumer behaviour, as well as strategic work through the inclusion of marine litter in relevant waste plans and programmes.

Within the area of chemicals, the Swedish work being conducted at international level and within the EU is vital. Sweden should for example strive to ensure the global elimination of substances of very high concern, restrictions on hazardous substances in different product groups, closer EU collaboration with regard to inspections concerning chemicals, etc.
5. Cost-effectiveness

The purpose of this chapter is to present the conclusions of a cross-objective analysis concerning how the cost-effectiveness of the work relating to the environmental objectives can be improved through adjustments in the application of existing key instruments which are discussed in Chapter 4. A high level of socio-economic cost-effectiveness is achieved when an objective is achieved at a low socio-economic cost.

In connection with decisions relating to environmental policy, particularly as regards the formulation of instruments, cost-effective management by objectives usually plays a less important role than it should. For example, a study by the European Environment Agency\(^ {53}\) indicates that the formulation of environmental taxes is less cost-effective than is socio-economically desirable, as the environmental issues are split in the political decision-making process. It would therefore be of particular interest to evaluate the key instruments that have been identified as being key to achieving the environmental objectives in Chapter 4 from a socio-economic perspective. Analyses based on a socio-economic perspective can help to clarify the relationship between the decisions and choices which give rise to environmental problems and the instruments and measures that are needed to correct these choices and decisions. The balances that are struck are based on the polluter pays principle for the damage that is caused. A more comprehensive review of the socio-economic perspective is presented in Appendix 4.

The contribution of the socio-economic perspective to the analyses for each objective is aimed at identifying whether cost-effective framework conditions are in place which will enable existing instruments to contribute to the achievement of each of the environmental objectives through tackling the underlying causes of the environmental problems, i.e. the choices and decisions that are made by different actors in society which in turn lead to environmental problems. For the first time within the framework of the in-depth evaluation of the environmental objectives, overarching socio-economic analyses are carried out for all of the environmental quality objectives. Analyses of the instruments which this chapter proposes be adjusted with the aim of achieving individual environmental quality objectives are presented in the in-depth evaluation for each of the environmental quality objectives in \(\text{Mål i sikte}\)\(^ {54}\).

This chapter focuses on the conclusions that can be drawn from cross-objective cost-effectiveness, i.e. systematic patterns where there is considerable scope to improve resource utilisation within the environmental work and increase the extent of management by objectives across the work relating to the environmental objectives\(^ {55}\). The analysis is based on identified situations where instruments are necessary to ensure that societal objectives are achieved with a high degree of cost-effectiveness.


\(^{54}\) Naturvårdsverket (2015c), Mål i sikte. Analys och bedömning av de 16 miljökvalitetsmålen i fördjupad utvärdering 2015 Volym 1 och 2.

\(^{55}\) As the concept of ‘cost-effectiveness’ is an indicator that is always used in relation to a specific objective, the examples presented in this chapter concern proposals to improve the cost-effectiveness in relation to individual environmental quality objectives if changes are made to instruments which are considered to be key to selected cross-objective areas.
All conclusions from the analysis are concretised and clarified with examples from the analyses for each objective. The examples have been chosen to ensure that they clearly show key aspects of how a cross-objective socio-economic analysis can improve the degree of cost-effectiveness.

5.1. A socio-economic perspective on environmental problems

Environmental policy is facing a complex management situation. In order to bring about a transition towards the environmental objectives, an understanding of the fundamental incentive structure is needed, i.e. why different actors in society behave in a way which harms the environment. The environmentally harmful behaviour of households and businesses could for example stem from the fact that:

- society lacks sufficient awareness of environmental problems
- society lacks information concerning the contents of consumer products and the environmental impact of the production and waste stages
- actors in society have a short-term perspective and do not consider damage and benefits in their decisions
- the environmental costs affect people other than those who are exploiting the natural environment
- environmental problems persist which originate from historical actors who are no longer in existence

It is in these identified situations that it will be appropriate for the state to introduce instruments and state measures in the first instance. The instruments that have been implemented have a sound basis on which to make a positive contribution to the welfare of society, as they correct weaknesses in the economic system. Each of these causes of an environmentally harmful behaviour have their own solution. This could be in the form of support for research, the provision of information, the introduction of instruments or state grants for measures. Additional initiatives may be necessary in other areas. It is necessary to eliminate barriers in an otherwise functioning market, i.e. where there are otherwise strong incentives to achieve the desired objectives.

5.2. Known barriers to achieving a high degree of cost-effectiveness

Around the world, instruments must undergo a political process where compromises are agreed in order to satisfy the needs of interest groups. Instruments themselves can also sometimes be renegotiated in order to deal with distributional effects. One solution that is likely to be cost-effective for society would be to formulate environmentally oriented instruments so that they can help to solve the environmental problems that we are facing and to implement other political measures in order to directly solve other important political issues. The EEA refers to five pitfalls where
compromises in the design of instruments, particularly as regards environmental
taxes, often reduce the cost-effectiveness of the instruments and thereby increase the
cost of achieving the environmental objectives:

- Decision-makers find it difficult to resist strong groups of polluters who oppose
  environmental taxes citing competitive disadvantages and substantial adminis-
  trative costs:
- The tax rate is determined in order to achieve fiscal objectives rather than envi-
  ronmental objectives.
- Decision-makers use tax relief and exceptions in the environmental legislation,
or environmental taxes, in order to favour and promote certain groups or sec-
  tors in society.
- Environmental taxes are of marginal importance as regards the national
  budget and are often given a low priority in connection with formulation
  and evaluation.
- For administrative reasons, instruments which must interact with other instru-
  ments can be formulated in a similar way, and key technical aspects of individual
  instruments can be lost.

The EEA also identifies a number of general challenges which arise when instru-
ments are proposed in the political process. A cost-effective environmental policy
must combine the international aspects of the environmental problem with con-
sideration for the specific circumstances in individual countries. The international
aspects of environmental problems do not solely stem from the fact that many such
problems are cross-border in nature; they also arise both because environmental
policy is increasingly being determined in an international arena and because many
actors that trigger environmental problems are operating in such an arena. Some
clear examples where the scope of individual countries to formulate cost-effective
instruments is limited due to their limited scope to take account of country-specific
circumstances are:

- harmonisation of environmental taxes within the EU
- international agreements for enterprises which operate across national borders,
e.g. international shipping and the aviation industry
- rules concerning competition neutrality, such as the EU’s state aid rules

The structure of our society is complex, and indirect changes and compromises are
often needed in other areas in order to chisel out the ideal instrument for achiev-
ing a desired environmental objective in a cost-effective way. There is therefore a
high probability that the political decision-making process will result in a lower
dergee of cost-effectiveness for the socio-economy as a whole, often as a result of
compromises and consideration being given to factors other than the environmental
objectives. It is possible to discern such tendencies as early as during the formul-
ation of the environmental quality objectives. There is a tendency for consideration

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instruments in Europe.
for different industries to be formulated as part of the environmental objectives. It is important for decision-makers to know which aspects of a proposed instrument can be varied and negotiated without compromising the principal purpose of an instrument, i.e. solving environmental problems at a low cost for society.

5.3. Cross-objective analysis of cost-effectiveness

The 2012 in-depth evaluation of the environmental objectives (Steg på vägen Fördjupad utvärdering av miljömålen 2012) introduced a socio-economic analysis where socio-economic benefits are described as an important motive for introducing instruments. The instruments used in the work relating to the environmental objectives were reviewed. In this edition of the in-depth evaluation, the aim is to go one step further and also analyse cross-objective cost-effectiveness. This is a big step to take, as few economists have so far evaluated the work concerning the environmental objectives, and the competent government agencies are still in the initial phase of developing a basis for evaluating whether the existing instruments can be made more effective. Without a clear basis, it is difficult to assess the degree of cross-objective cost-effectiveness. However, many interesting questions have been raised by the analysis work, and there is reason to consider that the competent government agencies will be able to refine their analyses in the coming years and develop increasingly accurate solutions.

In this evaluation, the key instruments were chosen on the basis of the identified key environmental problems which have yet to be overcome.

5.3.1. Visionary objectives

The objectives are visionary in many cases, and applying and concretising them can easily lead to unreasonable requirements concerning information needs, instruments and measures if clear, balanced clarifications are not drawn up. This also means that the requirement for cost-effectiveness, i.e. for resources to be used where they contribute most towards achieving the desired objectives, is impossible to achieve. The work relating to the environmental objectives may well have become more characterised by management by objectives had the objectives been formulated in a way which included social considerations. As no such considerations have been formulated for all environmental quality objectives, the approach that has been adopted for this chapter is to identify formulations for instruments which are likely to boost cost-effectiveness more than they do at present.

Aspects of the analysis for the environmental quality objective Good-quality groundwater can act as examples of a situation where there is scope to fine-tune the description of the objective from a cost-effectiveness perspective. In the analysis, it is stated that one of the key problems is that not all the water management programme’s groundwater occurrences have a good chemical or quantitative status. The substantial number of groundwater occurrences leads to difficulties in fulfilling the water management programme’s requirements concerning the description, analysis and mapping of human activity which impacts on groundwater. In this regard, it is therefore important to analyse the initiatives that would be socio-economically desirable, i.e. that have benefits that outweigh the costs, and thereby determine
which of these initiatives should be implemented and which should not. The next chapter contains a more comprehensive presentation of this environmental quality objective. It is apparent from that chapter that Sweden has considerable scope to influence the initiatives that are required in order to achieve the objective. There is also plenty of scope to decide when the various clarifications of the objective have been achieved. However, the question remains as to whether it is desirable for society at large that the clarifications be achieved in full.

5.3.2. Prioritisation

A common characteristic of the analyses for each objective is the absence of an expressly stated prioritisation of environmental problems and instruments. All the work relating to the objective seems to be equally important and necessary. However, resources within society are limited and are not sufficient to enable everything to be implemented.

As an example, three areas are highlighted in the strategy for *A good built environment* as being key. All clarifications are, to a greater or lesser extent, included in these three key areas. In order to make progress with a cross-objective cost-effectiveness analysis for *A good built environment*, there is a need for a clearer statement of the problems that are most serious, information on the behaviours that prevent the objective from being achieved and proposals regarding how these can be solved in the simplest possible way using existing instruments.

In Chapter 4, it is stated that there is considerable scope for coordination gains at an overarching level in planning solutions which meet the requirements laid down in both the Planning and Building Act and the Environmental Code. In the proposed strategy for *A good built environment*, the National Board of Housing, Building and Planning states that the coordination of spatial planning needs to be reinforced and developed in regional forums. Society’s framework conditions for energy and transport needs, among other things, are determined for decades through the spatial planning process, and it is essential to establish clear priorities as regards the environmental problems that must be overcome. With the aid of the Planning and Building Act, assessments are made and balances struck between different societal objectives, but analyses that were carried out prior to the in-depth evaluation of the environmental quality objectives indicate that it was easy to overlook the environmental perspective in the planning process. Expanded collaboration and a stronger focus on planning issues amongst environmental actors could help to give the environmental objectives a more obvious/secure place in the planning process. For example, the Environmental Protection Agency is funding the research programme entitled “Societal planning for reduced environmental impact”. This programme will generate proposals which can be used to develop the planning system and its application in connection with strategic environmental assessments of plans and programmes, as well as in connection with environmental impact assessments of projects. The intention is to help ensure that the spatial planning process is carried out in accordance with the provisions of the Environmental Code concerning the environmental adaptation of projects, plans and programmes.

In summary, it can be stated that it is important to improve the framework conditions for establishing a consensus between planning and environmental issues in order to avoid expensive lock-in effects. Placing a stronger spotlight on activities
that are environmentally harmful, where the major environmental gains can be made and the decisions and choices which harm the environment would make it easier to show what the priorities should be in the transition towards A good built environment.

5.3.3. Including environmental costs and benefits when establishing a balance

As described in section 4.2.1, the Environmental Code is also a key instrument for many environmental quality objectives. The Environmental Code constitutes framework legislation which in many areas is based around the establishment of practice. The 16 years that have passed since the establishment of the environmental objectives have not yet seen the establishment of any clear practice as regards the balancing principles in Chapters 2:7 and 11:6, i.e. how the costs incurred by enterprises must be balanced against the benefits accruing to society through a measure (not only to reduce discharges into the atmosphere and aquatic environment, but also where applicable benefits for biodiversity and other collective benefits). One consequence of this lack of clarity in practice is that environmentally disruptive operators are sometimes permitted to operate without implementing appropriate measures. They are able to do this, as they can show that the measures would be expensive, regardless of the cost of the environmental damage that is caused. It takes time for a practice to become established. Guidance from the Environmental Protection Agency could clarify established balancing methods.

One conclusion is that, in order to improve the cost-effectiveness of the work relating to the environmental objectives, it will be important to avoid deviations from the polluter pays principle.

5.3.4. The right instrument in the right place

In this edition of the in-depth evaluation, a cost-effectiveness approach is adopted for all environmental quality objectives in parallel. The analyses for each of the objectives as to whether society has established the right instrument in the right place were carried out with varying levels of ambition.

As regards the environmental quality objective Zero eutrophication, the spotlight in this year’s report has been placed on emissions from agriculture, i.e. externalities – emissions which the polluter does not currently need to consider under the current economic system (including instruments). Such emissions consist of nitrogen and phosphorus. The key instruments are stated as being agri-environmental payments and the Nitrate Directive. The environmental payments are subsidies to farmers who carry out measures such as catch crop cultivation. However, the environmental payments do not tackle the main problem, i.e. the emissions or the externality, but represent a way of mitigating the problems that the emissions give rise to. In order to solve the problems in the long term, it will be necessary to focus on the causes of the nitrogen and phosphorous emissions. These subsidies also have the indirect effect that they stimulate agriculture and thereby also the use of fertiliser. The Nitrates Directive contains provisions concerning local emission ceilings and requirements for programmes of measures, and has been realised through legislation concerning how and when fertilisers can be used. These emissions are caused
by the use and application of commercial fertilisers in the agricultural sector. The legislation concerning how and when fertilisers can be used regulates the use and spreading of commercial fertiliser, but contains no incentive to decrease the amount of fertiliser that is used to below the level permitted by the regulations. All farmers in the area will reduce their over-use by an equal amount, regardless of the cost of the reduction. This does not facilitate cost-effectiveness.

In section 4.6, it is noted that a number of objective-based analyses point out that the Rural Development Programme would have more environmental impact if fewer corrections were made. It is stated that a stronger focus should be placed on reducing nutrient inputs into aquatic environments. Evaluations of the previous Rural Development Programme indicate a lack of transparency, that the programme’s objectives only steered the process of distributing funds to a limited extent and that far too many resources were allocated to broad support rather than targeted initiatives. In summary, it can be stated that, although existing instruments contributed a reduction in inputs of around 10–30 percent, few environmental measures were implemented. A new Rural Development Programme (the Rural Development Programme 2014–2020) will enter into force once the Swedish regulations are in place. In the new programme, the requirements for farm payments are stricter and more clearly formulated. These requirements also include nutrient leaching into the aquatic environment to some extent. The programme also includes environmental investment aid, which among other things concerns measures to improve water quality, and to establish and restore wetlands in particular.

In the longer term, the cost-effectiveness could be improved further if separate instruments were to be developed in order to maintain prioritised collective goods contributed by the agriculture and forestry sectors. There are for example ecosystem services associated with rural industries. In order to support commercial enterprise, basic enterprise aid should be developed, e.g. farm payments based on value-based land payments where polluters must pay for the environmental damage that they cause, as is the case under the current system.

In summary, it can be stated that there is a need to review instruments within the agriculture sector to ensure that they hold polluters accountable to a greater extent for the environmental costs that agricultural activities cause. A tax on phosphorous and nitrogen in commercial fertilisers should for example be introduced.

5.3.5. Combinations of instruments
Combinations of instruments are a challenge to analyse. The question is whether they complement each other or whether they result in double management? It would be easy to think that several instruments would be better than one. Double management often appears to occur. In order for it to be possible to take more well-founded decisions concerning how instruments can be improved and act in line with developments in the outside world, there is a need for more evaluations of the combined contributions and impacts of instrument systems on the achievement of objectives. Society has much to gain from ensuring that the incentive structures (see Figure 12 in Appendix 4) act so that the desired objective is achieved without state intervention in individual measures.
Section 4.6 discusses the need for international regulations in order to reduce concentrations of cross-border air pollutants. The UN’s Convention on Long-Range Transboundary Air Pollution and the EU’s Ecodesign Directive are currently being negotiated. These could pave the way for new, nationally formulated instruments. Instruments could perhaps be formulated for particulates and nitrogen oxides from road traffic, ground-level ozone in confined street areas, the use of windscreen washer fluids and other household solvent use, as well as for emissions from solid fuel stoves. When these instruments are developed, it is important that they are targeted sufficiently accurately to ensure that the underlying driving forces behind the various emission problems are investigated and that attempts are made to utilise the instruments which best overcome the individual problems. Each secondary objective and secondary problem requires its own separate solution. Economic instruments may be the most accurate in some cases, while planning tools can help to overcome more geographically linked situations. A central instrument may perhaps need to be indirectly linked to other instruments, and perhaps also to separate compensatory measures, in order to ensure that a new instrument is accepted. In order to introduce socio-economically cost-effective management by objectives as regards regional and national atmospheric emissions (which in a socio-economic sense consist of externalities which the socio-economy needs to internalise), it is desirable that any compromises which are established retain the incentive structure which promotes the polluter pays principle.

There are existing instruments within this area which overlap each other. To achieve the objective concerning Clean air, emissions of nitrogen oxides and other gases must be cut. The nitrogen oxide tax and the issuing of permits for emission ceilings are two instruments which are used to cut nitrogen oxide emissions from point sources, i.e. permanent incineration plants. Many of the large incineration plants in Sweden have an emissions ceiling for nitrogen oxides, which is imposed through permit appraisal. These sources are also covered by the nitrogen oxide tax system.

However, both instruments regulate the same emissions, and therefore the same choices and behaviour. This results in double management. The problem associated with double management is that at least one is superfluous. This is because both instruments correct the same externality. However, both instruments consume administrative resources. Double management requires more resources without exerting any more influence than if only one of the instruments regulated the emissions.

5.3.6. Lack of information or knowledge
This section presents a discussion of two aspects of the information and knowledge problem: (1) that consideration must be given to the fact that acquiring new knowledge and information is expensive, and (2) that management when we lack information presupposes that a risk analysis indicates that potential damage to the environment would cost society more than preventing any damage from occurring in the first place.
INFORMATION AND KNOWLEDGE ARE EXPENSIVE

In connection with information or knowledge deficits, there is a tendency to consider that it is important to acquire more knowledge and information, without considering how much it would cost to acquire the information, i.e., whether it is worth acquiring the information given the extent of the environmental problem.

One of the main problems highlighted in *A non-toxic environment* is that research is needed into how the various chemicals act both in the environment and as regards health. Here, the need to impose information requirements on actors and implement state initiatives relating to knowledge-raising measures is highlighted.

If a cost-effective approach to this issue is adopted, it would be necessary to decide how the objective should be formulated. A debate would then be needed as to how much research would be socio-economically justifiable with regard to the costs and benefits for society.

DECISIONS IN THE FACE OF UNCERTAINTY

One example of an uncertain future scenario which actually imposes more demanding requirements on decision-makers to identify strategies to make robust decisions in the face of uncertainty concerns the increasingly tangible climate changes that are occurring globally. The world is now facing up to the fact that climate changes caused by human activity are already affecting our society today. Ahead of these changes, society can choose between preventing damage, living with the damage (individually or sharing the losses collectively) or relocating vulnerable activities and habitats.

- It is primarily a question of identifying local measures caused by a global problem, where there is no correlation at national or individual level between the magnitude of the climate-changing emissions from one actor and the magnitude of the (future) damage. There is reason to consider that far too few resources are being invested in climate adaptation measures in relation to what would be socio-economically effective. This is the result of the following problems, which often lead to actions which are sub-optimal for society. 

  - **Asymmetric information:** Information concerning known risks, probable scenarios and appropriate preventive measures have probably not reached all decision-makers yet. Climate changes are occurring gradually and tangible damage can be expected over a time horizon far in excess of most of the decisions that we are accustomed to taking. We seem instead to consider the major short-term benefits for ourselves and for society today, rather than the benefits for society in the future.

  - **Uncertainty over responsibility:** Climate adaptation measures can entail a high initial investment cost and can easily be set aside in favour of urgent measures in connection with budget restrictions for various actors. This is particularly true if there is uncertainty over which actors would be liable to pay in the event of damage occurring.

  - **Lack of clarity concerning ecosystem resilience:** There is uncertainty over where and when local climate measures need to be implemented depending on how ecosystems react to climate changes.
Through their long-term mandate, public sector institutions are able to adopt a coordinating approach in order to reduce the long-term economic risks to which society is exposed. They are able to do this by clarifying responsibilities and disseminating information concerning and, where appropriate, developing warning systems, as well as overarching information. Similarly, there are challenges within all environmental quality objectives as regards taking well-founded decisions in the face of uncertainty.

Different variants of the precautionary principle can probably provide guidance in many cases, e.g. a positive risk cost analysis, i.e. when a presumed probable damage would be more expensive for society than preventing the damage in the first place and no-regret options, i.e. decisions which result in better welfare for society regardless of whether or not environmental damage occurs.

However, it should be noted that the precautionary principle, as it is often interpreted, does not mean that one should refrain from activities where the effects are unknown; on the contrary, it is when information indicating that an activity or product is harmful to the environment is available that a decision to regulate the activity or product must be taken. This is because, by their very nature, all new activities and products have unknown effects and, in accordance with the prevailing case law, cannot be regulated until information indicating that they are hazardous comes to light. However, operators and those who introduce products can be held accountable for negative consequences which may arise. In order to determine whether an instrument is appropriate, and perhaps even characterised by a high degree of cost-effectiveness, proposals for instruments where the problems are still unknown need to be clearly justified.

In the evaluations for each objective, groundwater impacts on aquatic habitats are identified as one of the key problems for the environmental quality objective Good-quality groundwater. The analysis also states that the extent to which groundwater impacts on aquatic habitats is largely unknown. A number of key instruments are presented which to some extent will tackle the principal problem, i.e. that we lack sufficient knowledge concerning the environmental problem. The analysis also proposes protective measures for example. The instruments that are presented are the water management regulations, Natura 2000 and the rules of consideration. The instruments that are discussed seem to be factors which impact on the environmental problem, rather than direct management and measures in order to solve the environmental problem. The impression is that management is in place which may impact on emissions. The way in which emissions are then linked to the actual principal problem that groundwater is becoming a medium through which surface water will become polluted in the future needs to be clarified further. Research and information concerning how groundwater impacts on surface water would be a more appropriate key instrument. As with all other use of state funds, this must of course also be cost-effective, i.e. one must ask oneself the question whether the environmental problem is sufficient important and serious to justify the research and information that is needed to improve the management and environmental policy.

This indicates the importance of ensuring that decisions take into account more long-term consequences of the decision.
5.3.7. Management without instruments

Instruments are the state’s instruments for rectifying shortcomings in society which cannot be resolved more effectively in other ways. Voluntary undertakings by industry with the aim of pre-empting what could be more inflexible state intervention can therefore not be called a state instrument in the true sense. It is actually the inspections and the state monitoring in the form of rewards or sanctions that constitute the instrument. As a result of state priorities in the inspection work and the nature of various legislations, there is scope for improvements as regards the monitoring of voluntary measures concerning environmental considerations within the forestry sector, for example. From a socio-economic perspective, there are clear guidelines concerning when voluntary solutions can be an effective way of achieving the environmental objectives and when they are less suitable. When commercial and private finance interests do not conflict with socio-economic interests, there are good opportunities to achieve the environmental objectives via voluntary undertakings. The actors concerned will then themselves have an interest in implementing measures which also benefit society. However, when commercial and private finance interests do conflict with socio-economic interests, there is considerably less scope to achieve the environmental objectives via voluntary undertakings, as the undertakings themselves mean that the private actors incur costs, e.g. in the form of tougher environmental regulations or environmental sanctions.

As explained in Chapter 4, there is also scope for clearer management by objectives, particularly linked to voluntary undertakings in the provisions of the Forestry Act. In order to further improve the cost-effectiveness, the background information to the 2015 in-depth evaluation\(^{57}\) stresses that the competent government agencies should be encouraged to investigate the consequences as regards whether application and compliance would be improved if the sections of the Forest Act which concern environmental aspects were to be incorporated into the Environmental Code. The polluter pays principle needs to be reviewed if it is to be applied more clearly in the current forestry policy. For example, this applies in connection with questions regarding within which areas it would be effective to continue with voluntary agreements and within which areas instruments are necessary. Forests with a high continuity value need to be mapped and habitat protection reviewed. As regards thinning in continuity forests and objects of natural value, the benefits of introducing a duty of notification appear to outweigh the disadvantages. The consequences of the current view of ownership rights and the Forest Agency’s practice concerning the limitation of encroachment also need to be investigated.

In summary, it can be stated that, in order to improve cost-effectiveness, it is important to seek and facilitate clearer management which does not solely depend on voluntary undertakings by forest and land owners. It should be profitable for an ambitious commercial forester to do what will benefit the whole of society.

\(^{57}\) Naturvårdsverket (2015c), Mål i sikte. Analys och bedömning av de 16 miljökvalitetsmålen i fördjupad utvärdering 2015 Volym 1 och 2.
6. Steps towards objective fulfilment

**The purpose of this chapter is to discuss** the follow-up of the environmental objectives as a strategic tool for the environmental work from a development perspective. In the 2012 in-depth evaluation, it was stated that clear priorities are needed in order to increase the rate of progress being made in the environmental work. The perspective provided guidance in the steps towards the development of the analyses set out in this in-depth evaluation. A number of specific aid measures for better analyses of the gap to objective achievement are therefore discussed here, e.g. key aspects of objectives as a tool for clearer cause and effect analyses and the pace of change and trends. This development work needs to continue. As mentioned in the preface, the work was based around a system analysis approach, which is particularly apparent in this chapter.58

In the chapter, it is stated that systematic monitoring will be required if the in-depth evaluations for each of the objectives are to provide a sound basis for structured environmental work. In order to assess whether the initiatives (instruments and measures) are effective in relation to the objectives, a clear link is needed between the objectives and the initiatives, i.e. cause and effect analyses. This presupposes the delimitation of what is to be achieved within the objectives and clearly linked suitable indicators which measure changes in the environment.

6.1. Environmental objectives as an instrument for management by objectives and results

Environmental policy is based around the national environmental quality objectives and the generational goal for the environmental work which were approved by the Parliament. The environmental quality objectives describe the state of the Swedish environment that the environmental work is to result in. The purpose of the Swedish environmental objective system is to provide the framework conditions for structured environmental work and the systematic follow-up of environmental policy.59

What we want to achieve through each environmental quality objective is described as a desired state of the environment. For example, this could be the achievement or maintenance of a particular level of environmental quality through the efficient use of natural resources and within the planetary limits, or humans, animals and the natural environment not being harmed by pollutants generated by human activity.

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58 System analysis has its roots in cybernetics research in the 1940s and became a popular approach within the engineering disciplines, e.g. automatic control engineering and simulation research. System analysis involves dissecting a problem, understanding links, discovering how the structure is connected together and identifying key variables which express the properties in the system. The method is aimed at combining, interpreting and communicating the combined knowledge in a simple way. System analysis is interdisciplinary, as it is intended to analyse many systems simultaneously and the interactions between these systems through developing logical structures. Read more via http://www.iiasa.ac.at/ 20150910.

59 See for example SOU 2015:43 Vägar till ett effektivare miljöarbete.
The environmental quality objectives vary in nature. In some cases, the target levels of the environmental quality objectives can be expressed as “decreasing” or “increasing”. For example, the aim could be to reduce atmospheric emissions or to increase the proportion of protected forest. The assessment of objective fulfilment in accordance with the Government Bill *Svenska miljömål – för ett effektivare miljöarbete* contains two aspects: the government agencies must assess whether the state of the environment which the environmental quality objective describes will be fulfilled by the target year, and whether the necessary framework conditions are in place in order for the environmental quality objective to be achieved.

The environmental objectives are visionary in their description. In order for activities and performances to be effective in relation to the established objectives, the initiatives must have a clear link to the objectives, i.e. it is anticipated that the initiatives will impact on the objectives. An effect can be defined as “a change which occurs as a result of a measure that is implemented and which would not otherwise have occurred”.

The 2012 in-depth evaluation introduced an effect chain (intervention chain) for environmental policy as an aid to the assessment of the effects of instruments and measures. The intervention chain in Figure 8 illustrates the implementation process from political decision to effects on the state of the environment. The chain is based on the management by objectives and results practised by the state, i.e. an anticipated ideal scenario with political objectives as a starting point.

In the first step, the orientation of the policy and individual instruments (1) are decided. Depending on the type of instrument concerned, decisions are primarily taken by the Parliament, Government and central government agencies. The “implementation of instrument” stage (2) involves the creation of clarity and the framework conditions necessary to enable them to be implemented, e.g. through the provision of information and guidance and the development of methods. The Government and central and regional government agencies are key players in this regard. The instruments must then lead to the planning and implementation of suitable measures. To achieve this, questions must be prioritised and plans drawn up. Both public and private sector actors (3) then change activities and implement any measures (4) which impact on the state of the environment in the direction of achievement of the environmental objectives. Via effects in society, the instruments then lead to effects on the environment, which in turn result in an improvement in the state of the environment (5) and ultimately achievement of the established objective. However, it is the actors themselves who decide whether or not they will implement the measures. Not until the instrument and its effects have been evaluated will it be possible to say whether the instrument has had the desired effect, i.e. led to measures which resulted in an improvement in the state of the environment.

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60 *Regeringens proposition 2009/10:155 Svenska miljömål – för ett effektivare miljöarbete.*
6.2. Gap analyses – delimitation of objectives and monitoring indicators for measuring success

In order to improve the analyses in the environmental objective system and present clearer examples of success in achieving the environmental objectives and the effects of instruments and measures, each environmental objective must be delineated clearly, and monitoring indicators must be developed so that they reflect the various aspects of the objective. Clear monitoring indicators enable the gaps which exist between a particular state of the environment and the desired environmental state which the environmental objective is intended to achieve to be analysed. Gap analyses are important, both to illustrate the distance to achievement of an objective and to identify the rate of change that is needed in order to achieve the objective. From the perspective of instrument and measure analysis, this analysis work will be important in making it possible to link what is needed to when it will be needed and how much and for how long. Analysing the objectives based on its various constituent parts in a clearer way can provide a better basis as regards what needs to be prioritised going forward.

In addition to splitting the objectives into aspects, the constituent parts should be valued relative to each other. The clarifications themselves are constituent parts of the objectives. They develop or describe the content of the state of the environment that is to be achieved. In order to say something about the effects of instruments and measures, previous steps in the intervention chain must also be followed up. The key indicators that are sought in the 2015 in-depth evaluation are intended to be result indicators to a greater extent than the existing environmental objective indicators64.

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64 See for example SOU 2015:43 Vägar till ett effektivare miljöarbete, p. 130–137.
As noted above, effect chains and the clarification of cause and effect between initiatives and objectives are needed in order to determine what can be considered to constitute objective achievement. In order to improve this part of the objective monitoring, objective manuals have been prepared by the competent government agencies. In connection with the evaluation of each environmental quality objective, the government agencies have worked on the basis of instructions which focus more on cause and effect.

6.2.1. More trends in the assessment

Changes in monitoring indicators over time are an important aspect of the monitoring of the environmental objectives. A change in the state of the environment over time depending on the impact of different activities and other external factors concerns the rate of change in the monitoring indicator. In this context, it is important to observe which instruments and measures lead to the biggest change per year. A dilemma is that some environmental states cannot be altered in the short term due to protracted recovery times and slow feedback in systems which are slow to change. An instrument or measure is introduced to influence an environmental state through influencing activities which cause the environmental state to change in the desired direction. Depending on the magnitude of the initiatives or how quickly the state of the environment changes, a number of possible scenarios emerge which we can choose between. It is important that the cause and effect links between instruments and measures and the environmental state which they are intended to change are transparent and clear. Such transparency will facilitate a better analysis of the magnitude of the initiatives that are required each year to ensure that the rate of change is optimal with respect to the achievement of each objective. This can also help to support the work relating to the prioritisation of initiatives at a cross-objective level. The rate of change and the opportunity for positive effects relating to a particular objective can then justifiably be prioritised over initiatives linked to other objectives.

To indicate how different instruments and/or measures can impact on the anticipated state of the environment, the monitoring indicators can be reported with the aid of a description of one or more scenarios. However, the forecast for an environmental state is always the most likely effects of instruments and measures (including uncertainties) to influence the rate of change so that the environmental state moves in the desired direction.

6.3. Examples of results of gap analyses for each objective

In the 2015 in-depth evaluation, the focus in the assessments is placed on the key problems which cause the environmental problem that the objective is intended to solve. This focus entails a delimitation in relation to the clarifications. Despite the

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68 Naturvårdsverket (2014) Anvisningar och metodstöd för uppföljning, analys och bedömning av miljökvalitetsmål i FU15 p. 3.
focus, the objectives are assessed in their entirety. The work that was commenced in the 2015 in-depth evaluation which is described above and which was based on the instructions generated a number of results, including an understanding of what is key to the objectives, the importance of these key aspects for the achievement of the objective, etc. In their in-depth evaluations, the various environmental quality objectives have been covered in different ways. From a cross-objective perspective, the results are therefore not sufficiently certain. What is presented in this section must therefore be seen as examples.

OBJECTIVES AND THEIR CONSTITUENT PARTS
In their respective in-depth evaluations, most objectives have been analysed on the basis of their various constituent parts. In many cases, these constituent parts are defined on the basis of the clarifications, while in other cases, key problems which collectively cover the objective’s clarifications have been used as a basis. In the in-depth evaluation of nine objectives, the importance of the constituent parts as regards the achievement of the objective has been evaluated.

The combined parts of an objective make up the objective as a whole, and indicate the objective’s system boundaries. In some cases, the constituent parts of an objective are the same as the clarifications, while in others, they are defined using the objective’s key problems as a starting point. For each part of each objective, there should be a specified objective level and associated key indicator in order to enable the degree of objective fulfilment to be measured. Some objectives have one monitoring indicator per constituent part. Other objectives have several.

As mentioned in section 6.2, the scope to assess change and objective fulfilment and monitor developments within each objective can be improved by focussing on the key problems or constituent parts of the objective in the monitoring process. For many objectives, either equal weighting has been given to all the constituent parts of an objective (Good-quality groundwater) or no evaluation was carried out of the relative importance of the respective parts (A non-toxic environment, Natural acidification only, Sustainable forests, Reduced climate impact).

As regards what parts of each objective are considered to be more important for achieving the objective, a number of parts are highlighted. For example, in the case of Clean air, it is particularly important to monitor developments in the clarifications concerning particulates, nitrogen dioxide and ozone.

6.3.1. Where can one find positive examples of the achievement of the objectives?
One way of saying something about the gap between the current situation and the achievement of the objectives is to determine which constituent parts of the objectives are considered to be YES or CLOSE. A number of examples can be discerned from the summary table presented in the in-depth evaluation for each objective.70
It is considered that the objectives for genetically modified organisms in a magnificent mountain landscape and a rich diversity of plant and animal life, the production capacity of the land and seasonal mountain holdings in a varied agricultural landscape and petrol, butadiene and formaldehyde in clean air will be achieved by 2020. A common factor in the constituent parts where success is apparent is that the national scope is considered to be considerable. It is also interesting to note that all of the constituent parts that are identified as being successful are considered to make a small contribution to achievement of the objective as a whole. Note that the approach differs between the objectives. In their respective in-depth evaluations, the analysis for some objectives covered the entire objective, whilst that for others concentrated on the constituent parts which are most difficult to achieve.

**Good-quality groundwater as an example – how big is the gap and when can the objective be achieved?**

In the in-depth evaluation of *Good-quality groundwater*, the objective was divided into five parts. These five parts are considered to be of equal importance as regards achievement of the objective and cover all the objective’s clarifications (Table d). The key monitoring indicators have been linked to the respective areas and to levels for objective fulfilment with clearly defined monitoring indicators.

<table>
<thead>
<tr>
<th>No.</th>
<th>The environmental objective’s defined parts</th>
<th>Monitoring indicator</th>
<th>Contribution to objective achievement (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Groundwater quality.</td>
<td>Groundwater quality in general and individual water resource areas.</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Groundwater within the water management programme.</td>
<td>Chemical and quantitative status of groundwater occurrences within the water management programme.</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Awareness and planning</td>
<td>Number of water protection areas and number of regional (+ local) water supply plans.</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Impact of groundwater on aquatic habitats.</td>
<td>Groundwater-related problems identified in new and old conservation plans. Groundwater and surface water status assessment.</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Natural gravel deposits.</td>
<td>Gravel use.</td>
<td>20</td>
</tr>
</tbody>
</table>

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21 This section represents a development of the in-depth evaluation for Good-quality groundwater. For more details and complete descriptions, see Naturvårdsverket (2015c) Volym 1 p. 372 onwards
For Good-quality groundwater, it is considered that a total of 13 instruments are of relevance to the objective management (Table e).

Table e. Summary of instruments and how their use impacts on groundwater, steering towards objective fulfilment.

<table>
<thead>
<tr>
<th>Key instruments (shortname in italics)</th>
<th>Key problems which are affected positively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling of quality and quantity (Food product legislation/ Water Management Regulations/Environmental Code)</td>
<td>All</td>
</tr>
<tr>
<td>Water protection areas (Environmental Code 7)</td>
<td>All</td>
</tr>
<tr>
<td>Water supply plans in comprehensive spatial plans (Planning and Building Act)</td>
<td>All</td>
</tr>
<tr>
<td>Material supply plans in comprehensive spatial plans (Planning and Building Act)</td>
<td>All</td>
</tr>
<tr>
<td>The water management programme’s regulations (Water Management Regulations)</td>
<td>All</td>
</tr>
<tr>
<td>Permit issuing (Environmental Code, Chapters 9 and 11 of the Environmental Code)</td>
<td>All. (As regards the conservation of natural gravel, Chapter 9 Section 6f of the Environmental Code in particular.)</td>
</tr>
<tr>
<td>Good inspections (Environmental Code/LV)</td>
<td>All</td>
</tr>
<tr>
<td>Remediation of polluted areas (Environmental Code 10)</td>
<td>All except Conservation of natural gravel.</td>
</tr>
<tr>
<td>The Rural Development Programme’s requirements and advice (CAP)</td>
<td>All except Conservation of natural gravel.</td>
</tr>
<tr>
<td>Procurement requirements and sector guidelines</td>
<td>Primarily Conservation of natural gravel.</td>
</tr>
<tr>
<td>Natural gravel tax</td>
<td>Conservation of natural gravel.</td>
</tr>
<tr>
<td>Natura 2000 sites</td>
<td>Groundwater within the water management programme and Groundwater impacts on aquatic habitats.</td>
</tr>
<tr>
<td>Forest Act</td>
<td>Groundwater within the water management programme and Groundwater impacts on aquatic habitats.</td>
</tr>
</tbody>
</table>

Based on an assessment\(^\text{72}\) of the current state and existing knowledge concerning the implementation and effects of instruments and measures, it is concluded that the objective as a whole will not be achieved. However, varying degrees of progress have been made towards objective achievement in the objective’s constituent parts.

Based on the in-depth evaluation of Good-quality groundwater, the Environmental Protection Agency has developed the analysis that is presented in Figure 9. The figure indicates that the current situation as regards the state of the environment was equivalent to 35 percent objective achievement (objective achievement is >90 percent in accordance with the instructions and is considered to be close if objective achievement is >75 percent). Based on the instruments and measures which are in place today, it is considered that the best possible effect on the state of the objective by 2020 is around 50 percent. However, an assessment of the framework conditions (i.e. based on the estimated effect of instruments and measures through to 2020) by the competent government agency (the Geological Survey of Sweden) indicates that around 45 percent objective achievement will be attained.

\(^{72}\) This assessment is based on weighted (how much an aspect or part contributes to overall achievement of the objective) effects of instruments and measures on the anticipated objective achievement. The difference between the objective achievement achieved so far (2015) and the anticipated objective achievement (2020) constitutes the proportion of objective achievement which we want to present for each monitoring indicator. The more effective the instruments and measures are, the closer we will get to the anticipated objective achievement. In the overall weighted assessment, consideration is given to the key monitoring indicators’ contributory share to objective achievement.
Cross-objective analysis of the environmental objectives

Figure 9: Illustration of the gap for Good-quality groundwater between the current state (2015), the best possible effect on the objective state when instruments and measures are in place by 2020 and an actual assessment of the objective state by 2020. The objective will be considered to have been achieved if at least 90 percent of the objective is achieved, and close to being achieved if at least 75 percent of the objective is achieved.

Figure 10 shows the same relationships broken down between the five constituent parts of the objectives. In the figure it is possible to see that part 2 (see Table d above) has come closest to fulfilling the objective and that part 4 has the furthest still to go. This means that some of the objective’s constituent parts could be achieved while others may lag behind. Figure 10 also indicates that the actual state of the environment for part 2 showed the biggest increase in respect of all constituent parts, while part 4 shows a marginal increase.

Figure 10: Illustration of the gap for Good-quality groundwater for all five constituent parts (see Table d), between the current state (2015), the best possible effect on the objective state when instruments and measures are in place by 2020 and an actual assessment of the objective state by 2020. The objective will be considered to have been achieved if at least 90 percent of the objective is achieved, and close to being achieved if at least 75 percent of the objective is achieved.
From a gap analysis perspective, it is important to analyse the reasons why different parts of the objective are easier or more difficult to change. In cases where the rate of change in the state of the environment is slow, e.g. as a result of delayed effects of instruments and measures, this may mean that the rate of change will not increase for this particular part, and that it must therefore be analysed in a longer time perspective. It may be interesting to highlight such differences within the objective for the objective as a whole. In this regard, uncertainties concerning continuity and the efficiency of the instruments in a longer time perspective become a factor. The more complex the effects of instruments are, the greater the uncertainty that a long-term undesirable development scenario may arise.

*Good-quality groundwater* has clear monitoring indicators. However, some of the instruments are overarching and complex in their formulation and many initiatives are combined, e.g. requirements and advice. This will represent a challenge when analysing effects on the state of the environment. An analysis which assesses the constituent parts of a package of instruments and the way in which they impact on the monitoring indicator would help to provide a better picture of the impact of instruments on objective achievement.

At a cross-objective level, it is the long recovery times in particular that create uncertainty as to whether or not instruments are having an effect. It is therefore important to understand what individual instruments do and how they impact on the rate of change in the state of the environment.
Source list

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Appendix 1.

Table-based assessment of the scope for achieving the environmental quality objective and developments in the environment

Table: Assessment of the scope for achieving the environmental quality objective and developments in the environment.

<table>
<thead>
<tr>
<th>Objective Description</th>
<th>Assessment</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduced climate impact</td>
<td>NO NEGATIVE</td>
<td>Greenhouse gas concentrations are rising, primarily due to emissions from the use of fossil fuels, principally in connection with electricity and heat generation, industrial processes and transport. In the long-term, global emissions need to be around zero in order to avoid a temperature rise in excess of 2°C and to minimise the risk of dangerous climatic impacts. Major societal changes and technological advances are needed. The new international climate agreement must come into force, along with both stricter and new national policy instruments.</td>
</tr>
<tr>
<td>2. Clean air</td>
<td>NO POSITIVE</td>
<td>Despite a fall in concentrations, air pollution still causes significant damage to human health, vegetation and cultural heritage. Further action will be needed to achieve this objective. EU and international initiatives must be carried out to reduce concentrations of particulates and ground-level ozone. At national level, additional action is required to curb emissions of nitrogen oxides and of particulates from the use of studded tyres.</td>
</tr>
<tr>
<td>3. Natural acidification only</td>
<td>NO NEUTRAL</td>
<td>The deposition of pollutants causing acidification is declining, as is the number of acidified lakes and watercourses. Further action is needed to reduce emissions from land-based sources in Europe and from international shipping. The new clean air strategy and the revision of the National Emission Ceilings Directive in the EU are key initiatives. At national level, action is needed in order to mitigate the effects of forestry in particular.</td>
</tr>
<tr>
<td>4. A non-toxic environment</td>
<td>NO NEUTRAL</td>
<td>Certain environmental toxins are declining, although in the case of many substances, we do not know enough about their effects on humans and the environment. Rising global consumption is leading to higher production of chemicals and other products, and with it the diffuse release of hazardous substances. Restrictions on the use of substances of very high concern have been introduced within the EU. The level of interest in voluntarily substituting hazardous substances is increasing in many sectors. Legislation must be developed in certain cases in order to bring about non-toxic life-cycles.</td>
</tr>
<tr>
<td>5. A protective ozone layer</td>
<td>YES POSITIVE</td>
<td>Depletion of the ozone layer has ceased, with much evidence indicating that it has started to regenerate. The Montreal Protocol is the most important policy instrument for this and has proved to be successful. However, continuing use of the ozone-depleting substance nitrous oxide and emissions from end-of-life products remain a problem. Further international work and the national management of demolition waste are important.</td>
</tr>
<tr>
<td>6. Safe radiation environment</td>
<td>CLOSE NEUTRAL</td>
<td>Radiation safety has improved in many areas. However, incidences of skin cancer have been rising for many years. To reduce exposure to ultraviolet radiation, lifestyles and attitudes to sunbathing and personal appearance need to change. Even if exposure declines, cancer incidence will continue rising for some time, as it can take decades for skin cancer to develop.</td>
</tr>
<tr>
<td>7. Zero eutrophication</td>
<td>NO NEUTRAL</td>
<td>Inputs of eutrophying substances are declining, and the situation has improved in certain areas. The conditions are worst in the Baltic Sea. Action to curb nutrient emissions has produced results, but recovery is slow. Emissions, particularly from agriculture and international shipping, must be reduced further. The programme of measures concerning water management is important. Higher aspirations are needed for the international work.</td>
</tr>
<tr>
<td>8. Flourishing lakes and streams</td>
<td>NO NEUTRAL</td>
<td>Too few lakes and watercourses are achieving a good ecological and chemical status. Physical impacts, eutrophication, acidification and environmental toxins are problems. The restoration of lakes and watercourses and the elimination of migration obstacles require increased measures and more resources. Environmental actions linked to hydroelectric power are needed. Implementation of the programme of measures concerning water management is crucial.</td>
</tr>
<tr>
<td>No.</td>
<td>Objective</td>
<td>Status</td>
</tr>
<tr>
<td>-----</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>9.</td>
<td>Good-quality groundwater</td>
<td>NO</td>
</tr>
<tr>
<td>10.</td>
<td>A balanced marine environment, flourishing coastal areas and archipelagos</td>
<td>NO</td>
</tr>
<tr>
<td>11.</td>
<td>Flourishing wetlands</td>
<td>NO</td>
</tr>
<tr>
<td>12.</td>
<td>Sustainable forests</td>
<td>NO</td>
</tr>
<tr>
<td>13.</td>
<td>A varied agricultural landscape</td>
<td>NO</td>
</tr>
<tr>
<td>14.</td>
<td>A magnificent mountain landscape</td>
<td>NO</td>
</tr>
<tr>
<td>15.</td>
<td>A good built environment</td>
<td>NO</td>
</tr>
<tr>
<td>16.</td>
<td>A rich diversity of plant and animal life</td>
<td>NO</td>
</tr>
</tbody>
</table>
Appendix 2.
Supplementary tables

Table f: Examples of constituent parts of objectives that are considered to be CLOSE or YES.

<table>
<thead>
<tr>
<th>Part of objective</th>
<th>Contribution to objective achievement</th>
<th>National scope</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol (Clean air)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>Butadiene (Clean air)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>Formaldehyde (Clean air)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>Production capacity of the land (A varied agricultural landscape)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>Seasonal mountain holdings (A varied agricultural landscape)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>GMO (A magnificent mountain landscape)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>GMO (A rich diversity of plant and animal life)</td>
<td>Little</td>
<td>Considerable</td>
<td>YES</td>
</tr>
<tr>
<td>Polluted areas (A non-toxic environment)</td>
<td>Not available</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Wetland distribution and ecosystem services, peat extraction sites and other exploitation (Flourishing wetlands)</td>
<td>Considerable</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Conserved natural/cultural environment values, consideration and voluntary appropriations (Flourishing wetlands)</td>
<td>Medium</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Conserved natural/cultural environment values, consideration and voluntary appropriations, protection (Flourishing wetlands)</td>
<td>Little</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Conserved natural/cultural environments (A magnificent mountain landscape)</td>
<td>Medium</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Outdoor recreation and noise (A magnificent mountain environment)</td>
<td>Medium</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Natural environments close to urban areas (A rich diversity of plant and animal life)</td>
<td>Medium</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Alien species and genotypes (A rich diversity of plant and animal life)</td>
<td>Medium</td>
<td>Considerable</td>
<td>CLOSE</td>
</tr>
<tr>
<td>Impact of climate changes (A rich diversity of plant and animal life)</td>
<td>Little</td>
<td>Little</td>
<td>CLOSE</td>
</tr>
</tbody>
</table>

The tables (g and h below) summarise the categorisation of the selected instruments and measures in the in-depth evaluations for each objective. During the dialogues that were conducted in connection with the analysis of these results, it became apparent that the categorisation is deficient to some extent and that certain categories have proven to be difficult to separate. This makes it difficult to draw conclusions concerning individual objectives based on the results, but the coarser pattern provides a basis for certain general observations.
Table g: Overview of some environmental quality objective assessments of instrument effects on the specific objective. The figures in the rows concern the constituent parts of the objectives; each row covers all the assessed parts of the objective. The parts can be of varying importance for objective achievement, something that is not illustrated here.

<table>
<thead>
<tr>
<th></th>
<th>We do not know whether the instruments are sufficient. (1)</th>
<th>The instruments are expected to steer developments in the direction of the objective, but are not sufficient. (2)</th>
<th>The as yet non-implemented instruments are expected to be sufficient. (3)</th>
<th>Implemented instruments are expected to be or are sufficient. (4–5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced climate impact</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural acidification only</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A non-toxic environment</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A protective ozone layer</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero eutrophication</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flourishing lakes and streams</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good-quality groundwater</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>A balanced marine environment, flourish- ing coastal areas and archipelagos</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flourishing wetlands</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A varied agricultural landscape</td>
<td>8</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>A magnificent mountain landscape</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

73 The table is based on the table that can be found at the end of the in-depth evaluations for the respective objectives.

“The key aspects of the assessment as to whether the environmental quality objective is achieved”; see Naturvårdsverket (2015 c).

This table has not been prepared for all objectives. A rich diversity of plant and animal life was not considered due to systematic errors in the underlying table.
Table h: Overview of some environmental quality objective assessments\textsuperscript{24} of measure implementation and effects on the specific objective. The figures in the rows concern the constituent parts of the objectives; each row covers all the assessed parts of the objective. The parts can be of varying importance for objective achievement, something that is not illustrated here.

\begin{tabular}{|l|c|c|c|c|}
\hline
 & We do not know enough to assess whether the measures will be sufficient. (1) & The measures are expected to steer developments in the direction of the objective, but are not sufficient. (2) & Measures are planned and expected to be sufficient. (3) & The measures are considered to be sufficient and are expected to be or will be implemented. (4–5) \\
\hline
Reduced climate impact & 2 & & & \\
Natural acidification only & 2 & & & \\
A non-toxic environment & 4 & 1 & 1 & 1 \\
A protective ozone layer & & & & 1 \\
Zero eutrophication & 1 & 3 & & \\
Flourishing lakes and streams & 5 & & & \\
Good-quality groundwater & 1 & 1 & 2 & 1 \\
A balanced marine environment, flourishing coastal areas and archipelagos & 6 & 5 & & 1 \\
Flourishing wetlands & 6 & 1 & 1 & \\
A varied agricultural landscape & 9 & & 1 & \\
A magnificent mountain landscape & 2 & 3 & 2 & \\
\hline
\end{tabular}

\textsuperscript{24} The table is based on the table that can be found at the end of each objective evaluation “The key aspects of the assessment as to whether the environmental quality objective is achieved”; see Naturvårdsverket (2015 c). This table has not been prepared for all objectives. A rich diversity of plant and animal life was not considered due to systematic errors in the underlying table.
Appendix 3.

Further explanation of problems in the implementation of the Environmental Code

Deficiencies in the formulation of the provisions of the Environmental Code or regulations issued pursuant to the Environmental Code.

Deficiencies in the use of strategic environmental assessments and environmental impact assessments (Chapter 6 of the EIA Ordinance) for plans and programmes are considered in the in-depth evaluations of Reduced climate impact and A good built environment, and in Towards sustainable urban development. The Swedish Transport Administration, many municipalities and a number of regional bodies do not carry out the necessary strategic environmental assessments, or at least do not carry out such assessments to a satisfactory level of quality. One deficiency is that there is no requirement for systematic strategic environmental assessments of the proposed measures that are drawn up as a basis for regional and national transport plans. Another deficiency in the legislation is that it is not possible to carry out inspections concerning these issues and that there are also no sanctions available to impose on municipalities and government agencies that are not considered to be complying with the regulations.

The regulatory formulation of environmental quality standards (Chapter 5) is considered in Clean air. Programmes of measures established pursuant to Chapter 5 are often not monitored adequately. No sanctions are available in the legislation for municipalities that do not follow the programme.

The in-depth evaluation of A non-toxic environment notes the lack of available sanctions that are directly linked to the discovery of offences concerning the use of hazardous substances in products (Chapter 14).

Difficulties in re-appraising permits for regulating dams and hydroelectric power stations in accordance with the Environmental Code are identified in the in-depth evaluation of Flourishing lakes and streams as the most important barrier to achieving good ecological status in freshwater bodies. The Environmental Code contains provisions relating to the appraisal, re-appraisal and inspection of hydroelectric power stations, and these are considered to be the key instrument for eliminating migration obstacles. Complicated rules, unclear application of the rules and insufficient resources amongst the government agencies to carry out re-appraisals mean that it takes far too long to issue modern, environmentally compatible permits for most power stations using the tools provided by the Environmental Code. A further barrier is the fact that, under the current practice, government agencies must compensate operators for certain costs which they incur as a result of production losses and no specific appropriations are allocated to the government agencies to cover this type of cost.

In the in-depth evaluation of Good-quality groundwater, it is stated that too few public water sources are protected and that a legal requirement should be introduced to cover this.
Complicated or unclear rules
The rules concerning land drainage and ditch clearing (Chapter 11) are complicated, according to the in-depth evaluation of *Flourishing wetlands*. This makes it difficult to carry out inspections within the area. It also acts as a barrier to the restoration and establishment of wetlands, as land drainage permits are difficult to amend. The processes for notification and issuing of permits for wetland restoration and establishment needs to be simplified.

Interaction between the Environmental Code and other laws
The in-depth evaluation of *A non-toxic environment* discusses the problem of poor correspondence between environmental quality standards for water in Chapter 5 (derived from the Water Framework Directive) and the chemical legislation REACH and the legislation concerning pesticides (Ordinances adopted pursuant to Chapter 14) respectively. There is a considerable risk that measures targeted at hazardous substances could fall between two stools. The link between the rules needs to be reviewed, so that any exceedance of the guideline values in applicable environmental quality standards can trigger a review of restrictions on the use of chemicals in accordance with the other legislations.

The in-depth evaluation of *Flourishing wetlands* refers to uncertainties in how the Act on certain peat deposits and the Environmental Code should be applied together with regard to the issuing of permits for peat extraction.

In the in-depth evaluation of *Sustainable forests*, it is stated that the link between the Forest Act and the Environmental Code is complex and that this complicates the implementation of these legislative acts for forest owners, government agencies and other actors.

Environmental work of industry refers to the difficulties associated with implementing the Industrial Emissions Directive (IED) in the Environmental Code. The provisions of the IED do not correspond those of the Environmental Code, as the Code is based on the framework conditions in each individual case and applies the principle of the “best available technology” for each plant. This leads to difficulties in application for both government agencies and industry.

Poorly developed practice – or underutilisation of rules
The fact that no practice has been developed may stem from the fact that the rules are complicated and difficult to interpret, or a lack of competence and resources amongst government agencies to pursue certain issues or the failure of the courts to adopt a sufficiently clear stance as regards issues where there are strong opposing interests. One possible consequence of this is that certain parts of the Act are underutilised.

The in-depth evaluation of *A non-toxic environment* notes that the practice for determining whether an operator or a property owner is responsible for cleaning up areas which were polluted before 1969 (when the old Environmental Protection Act entered into force) is unclear.

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75 Naturvårdsverket (2015a) Miljö- och klimatarbete i näringslivet.
The in-depth evaluation of *Good-quality groundwater* states that permit appraisals under the Environmental Code do not give sufficient consideration to groundwater, and that better conditions need to be imposed on permit holders regarding protective measures and the monitoring of impacts. With regard to this, it is noted that the application of the provisions of the Environmental Code concerning gravel quarry cases vary across the country and need to be tightened in certain counties. Implementation of the necessary monitoring within the water management program is also inadequate.

The in-depth evaluation of *Flourishing wetlands* refers to uncertainties concerning how far-reaching the conditions that the inspection authority can impose under the Swedish Species Protection Ordinance can be.

The in-depth evaluations for *A rich diversity of plant and animal life* and Environmental work of industry note the poorly developed practice for establishing a balance between the costs of measures and economy in accordance with Chapter 2 Section 7. A background report prepared prior to the 2015 in-depth evaluation indicates that there are no clear lines in decisions and court findings. 76

The in-depth evaluation of *A rich diversity of plant and animal life* discusses the issue of compensatory measures (Chapter 16 Section 9 of the Environmental Code). It is generally uncommon for requirements for compensation to be applied outside protected areas, although it does occur relatively frequently in connection with encroachment on landscape elements which are covered by biotope protection, e.g. requirements for the replacement of avenue trees which are felled. There is a need to align the application of ecological compensation between the appraisal authorities.

In the in-depth evaluation of *A rich diversity of plant and animal life*, it is noted that it is difficult to gain a hearing for protective measures in the courts, particularly as regards protected species which are not threatened. One reason for this could be that the Habitats Directive has not been fully implemented in Sweden, and amendments to the Species Protection Ordinance are needed in order to clarify the provisions. The responsibilities of operators and landowners as regards self-regulation in connection with measures which could impact on protected species are also unclear.

The focus report *Environmental work of industry* 77 presents the view that the general rules of consideration in Chapter 2 have not been sufficiently utilised in the appraisal of environmentally hazardous activities. Questions concerning resource management and energy efficiency have not often been considered by government agencies or industry, and the courts have no guidelines as to how they should deal with such issues. This is probably largely also because of a lack of competence and resources amongst all the actors concerned.

Issues concerning trial periods pursuant to Chapter 22 Section 27 are also discussed in *Environmental work of industry*. According to the preamble to the Environmental Code, the provision should be applied restrictively and only when there are clear motives for doing so. However, the courts apply trial periods in

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76 Enveco (2015) Hur tillämpas miljöbalkens rimlighetsavvägning?
77 Naturvårdsverket (2015a) Miljö- och klimatarbete i näringslivet. En översikt med fokus på drivkrafter och klimat.
different ways. There are examples of rulings where trial periods are established for almost every issue, along with other cases where the trial periods are unreasonably long or repeatedly extended. There are also cases of rulings where trial periods are established concerning issues which are of importance as regards permissibility (e.g. species protection and issues which ultimately concern Natura 2000 sites).

**Lack of resources and/or competence**

The in-depth evaluation of *A protective ozone layer* discusses the problem of the poor sorting of demolition waste. As a result of this lack of sorting, around 80 percent of CFCs in insulating materials are not disposed of correctly in connection with demolitions. Part of the reason for this is a lack of competence amongst the operators concerned. Another reason is a shortage of resources for municipal inspections. A further barrier that has been identified is a lack of cooperation between building and environmental administrations in many municipalities.

The in-depth evaluation of *Zero eutrophication* notes that the potential to reduce nutrient loads under Chapter 12 and the Ordinance on environmental considerations in agriculture (the Nitrates Directive) is considerably greater than the actual effect.

The in-depth evaluation of *A balanced marine environment, flourishing coastal areas and archipelagos* refers to deficiencies in inspections and the associated guidance concerning the provisions regarding shore protection (Chapter 7). This could be interpreted as an indication of a lack of resources for inspections. Similar shortages in resources are identified concerning the re-appraisal of permits for regulating dams and hydroelectric power stations in the in-depth evaluation of *Flourishing lakes and streams*.

The in-depth evaluation of the environmental quality objective *Good-quality groundwater* notes that the lack of resources and competence amongst inspection authorities and within spatial planning amongst county administrative boards and municipalities means that insufficient consideration is given to groundwater aspects in permit cases and in comprehensive and detailed spatial planning processes, and that there is a shortage of resources available for inspections to ensure compliance with the rules that apply within water protection areas, for example. The lack of resources within water management is also noted, particularly as regards groundwater monitoring.

According to the in-depth evaluation of *Flourishing wetlands*, a number of county administrative boards have reported that the rate at which wetland sites are being protected has been declining due to the efforts to protect forests taking precedence. More resources are needed for both administration and land acquisition in order to accelerate the process. Reference is also made to deficiencies in inspections and the provision of advice aimed at ensuring that more consideration is given to the environment and protecting wetlands with high natural values in connection with different activities, particularly within the forestry and agriculture sectors (Chapter 11).
In the in-depth evaluation of *A rich diversity of plant and animal life*, it is concluded that sufficient resources in the appropriation to cover compensation payments to landowners, adequate administrative resources (particularly amongst the county administrative boards) and compensatory land for forest owners will be essential if we are to achieve the objectives laid down in the Convention on Biological Diversity. The formal protection is incomplete in terms of its scope, content, representativeness and connectivity. The demand for funding for protective measures is considered to outstrip the funds that are available. More resources must be allocated to the work relating to formal protection and management agreements. The in-depth evaluation of *Sustainable forests* also notes that sufficient resources must be set aside in the appropriation for the formal protection of forests.

The in-depth evaluation of *A rich diversity of plant and animal life* states that appraisals which encompass species protection need to be improved, as does biological background information. In connection with the appraisal of shore protection dispensations, the habitats of plants and animals are rarely taken into account, even though this is one of the aims of shore protection. Some of these deficiencies can be attributed to a lack of biological competence amongst the municipalities. The evaluation also concludes that the general rules of consideration in Chapter 2 (particularly Section 5) have not been sufficiently utilised in the appraisal of environmentally harmful activities. Issues concerning resource management and energy efficiency are often not considered by the government agencies. The courts have shown no clear practice as regards the way in which they deal with such issues. This is probably largely because of a lack of competence and resources amongst all the actors concerned.

In *Environmental work of industry*, it is claimed that the inspections carried out in accordance with the Environmental Code are inconsistent both between municipalities and between category ABC facilities in relation to category U (other) facilities. This is partly because municipal authorities are reluctant to collect inspection fees from small businesses. Many county administrative boards consider that it is necessary to prioritise appraisal issues, but this happens at the expense of inspections and the associated guidance.

It is also stated in *Environmental work of industry* that surveys concerning the way in which small enterprises handle their self-regulation clearly indicate that many industry organisations are not good at providing support to small enterprises. As a result, many enterprises are finding it difficult to interact with the inspection authority in a way which facilitates cooperation between the authorities and enterprises.

**Environmental assessments and screening pursuant to 6**

In the spatial planning process, many societal objectives must be considered and often balanced against each other. A good process where environmental aspects are taken into account is essential in order to minimise the environmental impact of building developments and infrastructure. Spatial planning at municipal and regional levels is a decisive instrument in the work to strengthen the green infrastructure from a landscape perspective, and thereby improve ecosystem services and

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78 This section is taken in its entirety from Naturvårdsverket (2015d) Mot en hållbar stadsutveckling – Med fokus på miljömålen i planeringsprocessen.
the long-term survival rates of species and habitats. The decisions that are being taken in the infrastructure planning process today will also have a major impact on the scope to achieve the climate and other environmental objectives for decades to come, and poor decisions may result in lock-in effects which make it both harder and more expensive to achieve the climate objectives.

Screening, strategic environmental assessments and environmental impact assessments are tools which can improve the management by objectives of the environmental objectives in the spatial planning process. There is clearly insufficient transparency as regards the background material for decisions which is an aim in the regulations. The evaluation shows that municipalities seek guidance concerning strategic environmental assessments at too late a stage in the process, long after the planning process has begun and when the plan or programme is nearing completion. At this late stage, it is very difficult to tackle the strategic environmental assessment's obligatory procedural steps and consultation processes, and it is impossible to fulfil the obligatory process requirements.

A key aspect of strategic environmental assessments is the handling of alternatives. Choosing and considering different alternatives lie at the very heart of the planning process. It is rarely apparent from planning documents or environmental impact assessments why certain alternatives were not adopted, or whether possible alternatives were even considered at all. It is also very common for decision-makers at the various levels not to consider that the provisions are applicable to the type of plan or programme that they are working on. It is very common to think that it is too difficult, complicated and far-reaching, and to confuse project-related environmental impact assessments with strategic environmental assessments and think they are the same thing, and thus completely miss the point that strategic environmental assessments are a management tool. The result is a belief that it is not necessary to follow the rules. No other authority other than the municipal authority has any insight into how these rules are being followed.

At national level, the Environmental Protection Agency has submitted views indicating that the two most recent infrastructure plans do not fulfil the requirements of the Environmental Code concerning strategic environmental assessments, partly because of a lack of descriptions and assessments of alternatives. For the most recent national plan, which covers the period 2014–2025, no assessment was for example made of how the proposed plan will impact on traffic.

The conclusions in the synthesis report are that both the provisions of the Environmental Code and the associated planning legislation should be reviewed, but above all that more guidance is needed concerning strategic environmental assessments and screening and that the municipalities need better tools in order to enable them to establish a transparent balance between different societal objectives.

**Some examples where the Environmental Code has contributed to the achievement of objectives**

In the in-depth evaluation of *Reduced climate impact*, it is concluded that instruments within the waste sector, which were not primarily aimed at climate measures, have still made a strong contribution to a substantial reduction in greenhouse gases.
The Waste Ordinance and associated landfill disposal ban for sorted flammable and organic waste (introduced with effect from 2002) are generally considered to have made the biggest contribution to reducing the landfill disposal of organic matter, and thereby reducing methane emissions. The requirements in the Waste Ordinance concerning the collection of methane gas have helped to cut emissions from existing landfill sites, where methane gas is now extracted and used instead of being directly released into the atmosphere. In the in-depth evaluation of *Good-quality groundwater*, the work relating to water protection areas pursuant to Chapter 7 of the Environmental Code was identified as being successful.
Appendix 4.

What is a cost-effective instrument?

Socio-economic analysis can contribute structure to environmental policy, and thereby improve the framework conditions for solving the long-term structural management problems. A cost-effective environmental policy imposes requirements on the formulation of both individual instruments and measures, and the way in which these are combined. Cost-effectiveness also assumes that society takes account of the benefits and costs associated with the instrument, and it cannot simply be assumed that more instruments and measures will result in more effective management or more environmental improvements.

As this is the first time that a systematic socio-economic evaluation of all the environmental quality objectives collectively has been carried out, it is clear that the background information from the various environmental objectives is variable in quality. This makes it difficult to say anything about the cost-effectiveness of an individual instrument or a package of instruments at a cross-objective level, but there is strong evidence to suggest that there is considerable scope to improve the cost-effectiveness.

The Environmental Protection Agency’s government assignment required the preparation of a cross-objective analysis of the framework conditions and barriers for achieving the environmental quality objectives and the generational goal. Such an analysis is based on socio-economic effectiveness analysis, where active balances are struck in order to achieve the established environmental quality objectives and the generational goal. In order to apply the right tools for overcoming the key obstacles and achieving the objectives, the respective problems must be analysed. The socio-economic perspective can contribute to this analysis. Such an analysis is described below.

Effective instruments

The environmental quality objectives contain several different types of environmental problem:

1) In most cases, the environmental problems are caused by decisions and choices which we humans have made or are making. In Clean air, emissions from small-scale wood-fired heating installations cause health and environmental problems. In this case, it is individual choices of heating form which impact on whether or not the environmental objective will be achieved. The state can then introduce instruments to incentivise choices which will lead to a socio-economically optimal level of emissions from small-scale wood-fired heating installations. This could for example be done by imposing emission requirements on new boilers or by encouraging the scrapping of old boilers in advance.
2) The environmental quality objectives also contain conservation and protection objectives which are based around avoiding future decisions and choices which could cause the environmental problems. An example of this can be found in the environmental quality objective “Flourishing wetlands”, where wetlands contribute collective benefits such as carbon storage, water retention functions, nitrogen retention and recreation. However, they must cede precedence to more short-term interests relating to private finances. Again, the management is about making what is optimal from the perspective of private finances compatible with what is optimal from a socio-economic perspective. An example of a planning instrument is the bog protection plan, which prioritises Sweden’s most valuable bogs for protection over the next few years. Of the sites covered by the plan, around 200,000 hectares of wetland remain to be protected from future exploitation.

3) Some environmental quality objectives also include consideration for other societal objectives, such as industrial policy and regional interests. In this regard, the environmental quality objective “A good built environment” acts as a good example as regards objective achievement in relation to the structure of building development and transport.

A number of basic principles for the way in which the state can achieve environmental improvements can be deduced from a simple illustration of how the environmental policy works.

![Diagram](image-url)

Figure 11. State decisions concerning instruments and public sector measures impact on the quality of the environment by providing incentives for actors to implement measures which are beneficial for society in general. Source: Processing by the Environmental Protection Agency of Söderholm (2014), p. 5.
Figure 11 presents more details of the overarching intervention chain which is presented in Figure 8. The figure shows that the state’s scope to improve the environment can be divided into two main branches. The branch that is chosen will depend on the fundamental causes of the environmental problem. One branch consists of measures which the state achieves through incentivising the behaviour of households or businesses, through instruments such as permits, environmental taxes or emission permits. Instruments are most effective in cases where the fundamental causes of environmental problems are the result of socio-economic structural faults, known as ‘market failures’, and where the problem can be resolved via a possible change in the behaviour of stakeholders. The other branch consists of public sector measures which the state implements itself, e.g. the liming of acidic lakes, the protection of valuable nature and the remediation of polluted land. Public sector measures are most effective in cases where a need for state management has been identified, but instruments cannot be used.

The challenge that lies in the management problem is to make what is individually rational when private actors act in the market into what is collectively rational with the aid of instruments, so that private actors give more consideration for the environment. Figure 12 illustrates the components that are of vital importance in the design of a socio-economically effective instrument.

![Diagram](image.png)
The figure illustrates that there are two distinct types of decision and choice which may need to be corrected through instruments:

1. Where the harmful properties of goods and services during consumption or manufacture are known, but not by those who are affected; known as asymmetric information.
2. Where ownership of the environment is unclear; known as externalities

**Information problem – Asymmetric information**

Instruments for correcting information problems are aimed at making the information concerning the harmful properties known to those who could be affected. A typical example is the obligation of businesses to provide information in the form of symbols and warnings if a product is hazardous or could be hazardous in certain situations. Asymmetric information means that one actor has more information than the other. A classic example in the context of the environment is when vegetables which have been sprayed could contain pesticide residues. The consumers are unaware of this and purchase products which could harm their health. Similarly, textiles can for example contain harmful substances or substances with undesirable properties which are unknown to the consumer. If the information concerning the properties of the products becomes known to consumers, their demand for these goods is likely to decline.

It is important to note that if no one is aware of an activity's harmful properties, it is a knowledge problem rather than an information problem (see section 4.4.5). If those who are harmed are aware of the harmful properties but still choose to expose themselves to the risks, the management problem becomes more complicated. In order to solve the problem, it is necessary to understand why individuals decide to take risks.

**Ownership problem**

The second type of problem which is referred to above is perhaps the most common and can in turn be divided into two types of ownership problem:

1. An externality for third parties where an activity affects individuals who are not involved in the activity, and
2. An externality where the damage is more indirect and occurs as a result of an activity reducing the scope for others to use the same resources; this is known as “the tragedy of the commons”.

**Externality which harms third parties**

This is the classic example of an environmental problem where actors release pollutants and also affect third parties by harming health and the environment. An example of this type of environmental problem is emissions of harmful substances such as CO2 from road traffic, which causes global warming and affects third parties. This type of environmental problem can be regulated using classic instruments such as administrative/legal regulations and economic instruments such as taxes and emission permits. The type of instrument that is most appropriate will depend on
the type of emission source (diffuse or point), the degree of uncertainty as regards when the objectives will be achieved and requirements concerning the degree of cost-effectiveness.

**Externality: “the tragedy of the commons”**.
The other type of ownership problem is linked to access to physical resources in relation to use. An example which can be used to illustrate the problem concerns fishing. When a fisherman catches fish, this reduces the quantity of fish remaining in the water and makes it more difficult for other fishermen to find the other fish that are still in the water. Thus, other fishermen will spend more time and resources finding the remaining fish and incur costs in doing so. Groundwater, recreation and other common goods are other examples of this type of environmental problem.

**Public sector measures instead of instruments**
There are cases where instruments cannot be used, even though in theory they may be appropriate for solving a particular type of environmental problem. An example is where environmental problems are historical and caused by choices and decisions which are no longer relevant. As relevant choices and decisions which can be managed no longer exist, instruments are unsuitable, and it becomes necessary for the state to intervene directly in order to solve the environmental problems. An example of where public measures are necessary is the remediation of polluted land where the polluters are no longer in existence. There are also situations where public sector measures are necessary, e.g. in connection with international environmental problems where there is no scope to influence emissions generated outside a country’s borders which cause domestic environmental damage. Another example of where public sector measures may be necessary is when the incentivising of choices and decisions made by households and businesses is too complex and uncertain. In addition, objectives concerning the protection and conservation of nature often require state measures such as the protection of wetlands in accordance with the bog protection plan. The measures then need to be based on the idea of societal needs, and it is difficult to impose such a responsibility on private actors. Protection can be described as the prevention of an environmental problem through regulating future choices and decisions which could cause environmental problems.

**Cost-effectiveness**
In the case of a high degree of cost-effectiveness for society, the objectives will be achieved at the lowest possible cost, i.e. any barriers are eliminated so that the objective can be achieved without any expensive side-effects. In this context, ‘cost’ means the amount of resources which society must allocate in order to achieve the desired environmental changes. In the objective-based environmental policy, a high degree of cost-effectiveness is a more appropriate monitoring concept than socio-economic effectiveness\(^7\), as it places the spotlight on objective achievement.

\(^7\) If the objective is set at a level where the benefits to society outweigh the costs incurred by society in achieving the objective, it may also be interesting to follow the benefit side of the calculation when striking a balance between measures and instruments.
The definition of cost-effectiveness highlights two aspects in the management process: the capacity to bring about the environmental improvement (output) and the costs, i.e. resources, that are needed in order to achieve it (input). This approach thus compares costs with what is to be achieved and can be specified as a cost per unit of environmental improvement.

*The right instrument in the right place*

From a management perspective, it is very important that the right instrument is implemented in the right place. An instrument or measure which redirects resources so that the resources are used ineffectively will in practice result in a lower degree of cost-effectiveness. An example is where a uniform environmental tax is imposed on everyone who extracts groundwater for use as drinking water. As using groundwater as drinking water represents a threat within certain defined areas, this means that, in all other areas where groundwater is not threatened, the tax is unnecessary and corrects an environmental problem that does not exist. From a socio-economic perspective, the tax will mean that resources which actors could have used for other activities or consumption are redirected to an activity where they are of less benefit.

In order to identify the right instrument for the right place, it is first necessary to address each category of behaviour and decision which causes environmental problems using the instrument which best incentivises the individual actor into taking decisions which benefit society in general (e.g. by giving more consideration to the environment). If the behaviours and decisions which cause the problems are easy to observe and similar across the whole country, economic instruments will probably be the most appropriate. If there are important regional and geographic variations, administrative/legal instruments such as the issuing of permits may be more appropriate. If the best instrument for each category of behaviour and decision is introduced, a cost-effective package of instruments will have been created. This means that each individual instrument will play a clear role in the work to achieve the environmental objectives.

*The right combination of instruments*

An environmental problem can arise from a number of independent decisions and activities which collectively cause the problem. This means that, in order to achieve the environmental objective, we must solve a number of distinct environmental problems. The environmental quality objectives and the clarifications are often complicated and consist of a number of different types of behaviour and decisions amongst businesses and households which collectively cause the combined environmental burden. To ensure that an environmental policy is cost-effective, it is therefore important to ensure that the right combinations of instruments are chosen in order to achieve a particular environmental objective. It is not unusual for two instruments, which are constructed in different ways, to at least partly attempt to correct the same environmentally harmful choices and decisions, i.e. to overlap each other and thereby result in overlapping management. When one instrument corrects certain choices and decisions, the other instrument becomes superfluous. This will result in resources not being used where they can achieve the most benefit. It is therefore important to ensure that the instrument package consists of instruments which complement each other.
It may sometimes be impossible to put together the optimal combination of instruments based on the established objective. There can be various reasons for this, e.g. lock-in effects as a result of existing legislation or specific solutions, negotiated for particular interest groups. It is valuable to identify where in the management process such ineffectiveness exists. This is essential if society is to be able to take a well-founded decision as to whether or not it is worth improving the management process.

Example:
Acidification in Sweden partly originates from emissions of acidic substances, particularly nitrogen and sulphur oxides, from transport, industry and agriculture, both within and outside Sweden’s borders. The behaviours that trigger the environmental problem can therefore be categorised into at least two acidic substances from three different types of activity taking place within and outside Sweden. Each of these categories represents an individual category of environmental problem (or market failure) which requires its own solution. In other words, both domestic and foreign instruments are needed, at least as regards nitrogen and sulphur oxides, for each of the activities (transport, industry and agriculture) which generate the emissions.
Cross-objective analysis of the environmental objectives

Background report for the 2015 in-depth evaluation of the environmental objectives

This report analyses the environmental work based on key instruments and their effects, cost-effectiveness and various types of gaps to objective fulfilment. The report also looks at a number of issues of relevance to the development of the follow-up.

The conclusions highlight the need for a stronger focus on driving forces and behaviour in the environmental work, and that more advanced analyses of instruments and measures along with more transparent monitoring can improve the framework conditions for the establishment of clearer priorities within the environmental work.

This report is one of the background reports for the 2015 in-depth evaluation of the environmental objectives. The analysis is primarily based on the 16 in-depth evaluations of the environmental quality objectives.