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STJÓRNMÁL & STJÓRNSÝSLA

The roles and tasks of environmental agencies in Europe

David Egilson, Secretary of the EPA Network 2007 - 2011

Abstract

The paper describes the outcome of a survey conducted among heads of environmental protection agencies (EPAs) throughout Europe. Around 70 - 80 % of the domestic environmental legislation in Europe is decided at EU level. The laws decided at EU level apply either directly or are transposed into national legislation by a decision of the national parliaments. It is usually the task of an EPA to monitor and oversee the implementation of the legislation. The majority of the EPAs regard themselves as "quasi-independent" i.e. independent agencies with strong ties to, and cooperation with, ministries upon which they are dependent financially. Around a quarter of EPAs are ministerial departments. There is no noticeable correlation between demographic properties and the administrative structure of the EPAs. The active level of governance, with some noticeable exceptions, is on a national level. Most EPAs have policy advice and contribution to the knowledge base (research, monitoring, data gathering and assessment) as their main tasks. A significant number of EPAs are also tasked with regulatory functions, but in other instances these important functions are carried out within other government entities. Their main field of work as regards pollution prevention is air, freshwater and waste. EPAs also deal substantively with climate change and soil. Energy, agriculture and health are also covered, albeit not on a major level. Environmental communication is a major task for most EPAs. Virtually all of them deal with environmental indicators, assessment reports and provision of information to governments and the general public. Future environmental policy needs to address the fact that present lifestyles, resources and land use seem to put substantial pressure on the environment. EPAs will have increased role therein as the managers of the knowledge base, the communicators of environmental knowledge and brokers for sustainable resource use. The EPA Network has established itself as an important part of the environment policy loop in Europe due to its cooperation and practical knowledge from domestic implementation of European environment policy and legislation.

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Úrdráttur

Greinin lýsir niðurstöðu könnunar sem gerð var meðal stjórnenda umhverfisstofnana í Evrópu. Um það bil 70–80 % af innlendri löggjöf þessara landa er varðar umhverfismál er mótuð og ákvörðuð innan Evrópusambandsins. Ákvarðanirnar eru innleiddar í innlenda löggjöf með reglugerðum eða tilskipunum eftir staðfestingu þjóðþinga viðkomandi landa. Það eru venjulega umhverfisstofnanir sem fylgjast með framkvæmd eða hafa umsjón með verulegum hluta umhverfislöggjafarinnar. Langflestar umhverfisstofnanir líta á sig sem „hálf-sjálfstæðar" með sterk tengsl við ráðuneyti enda eru þær háðar þeim varðandi fjárveitingar. Um það bil fjórðungur umhverfisstofnana eru ráðuneytisdeildir. Ekki er unnt að sjá nein tengsl milli fólksfjölda eða landstærðar og stjórnsýsluppbyggingar stofnananna. Langflestar stofnanir starfa á landsvísu, en á því eru þó mikilvægar undantekningar. Helstu viðfangsefni flestra umhverfisstofnana eru stjórnsýsluráðgjöf varðandi umhverfismál, uppbygging og utanumhald á þekkingargrunni í málaflokknum sem grundvallast á rannsóknum, vöktun og gagnasöfnun. Þó nokkur hluti umhverfisstofnana sinnir stjórnsýslu, svo sem leyfisveitingu, eftirliti og reglusmíð, en algengara er að þeim verkefnum sé sinnt af öðrum aðilum í stjórnsýslunni. Helstu verkefni sem snúa að mengunarvörnum eru loftgæði, ferskvatn og úrgangur. Margar umhverfisstofnanir sinna einnig verkefnum er varða jarðveg og loftslagsbreytingar. Stofnanirnar fylgjast einnig með orkumálum, landbúnaði og lýðheilsu, en ekki í miklum mæli. Flestar hafa umhverfisfræðslu að meginviðfangsefni og allar vinna við gerð umhverfisvísa, umhverfismat og upplýsingagjöf til stjórnvalda og almennings. Umhverfisstefna framtíðarinnar þarf að taka mið af því að auðlinda- og landnotkun og neyslumynstur sem fylgir lifnaðarháttum nútímans virðist valda verulegu álagi á umhverfið. Umhverfisstofnanir munu væntanlega fá aukið hlutverk við að halda utanum og uppfæra þekkingargrunninn varðandi umhverfismál. Þá er líklegt að umhverfisstofnanir fái einnig aukið hlutverk við upplýsingagjöf til almennings og stjórnvalda varðandi umhverfismál og sem talsmenn sjálfbærs lífstíls. Netverk forstjóra umhverfisstofnana,EPA Netverkið, er orðið mikilvægur aðili í mótun umhverfisstefnu í Evrópu. Styrkur þess byggir á þekkingu innan umhverfisstofnana á framkvæmd umhverfismála og umhverfislöggjafar heima fyrir.

1. Introduction

1.1 The objective of the research

The EPA Network[1] is an informal grouping of the heads and directors of European Environmental Protection Agencies(EPAs) and similar bodies across Europe. It consists of 1 – 2 key Environment Protection and/or Nature Conservation Agencies from countries across Europe along with the European Environment Agency (EEA). There are at present 38 members within the EPA Network. This author served as the secretary for the EPA Network during the years 2007 – 2011. During his time at the

secretariat he conducted a survey amongst the members of how they perceived the role of the EPAs and their functions by looking at their commonalities and differences. The purpose of the survey was to explore the level of governance the EPAs work on and how the roles that the EPAs play in individual countries differ so the EPA secretariat would be in a better position to assist the Network and its members in fulfilling their commitments both within the EPA Network and domestically.

The paper presents its main findings and attempts to address the following questions:

- At which level of environmental governance are national EPAs working?
- What are the roles and tasks of EPAs throughout Europe?
- How are the roles and tasks of EPAs likely to change in the future, in response to increased pressure on the environment. ?
- What will be the role of the EPA Network in future implementation of environmental policy?

1.2 The structure of the paper

The second chapter following the introduction describes the terrain within which the EPAs are working. It starts by giving a short description of the human and natural environment in Europe and continues to the environmental framework. This information provides a basis for understanding the differences and synergies in roles and tasks of EPAs that are formed as a part of the implementation of environmental policy. Chapter 3 describes the methodology applied and chapter 4 presents the results of the survey. The discussion is divided into two chapters; Chapter 5 deals with the outcome and provides an interpretation of various aspects of the survey including the limitations of such an approach. The discussion in chapter 6 is based on the recent outcome of the State of the Environment Report (European Environment Agency, 2010a) and attempts to analyze probable trends in environmental policy in Europe in the near future and the possible roles and tasks of EPAs therein. The conclusions are presented in chapter 7.

2. The terrain

2.1 The human and natural environment in Europe

Europe, excluding Russia, is home to around 600 million people and covers about 5.85 million km^2. It is one of the most densely populated regions of the world with an average of 100 people per km^2, with some 75% of the total population living in urban areas. In addition to being densely populated, early and long-standing utilization of technology in Europe has enabled citizens, in their effort to improve their lives, to transform and change a great deal of their natural environment. These activities have created a very high Gross Domestic Product (GDP) in large parts of Europe, even though there are significant regional differences in material wealth over the continent. These achievements have not come without cost. The European Environment: state and outlook 2010 report observes that anthropogenic effects have become more prevalent as a consequence of the expanding population in most of the countries and

increased resource use per capita (European Environment Agency, 2010a). One of the main messages is:

> "Environmental policy in the European Union and its neighbours has delivered **substantial improvements** to the state of the environment. However, **major environmental challenges remain** which will have significant consequences for Europe if left unaddressed."[2]

Air and water pollution, acid precipitation, climate change, loss of biodiversity and many other environmental problems tend to ignore national borders. Typically, the pressure caused by these problems present a threat that can affect more than one country. Thus, trans-boundary environmental problems need to be addressed at the regional, and even in some cases the global, level. There has been growing concern in recent decades about the human impact on the environment, and the general public in Europe has recognized the need for a common response to alleviate or reduce possible anthropogenic impacts.

Previous research has illustrated that the general public call for official legislation and its enforcement mainly concerns activities where the individual can neither perceive the risk nor control personal exposure to the risks (Slovic, 1987; Morgan, 1993). Environmental legislation and its enforcement are concentrated in that area of risk. With increased anthropogenic impact on the environment there is an increased tendency among the general public to call upon and expect authorities to extend regulation from activities relating to personal risk to more shared or communal risk.

2.2 Environmental framework in Europe

It is not common knowledge that some 70-80% of environmental legislation in the EU Member States and member countries of the European Economic Area (Iceland, Liechtenstein and Norway) is actually decided and agreed at EU level (European Commission - DG Environment, 2008). The subsidiary principle restricts EU action to those areas where it can be more effective than national or regional action.

The administrative structure within Europe differs quite substantively. Implementation of environmental legislation is done at both national and subnational level. Sometimes the policies and tasks are mainly carried out at national level, but in other cases the main efforts are at regional level. Majone refers to two main reasons for national governments to delegate powers: To reduce decision-making costs, for example by taking advantage of executive branch expertise, or to enhance the credibility of policy commitments, (Majone, 2001). In addition to these general terms there are other sorts of rationale such as enhancing efficiency of rule-making, resolving commitment problems overcoming information asymmetries in technical areas of governance, avoiding blame e.tc. (Thatcher & Sweet, 2002; Curtin, 2005).

Policies decided by the EU are of regulatory character (Nuget and Paterson, 2003). The reason for this can be attributed to relatively low costs incurred for EU itself, but not least due to the separation between the rule managing process and implementation

process. (Scott, 2005). EU lays down a regulatory framework for public activity in member states for example regarding operation of the market and the protection of the environment.. EU legislation is either passed as *regulations,* which are directly applicable, *directive*s which have to be transformed into national law or *binding decisions*. Due to the variety in the environmental conditions and administrative structures throughout Europe, the directive is the main instrument used in the EU environmental policy reflecting the need for flexibility in achieving environmental goals. The laws developed and adopted at EU level either apply directly or are transposed into national legislation by a decision of national parliaments.

The main role of the European Commission's Environment Directorate-General (DG) is to initiate and define new environmental legislation and to ensure that agreed measures are put into practice in the EU Member States. The European Commission began the practice of periodically issuing Community Environmental Action Programmes in the early 1970s. These programmes address broader perspectives on EU environmental policy in a strategic way and set out forthcoming legislative proposals. The sixth environmental action program, 6 EAP, has now come to an end and the 7EAP is under preparation (European Commission Environment, 2011;Europolitics, 2011).

Regulation is not achieved simply by passing laws but requires detailed knowledge of and intimate involvement with, the regulated activity. This requirement will necessitate sooner or later the creation of specialized agencies entrusted with fact finding, rulemaking and enforcement (Majone, 1994). The European Environment Agency[3](EEA) was created to increase policy-making efficiency by improving environmental reporting and providing solid information for EU policy making. The EEA has been assigned the task of providing sound, independent information on the environment for its 32 member countries. This information is one of the fundamental sources used by the Commission when it formulates its proposals; the Commission has acknowledged the importance of the EEA's role and in recent years accepted a potential extension of EEA support activities 'along the entire range of stages of the policy cycle' (Zito, 2009).

The EU's environmental policy has been in existence over the last 30 years. Initially it was limited to the core EU member states but it has now been extended over a much wider geographic area. The policy started with hot-spot pollution control and management but moved gradually towards a more holistic and integrated approach, looking for synergies between business and environmental goals. The developments over the years have always been very sensitive to wider economic and political cycles(Hey, 2005). Although the major share of environmental policy initiatives is nowadays decided at the European level, and despite the existence of a number of international environmental agreements, the implementation of environmental policy is still carried out at the national level. In spite of being the world's second smallest continent there is huge diversity in environmental and social conditions which has had an effect on the governance structure applied in individual countries. As a consequence, differences exist in the type and rigour of environmental regulation between European countries and regions (P. Vercaemst et.al., 2007).

Regardless of the legal structure within countries there is, though, usually an agency,

an EPA, that monitors, and in a number of cases oversees, part or the main part of the implementation. The EPAs within each country or region typically monitor and analyze the impact already caused by human activities. Some of them can therefore be classified as "information agencies" and policy advisors, while others have wider scope and perform tasks often attributed to Independent Regulatory Agencies (IRA) such as regulating, licensing and inspecting. At first sight the structure of the environmental governance at national level is following the typical governmental administrative order. The reality is, however, more complex. Firstly, the countries, most often EPAs report their findings to the EEA via a special network called EIONET[4]. This information provides a basis for the analysis of impacts and assists in deciding upon the most appropriate measures both domestically and at EU level. Secondly, the environmental policy preferred to be legally binding needs to be accepted by the Council of Ministers and the European Parliament, and implemented by the member states. Therefore, the EU environmental policy process requires different actors on different levels of governance i.e. national, subnational and supranational to cooperate with each other. The main expertise on the issues lies commonly within the national/regional EPAs. Therefore, this expert knowledge is quite often one of the most important information sources for the Commission when forming the environmental policy.

In terms of national agencies in the European framework, case studies indicate that national governments may be partly split so that national agencies can be serving both ministerial departments and the European Commission (Egeberg & Trondal, 2009). The main impact national and subnational EPAs have on the EU policy, is in providing information and advice into the policy cycle based on sound data. Unfortunately, some of the data collection by the EPAs, its analysis and quality assurance is quite time consuming. Sometimes it takes years before it is possible to compare outcomes or impacts between states or regions. With the present advances in information technology, ideas have emerged to use online information to inform authorities and the public on environmental issues. This relatively new methodology is called the SEIS approach[5]. Eye on Earth is a good example of recent developments in SEIS[6]. The SEIS approach should enable the authorities and public in states and regions of Europe to monitor changes instantly and get early warnings. It is also likely that this new type of information flow will enhance influence of national and regional agencies and indeed the general public on the EU Policy making.

Most of the EPAs in Europe have joined the EPA Network which has been quite active and presented joint opinion on policy matters such as better regulation and other environmental policy matters[7]. The Commission´s active involvement in the EPA Network shows that its work is considered valuable for the EU policy makers and receiving feedback from national environment agencies has become an important part of the environment policy loop (Hoffmann, 2011).

3. Methodology

This work is based on the outcome of an initial survey of the tasks and roles of environmental protection agencies in member states of the European Environment Agency. The survey was carried out by the EPA secretariat in 2009. To further

develop this research a questionnaire was uploaded online inviting members to respond. The survey was structured as follows:

Part I Governance issues in relation to EPAs
General questions about the agency

1. Relationship with the Ministry
2. The active levels of environmental governance
   - Domestically
   - Where EPA works
3. Does the agency have a board?

Part II Roles and tasks of EPAs
General role and tasks of the agency

1. Environmental protection/Pollution prevention
   Fields within Environmental protection/Pollution prevention
2. Nature conservation
3. Land use
4. Hazardous substances
5. Wildlife management
6. Sustainable development
7. Environmental communication
8. Connection to other collaboration activities
   - National Focal Points within Eionet or members of the EEA management board
   - IMPEL[8] the European Union Network for the Implementation and Enforcement of Environmental Law
   - ENCA Network[9] a sister network of the EPA Network and forum of European agencies dealing with nature conservation.

The directors of the EPAs, in their role as members of the EPA Network, were asked how they themselves perceived the role and task of their own agencies by offering them the options to score a range of specified roles and tasks as major, medium, minor and none/not applicable. The questionnaire contained specific guidance explaining the criteria for the replies. The members of the network are in general quite familiar with the functions of other EPAs and know often where there are synergies and differences between EPAs. To ensure coherence and consistency in the replies and avoid outliers, the results were returned to the responders after closing the survey, to invite them to adjust their replies in light of other responses. Three responders accepted the offer and made minor adjustments to their replies. The methodology is further discussed in section 5.3.

4. Results

4.1 The level of governance

This part of the analysis aimed to explore the level of governance at which EPAs are working. Furthermore, the intention was to investigate whether individual EPAs have, partly or fully, the function of an Independent Regulatory Agency, IRA (Gilardi, 2008; Thatcher, 2002a). The latter question was approached in two steps. Firstly by examining the EPAs relationship with its competent ministry and, secondly, asking whether the EPA had a board of directors.

The geographical outcome of this survey is illustrated on a map, Fig 1.

A majority of the agencies, or 76%, regard themselves as *Quasi Independent Agencies* i.e. independent agencies but with strong ties and extensive cooperation with the ministries on which they depend financially. The remaining 24% regard themselves as ministerial departments. The total number of members having the functions of EPAs and reporting themselves as *Ministerial Departments* is nine, namely Denmark, Hungary, Lithuania, Portugal, Rumania, Serbia, Slovenia, Switzerland, and Northern Ireland[10]. There is no observable correlation between population or area the EPA serves and the form of linkage to ministries. This implies that neither variable has any effect on the relationships between the EPA and the corresponding ministries.

The survey reveals that 46 % of the EPAs have a board that guides or manages them, whereas 54 % do not have a board. Interestingly, two ministerial departments, namely in Romania and Switzerland, also have a board. In line with the question on the linkage to ministries, the population or area EPA served appear not to have any correlation with whether the EPA has a board or not. This again implies that the presence of a board is neither influenced by the size of population nor area served.

The active level of environmental governance was in general reported by the vast majority to be national, and the same applies to the work of EPAs, see Table 1. The main exceptions are Belgium/Flanders and Spain/Basque Country.

Table 1. Levels of environmental governance within the EPA Network

	National	Regional	County	Municipal
Active levels of environmental governance within the country.	93.1%	58.6%	31.0%	48.3%
Level the EPA works on	93.1%	34.5%	6.9%	10.3%
			N=29	

Table 2 summarizes the response on what level environmental regulation and its implementation is administered.

Table 2. Levels of administering environmental regulation and its implementation

Regulating

	National	Regional	County	Municipal
All and Major	82.8%	24.1%	10.3%	13.8%
Medium	3.5%	20.7%	20.7%	13.8%
Minor	3.4%	17.2%	6.9%	27.6%
None	10.3%	37.9%	62.1%	44.8%
Sum	**100.0%**	**100.0%**	**100.0%**	**100.0%**

N=29

Licensing

	National	Regional	County	Municipal
All and Major	48.3%	41.4%	13.8%	24.1%
Medium	24.1%	13.8%	17.3%	6.9%
Minor	20.7%	10.3%	10.3%	17.3%
None	6.9%	34.5%	58.6%	51.7%
Sum	**100.0%**	**100.0%**	**100.0%**	**100.0%**

N=29

Inspecting

N=29	National	Regional	County	Municipal
All and Major	37.9%	41.4%	13.8%	24.2%
Medium	20.7%	10.3%	10.4%	10.3%
Minor	17.3%	6.9%	13.8%	13.8%
None	24.11%	41.4%	62.0%	51.7%
Sum	**100.0%**	**100.0%**	**100.0%**	**100.0%**

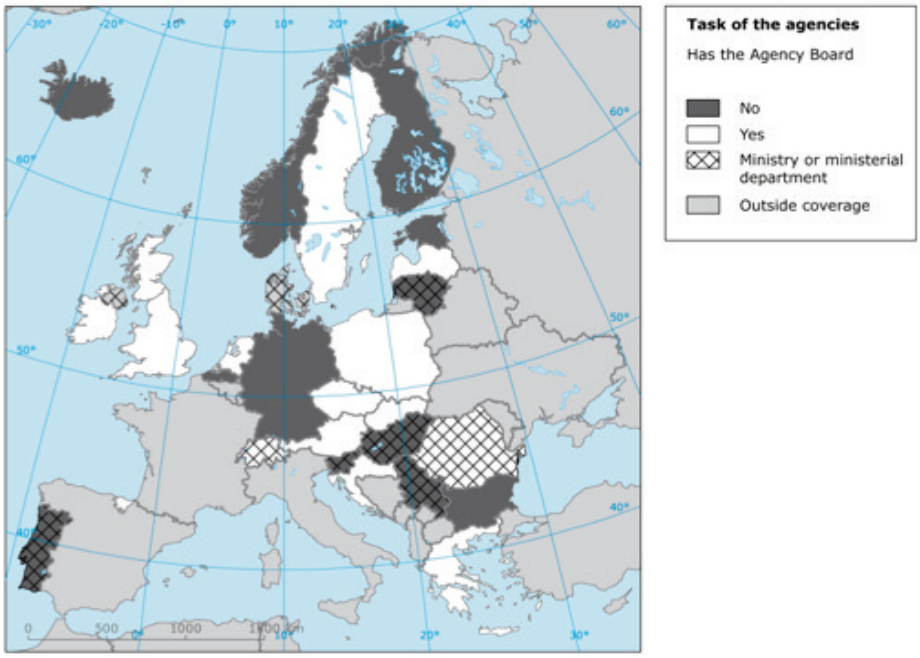
N=29

Other enforcement

	National	Regional	County	Municipal
All and Major	58.6%	20.7%	13.9%	10.4%
Medium	20.7%	24.1%	10.3%	10.3%
Minor	6.9%	13.8%	10.3%	31.0%
None	13.8%	41.4%	65.5%	48.3%

N=29

Figure 1. Linkages to ministries and whether EPAs have board



The administration of environmental regulations appears to be prevalently on the national level. However, in several instances, or 25 %, environmental regulation is reported to be a shared major task carried out jointly at national and regional level.

The role of the regional level in environmental governance becomes more apparent when looking at responses to the question on the level at which licenses are issued. Around 48% report that licenses are issued on the national level, whereas 42 % are reported on the regional level. It should be noted that the most polluting activities are licensed under the so-called IPPC permits[11] applied throughout the area in line with the EU environmental acquis. These permits can be relatively small in number in each country compared to other permits, but can entail extensive work. They are mainly issued by EPAs or bodies having similar functions. In about 10% of instances members report that only IPPC permits are issued at the national level. In this analysis issuing an IPPC permit has been classified as a medium task. It is, nevertheless, a matter of judgment whether IPPC licensing is a major or medium task since licensing activities under IPPC can be extensive work for a limited number of activities. If licensing IPPC activities would be seen as a major undertaking, the percentage of licensing seen as a major task on the national level would increase above 60% while still keeping the licensing as a major task at the regional level at 40 %.

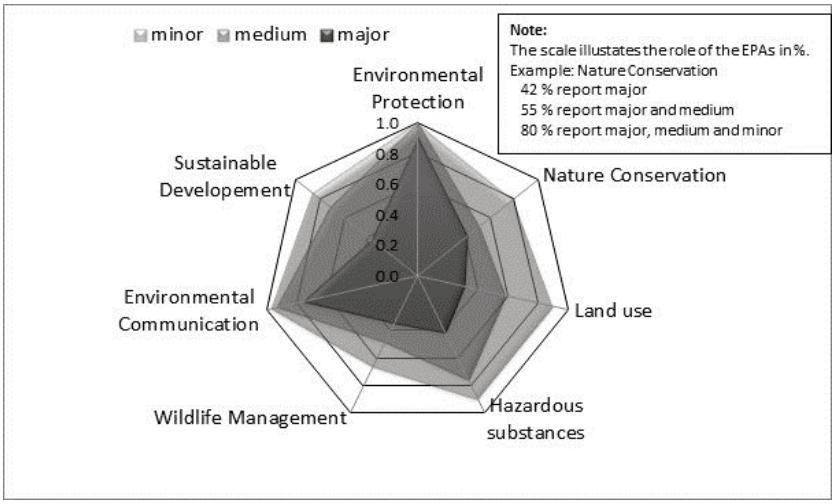
Inspecting various activities appears to be more a shared task between different governance levels. It seems indeed to be more common that inspecting is carried out

on a regional level compared to the national level and there are substantial activities down to municipal level. The bulk of activities related to other enforcement are carried out on national or, in some cases, regional levels.

4.2 Role of the EPAs

The analysis of the role of agencies divided the main fields of work of EPAs into seven categories commonly assigned to such agencies, or agencies with similar functions, and EPAs were asked to rank the importance of their role in each of these categories according to preset criteria. The main outcome of the analysis is presented in Figure 2.

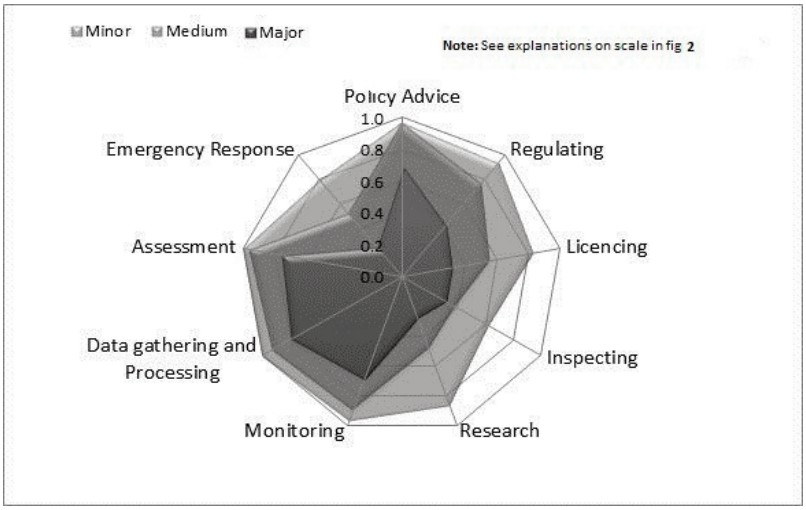
Figure 2. General roles of EPAs



The figure shows that environmental protection/pollution prevention and environmental communication constitute by far the most common fields of work within the agencies. Sustainable development comes second, followed by conservation and land use. Chemical management and wildlife management come fourth and fifth.

Looking more specifically at the tasks that EPAs are performing within their roles in environmental /pollution prevention the outcome is quite coherent, as shown in Figure 3.

Figure 3. Tasks of the agencies within environmental protection



The main emphasis is on policy advice and contribution to the knowledge base, i.e. research, assessment, data gathering and monitoring. The regulatory functions, i.e. regulating, licensing and inspecting, are major tasks and a very important part of the functions in around 30 – 40 % of EPAs, but are administered by other entities in several countries.

The responses on which fields within environmental protection/pollution prevention EPAs deal with is illustrated in Figure It is evident that the main fields of work within environmental protection/pollution prevention concern air, fresh water and waste.

Figure 4. Fields of work within Environmental Protection/Pollution Prevention

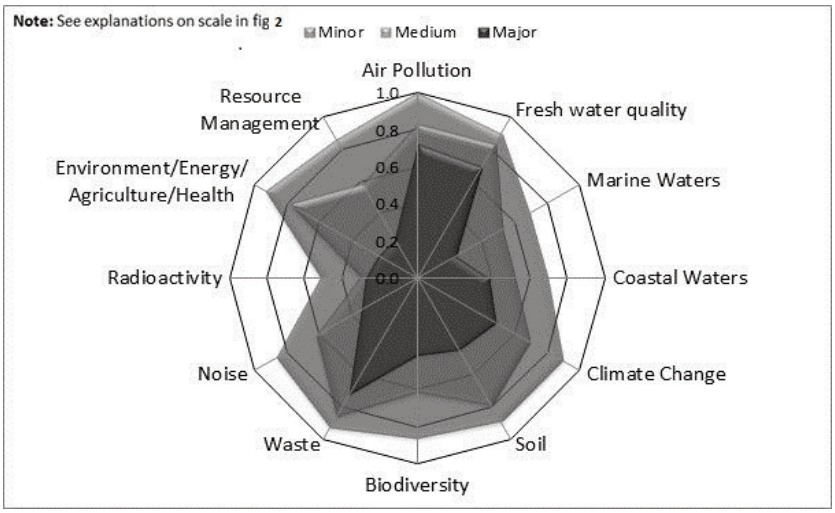


Table 3. Tasks carried out within various roles of EPA´s

Nature Conservation			
	Major	**+Medium**	**+Minor**
Policy Advice	38%	52%	86%
Regulation	24%	34%	62%
Property Management	7%	17%	38%
Site Management	10%	31%	48%
Monitoring and Assessment	45%	62%	86%
Hazardous substances			
	Major	**+Medium**	**+Minor**
Policy Advice	59%	72%	90%
Regulating	41%	48%	69%
Licensing	31%	45%	62%
Inspecting	21%	38%	45%
Research	10%	41%	76%
Monitoring and Assessment	31%	72%	93%
Emergency Response	34%	52%	79%
Sustainable Development			
	Major	**+Medium**	**+Minor**
Policy Advice to Governments	59%	72%	86%
Policy Advice to Subnational entities	34%	62%	72%
Ecolabelling	45%	45%	62%
Consumers	10%	38%	72%
Risk Management	14%	45%	76%
Land Use			
	Major	**+Medium**	**+Minor**
Policy Advice	38%	52%	86%
Regulation	24%	34%	62%
Property Management	7%	17%	38%
Site Management	10%	31%	48%
Monitoring and Assessment	45%	62%	86%
Wildlife Management			
	Major	**+Medium**	**+Minor**
Policy Advice	28%	45%	59%
Regulating	24%	28%	41%
Licencing	21%	31%	38%
Inspecting/Enforcing	10%	21%	28%
Research	7%	31%	52%
Monitoring/Assessment	34%	48%	69%
Environmental Communication			
	Major	**+Medium**	**+Minor**
Informing General Public	79%	93%	100%
Assessment Reports	86%	100%	100%
Environmental indicators	93%	100%	100%
Risk Communication	38%	69%	93%
European Cooperation	72%	97%	97%
International Cooperation	72%	93%	97%

Please note that the columns are accumulated. Example: 38% report Policy Advice as major task in Nature Conservation. Adding the 14% reporting Policy Advice as a medium tasks makes 52% having it as major and medium task. Adding the 34% reporting Policy Advice as minor task, accumulates EPA´s having it as as major, medium and minor task to 86%.

Figure 2. shows that 42% of EPAs report nature conservation as a major responsibility. By looking at Table 3 it is clear that the main tasks lie within monitoring and assessment and policy advice, while relatively few deal with site- and property management. The work on land use shows very similar characteristics, the main tasks lie within monitoring and assessment and policy advice.

It is apparent from Figure 2. that 72 % of EPAs deal with hazardous substances as a major or medium role. Table 3 shows that their work on hazardous substances is mainly on policy advice and monitoring. Furthermore, some regulating and licensing is carried out. Figure 2. also reflects that relatively few EPAs have wildlife management as a major or medium role. When pursuing the tasks of wildlife management, monitoring, policy advice and research get the most attention, Table 3

In order to minimize the risk of different interpretations as regards what was meant by sustainable development, members were provided with guidance reflecting the headings in Table 3. The classification in the guidance itself can be disputed, but it should have enabled members to approach the questions and their responses in a more consistent manner. Figure 2 illustrates that relatively few members regard sustainable development as defined in the survey as a major issue (40%), but a significant number see it as sum of medium and major issues (80%). Referring to Table 3, the core of the work on sustainable development appears to be towards policy advice and eco-labeling, while risk management, policy advice to subnational entities and work in the interest of consumers get less attention

The responses revealed quite clearly that most of the EPAs see themselves as having a major role in environmental communication and the main tasks of environmental communication were quite complementary to the tasks of environmental protection, Figure 2. Virtually all of the EPAs deal with environmental indicators, assessment reports and information to the general public, Table 3. Their task is also to facilitate the dissemination of policy relevant environmental scientific results (European Environment Agency, 2000a).

When asked about collaboration activities, EPAs appear to have quite strong ties to the EEA, since 85% of them are representing the National Focal Point (NFP) within EIONET. Besides, the EEA management board consists of a representative from each of its member countries. The staff of EPAs constitutes around 60 % of the EEA management board members or their alternates. Around half of EPAs are also members of the European Union Network for the Implementation and Enforcement of Environmental Law, IMPEL, but very few, or around 20%, are also members of ENCA, a sister network of the EPA Network and forum of European agencies dealing with nature conservation.

5. Discussion

This type of methodology has not, to the author's knowledge, been applied officially before to analyze the roles and tasks of EPAs or similar entities. The approach is a qualitative judgment, or perception, based on prescribed criteria, using quantitative methods to analyse the results. The outcome gives quite distinct results in many areas

of the research as reflected here below. The limitations of the method are further discussed in section 5.3.

5.1 At which level of environmental governance are national EPAs working ?

It was known beforehand that most, if not all, EPAs work closely with their national Ministries and that they depend financially on them to a substantial degree. The survey, therefore, left members with only two options to respond on their linkage to ministries, i.e. whether the EPA was a part of the ministry or a quasi-independent agency. Around one quarter EPAs, or 24%, report themselves as ministerial departments but not as quasi- independent agencies. Another indicator of the independence of an agency is whether it has a board of directors or not. The argument is that a board would act as a buffer between the management of the agency and the Ministry. The presence of a board would make the director and management team less exposed to the power and directions of the Ministry and external political pressure. The assumption is, however, not as straightforward as it might appear. First of all, the presence of a board appears to be related to the administrative culture in different countries, more prevalent in some than others. In addition, the independence of a board is in practice governed by several unrelated factors, such as whether the role of the agency is advisory or regulatory. If the role of an EPA is mainly gathering, analyzing, assessing and communicating information, the board might consist of scientific advisors guiding the agency in prioritizing and interpreting the scientific findings. If, on the other hand, the agency has regulatory role, it can, at least partly, have the function of an Independent Regulatory Agency (IRA) similar to agencies regulating competition (Gilardi, 2008; Thatcher, 2002a).

Furthermore the independence of the board is related to the autonomy of the members of the board, their selection mechanisms, such as partisan or tenure, and the extent of members' diversity (Maggetti, 2007;Gilardi, 2002;Thatcher, 2002b).

The survey reveals quite emphatically that neither population nor area served has any influence of whether the EPA is part of the Ministry or has a board. This is in itself in line with previous analysis carried out by the Network and supported by independent findings on IRAs that '*social features such as economic nature of regulation and institutional features and their interaction, can explain a good deal of the cross-national and cross-sectoral variation of the agency independency*'(Gilardi, 2005). The survey was not conclusive on whether one EPA is more independent than others. Yet, as less than half of EPAs have regulatory and licensing functions as their main tasks, it unlikely that IRA function is prevalent among many EPAs.

The active level of environmental governance is in the majority of cases on the national level, with the only exceptions in countries where regions have extensive autonomous power, Table 1. Table 2 furthermore reveals that the administration of environmental regulation is mainly on national level or as a shared task. The role of the regional level becomes more apparent when it comes to issuing licenses. This might in a way be a reflection of the number of licenses issued instead of effort in issuing each license. It was noticed in section 4.1 that IPPC permits are mainly issued

by EPAs or similar entities working at national level. The outcome in the survey on this issue could as referred to in section 4.1 overlook efforts made on national level. This means that the effort on national level in licensing could almost be as intense as in regulation. The proportional increase in the licensing at the regional level can be attributed to the fact that licensing of smaller activities are usually carried out on regional level.

The outcome that inspecting various activities appears to be more a shared task between different governance levels is as expected and logical. There is a tendency to have the specialist knowledge on licensed activities centralized to maintain and sustain the core expertise on the one hand, but at the same time utilize the knowledge in the local area regarding environmental and local conditions.

The activities related to other enforcement are typically guidance to regions and municipalities on implementation and similar areas. It follows that the bulk of this work is done on the national or, in some cases, regional levels.

5.2 What are the roles and tasks of EPAs throughout Europe ?

The analysis reveals quite clearly that even though there is diversity in the tasks and roles of EPAs throughout Europe, there is a clear pattern. Most of the EPAs are have pollution prevention together with communication of environmental information as their main role, Fig 2. Their main tasks are policy advice and what has been called collectively: Enhancing the knowledge base i.e. monitoring, data gathering and assessment, Fig 3. Interestingly and, in contrast to public perception in many countries throughout Europe, only 40 % of EPAs have licensing or inspecting functions as a major task.

EPAs main fields of work are within the area of water quality, air pollution and waste, Fig 4. These fields relate strongly to how the general public perceives a clean and pristine environment and they will affect the population as a whole if not properly managed. There is also substantial work on climate change and soil, while energy, agriculture and health appear to get some attention, albeit not major. Radioactivity is usually dealt with in highly specialized agencies, so it was not expected beforehand that the subject would be a major task within EPAs. The relatively small emphasis on noise and biodiversity in EPAs might well reflect the fact that these issues are usually shared tasks between a number of entities within each country; in the case of noise among planning agencies/municipalities, and in the case of biodiversity among conservation and planning agencies /municipalities.

It appears likely that the bulk of licensing of land use is through local authorities and planning agencies, even though some EPAs can have role e.g. in flood protection. Since issues such as traffic noise and biodiversity are highly influenced by land use, it is vitally important that the information contained within EPAs and other similar official agencies should be utilized in the planning process.

Figure 2 shows that 42% of EPAs report nature conservation as a major responsibility. Table 3 furthermore indicates that the main tasks of the EPAs lie within monitoring and assessment and policy advice, while relatively few deal with site and property management. It is therefore logical to assume that site and property

management is usually conducted by other entities or institutions possibly at the regional level, even though the oversight and monitoring resides by the EPA at the country level. The same general picture is prevalent regarding land use. The main emphasis of EPAs, when tasked with land use, is on monitoring and assessment and policy advice.

Work on sustainable development is embedded in various fields of the work of EPAs but at the same time it should be recognized that sustainable development is a very wide concept. Sustainable development can be defined simply as the pursuit of a better quality of life for everyone, both present and future generations. To promote sustainable development globally the aim is to link economic development, protection of the environment and social justice. Sustainable development includes employment, social cohesion, responsible use of natural resources and coherent policy-making in an open, transparent and accountable political system.[12] The classification in the guidance in the survey can be disputed, but it should have enabled members to approach the questions and their responses in a more consistent manner. The outcome in Table 3 reflects that EPAs are mainly focusing on guiding governments and subnational entities when addressing the sustainable development.

Environmental communication is probably the most effective means that EPAs have to influence the society and advocate for change of behavior and life style for the benefit of the environment and the society. Consequently, EPAs put a high emphasis on environmental communication. An important part of environmental communication is risk communication, i.e. informing about possible risks of actions and inactions on present activities. Risk communication in relation to the impact on the environment is not limited to EPAs. Other entities with similar roles to EPAs in monitoring and regulating consumption of particular products[13] [14] are also focusing on this aspect. Environmental communication is coherent with the present emphasis in Europe on resource efficiency and sustainable resource use.

The strong linkage of EPAs to EEA via EIONET reflects the fact that the vast majority of EPAs have environmental information gathering and handling as one of their main tasks. Around half of EPAs are also members of the European Union Network for the Implementation and Enforcement of Environmental Law, IMPEL reflecting that around half of EPAs are actually dealing with implementation.

5.3 Limitations of the methodology applied

The main limitations of the approach used are that the results obtained by the questionnaire are qualitative in nature, i.e. personal judgments based on prescribed criteria and have to be regarded as such. In order to counteract this limitation the responders were given quite definitive criteria to guide them in their responses and they were given the possibility to revise their submissions after the deadline in light of answers from other participants. The revision option was intended to help members compare and adjust their responses after seeing how their colleagues perceived the roles and tasks of their own EPAs. There were only three members who asked for minor adjustments and in limited fields after having seen the responses, implying that

the responders did not have afterthoughts and were content with the results. In this respect, it is important to know that EPAs directors know each other quite well through the cooperation within EPA Network and have a general perception of the situation their colleagues are encountering. One of the strengths of this approach is indeed that it is carried out in a collaborative manner in active network, where members are curious to roles of their agencies in relation to others.

The second limitation is that three important countries, namely, France, Italy, and Denmark did not take part in the survey, and the Basque Country and Flanders represented Spain and Belgium respectively. While it can't be denied that inputs from the abovementioned countries would have been of a great value, there are already 29 replies so the statistics are unlikely to have changed substantively. Besides, it has to be taken into account that both Denmark and Italy did indeed take part in a pilot survey two years earlier so in the broad sense their position on some of the questions was quite well known, and in line with the general outcome. In addition both Flanders and Basque Country represent autonomous regions and are members of the EPA Network. Full participation would, in the authors mind, certainly have given more detailed picture but not altered it.

Neither of these limitations should be overlooked, but the results from the pilot survey and the present one were quite consistent and the general results are very distinct. They give a clear general picture perceived by the directors of EPAs.

6. The status and likely trend in environmental policy in Europe

6.1 The present status and outlook

The present analysis reveals clearly that the combined roles and tasks of EPAs are a) to provide the knowledge base regarding the anthropogenic impact and deliver it to the public, authorities and stakeholders b) to oversee the implementation decided by governments. In addition, a significant number of EPAs have also regulating, licensing, inspecting and enforcing functions. These roles and tasks require a reputation for integrity combined with scientific rigor and balanced communication. An important part is to provide information on the state of the environment and possible scenarios when choosing different options in addressing environmental concerns. An example of the latter is the BLOSSOM project (European Environment Agency, 2011)

The future development of the environmental regulation and hence the roles of EPAs, has to be seen in the light of the status and trends in the environment. Present knowledge reveals quite emphatically that the environment is under increasing pressure, even though some of the recent abatements policies have been effective (European Environment Agency, 2010a). Typical examples of the negative impacts are the loss of biodiversity (European Environment Agency, 2009), the depletion of fish stocks (European Environment Agency, 2010b), land fragmentation (Joint European Environment Agency and FOEN Switzerland, 2011) and the extensive use of non-renewable natural resources. The power of our generation to change the environment has reached the level where it is now estimated that humans are annually moving an order of magnitude more rock and soil around than natural processes (Jones, 2011;

Jan Zalasiewicz et al., 2011)[15]. The trend within environmental policy has been shifting during the last decades and the policy is focusing beyond risk to the individual to the risk on the community. The emphasis has been on issues like climate change, loss of biodiversity, noise in the environment, flood protection, emergency preparedness from man-made and natural hazards, resource depletion and sustainable use. The most serious anthropogenic impacts, such as climate change and long range transport of pollutants, have reached a global scale and they will require global solutions, while others are more effectively addressed at the regional, national or local level. The impacts reported are to a great extent due to present behavior and lifestyles (European Commission, 2011).

When a fundamental part of a system is under such pressure that the effects are starting to be quite visible it is a matter of judgment when and how to intervene. If the present behavior and lifestyle is a significant cause of the pressure, it will at some stage become unavoidable to reduce the pressure and resulting impact. The main question is at what level and to what extent changes are needed and how to bring about public acceptance of such limitations. The environment is a very complex system which is influenced by many internal and external pressures with inherent interactions and feedback loops. The system responds to different pressures in non-linear manners and has the ability to jump from one equilibrium state to another, often in unpredictable ways. Therefore it is often quite complicated to pinpoint the cause and hence possible solutions of environmental problems. The complexity increases due to the fact that the perception within and between societies differ. Furthermore, there are frequently massive conflicting interests between different stakeholders with regard to the available options. It is quite common that limitations set by authorities are criticized by some stakeholders as being unfounded and obstructing economic growth, while others criticize that common goods or interests are sacrificed for potential and debatable short-term benefits. Examples of the latter are well represented in the report "Late lessons from early warnings" where legitimate concerns were disregarded with very serious consequences (European Environment Agency, 2000b). All this can make it extremely difficult to reach public agreement on what is at stake and who needs to bear the burden of the action or inaction proposed, and by some be referred to as a "wicket problem"[16]. The present financial crisis adds to the complexity as many of the measures will be costly and there is a delicate balance to strike for governments in prioritizing long term and short term achievements.

A fundamental element to alleviate such concerns is to maintain the integrity of the agencies responsible for maintaining scientific knowledge and communicating their findings to the public, government and stakeholders. The information they provide has to be unbiased, consistent, coherent and preferably instantaneously at hand for the public, authorities and policy makers. With the foreseen escalating environmental pressure this important role of EPAs will become increasingly vital.

6.2 How are the roles and tasks of EPAs likely to change in future ?

The present and upcoming pressures within the environment call for a shift in emphasis. Instead of dealing with isolated challenges there is a need to encourage an integrated approach where society as a whole participates to alleviate the pressure of a complex system (European Environment Agency, 2010a). Europe has indeed recognized the need for the shift as reflected in the consultative process preparing for 7EAP (European Commission Environment, 2012). Since most of the environmental policy is decided on European level it is evident that the forthcoming 7EAP will influence implementation of environmental policy throughout Europe.

The available means for authorities to enhance environmental protection have usually been categorized as regulation measures, communication/education, economic measures and technical solutions They will require more information sharing, exchange of success stories and pitfalls, joint assessment, on line information and networking to be effective. These requirements, together with the approaches such as SEIS (new technologies) will most likely require further networking at an EU level. How a regulatory system within the EU evolves will inevitably depend on other pressures and interests in the EU, such as financial, employment and regional issues, and will presumably be result of interaction of several multifaceted forces (Egeberg & Trondal, 2009). It is, however foreseen that the role of EPAs in the implementation will continue to rise with increased pressure on the environment.

In addition to the two main task of EPAs i.e. enhancing the knowledge base and overseeing the implementation, it is likely that the third task which relates to Environmental communication to promote sustainable use and lifestyle will be more and more important. The evolution of environmental policy from hot spot pollution control towards a more holistic and integrated approach is likely to continue. A significant part of the challenge we are facing is related to consumption and resource use, including alteration of land. Therefore it is logical to expect even more integration in environmental management. There are strong arguments to expect that future policy will emphasize synergy in planning, land use, resource and traditional pollution prevention. Whether the need for synergy in approaches and implementation will lead to institutional changes, for example by merging EPAs, planning agencies or conservation agencies remains to be seen. At the same time it is likely that the form and shape of the institutional structure will be governed by domestic factors mentioned in section 5.1

6.3 What will be the role of EPA Network in future implementation of environmental policy

The EPA Network has established itself, to be an important part of the policy cycle in Europe. Its importance lies mainly in practical and joint knowledge among EPAs on what approaches are working in practice under given circumstances and what are not. Furthermore it can be argued that cooperation within EPA Network might strengthen their positions domestically by exchanging success stories and pitfalls to avoid in implementation.

As it is foreseen that the pressure on the environment will not diminish in the near future, there is every reason to assume that the future environmental policy and management has to integrate and involve all sectors in society. The core of such activities will be promoting sustainable use. This role for EPAs and the EPA Network will most likely become increasingly important in the future and an integral part of their work at national level, as well as in the global and European environmental policy.

7. Conclusions

The outcome of the survey gives an overview on how directors of EPAs perceive the roles and tasks of EPAs in Europe.

Around 76 % of EPAs perceive themselves as quasi-independent while 24 % are a part of a Ministry. There is no noticeable correlation between demographic properties and the administrative structure of the EPAs. The active level of governance, with some noticeable exceptions, is on a national level. The role of regulation, licensing and inspection is a shared task on different administration level, where regulation is mainly applied on the national level but the activities on the regional level increase substantially in licensing and inspection.

Even though there is diversity in tasks and roles of EPAs throughout Europe, there is a clear pattern. Their main roles are pollution prevention together with environmental communication, Fig 2. The main tasks of EPAs are policy advice based on best knowledge and contribution to the knowledge base. Interestingly, and in contrast with the public perception in many countries throughout Europe, only 40 % of EPAs have regulating, licensing or inspecting functions, Fig 3.

Combined roles and tasks of EPAs are a) to provide the knowledge base regarding the anthropogenic impact and deliver it to the public, national authorities, the Commission and EEA, and stakeholders. b) to oversee the implementation decided by governments and at EU level. EPAs main fields of work are within the areas of water quality, air pollution and waste. There is also substantial work on climate change and soil, while energy, agriculture and health appear to get some attention, albeit not major, Fig 4.

Recent analysis on the state of the environment point to the fact that it is a very complex system influenced by many internal and external pressures with inherent interactions and feedback loops. The system responds to different pressures provided by different natural and social systems in multifaceted and often unpredictable way. The present lifestyles, resources and land use seem to be substantial contribution factors to pressure on the environment. Future environmental policy needs to address this fact and EPAs will have an increased role as the managers of the knowledge base, the communicators of environmental knowledge and brokers for sustainable resource use.

The EPA Network has established itself as an important part of the environment policy loop in Europe due to its cooperation and practical knowledge from domestic implementation of European environment policy and legislation.

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Notes

1 The EPA Network is an informal grouping bringing together the heads and directors of environment protection agencies and similar bodies across Europe. The network exchanges views and experiences on issues of common interest to organisations involved in the practical day-to-day implementation of environmental policy. http://epanet.ew.eea.europa.eu/

2 The bold text is an emphasis by the author.

3 The European Environment Agency (EEA) is an agency of the European Union. Its task is to provide sound, independent information on the environment. The EEA is a major information source for those involved in developing, adopting, implementing and evaluating environmental policy, and also the general public. Currently, the EEA has 32 member countries.
The regulation establishing the EEA was adopted by the European Union in 1990. It came into force in late 1993 immediately after the decision was made to locate the EEA in Copenhagen. Work started in earnest in 1994. The regulation also established the European environment information and observation network (Eionet).
The EEA's mandate is:http://eea.europa.eu
To help the Community and member countries make informed decisions about improving the environment, integrating environmental considerations into economic policies and moving towards sustainability
To coordinate the European environment information and observation network (Eionet)

4 EIONET is a partnership network of the European Environment Agency (EEA) and its member and cooperating countries. It consists of the EEA itself, five European Topic Centres (ETCs) and a network of around 900 experts from 39 countries in over 300 national environment agencies and other bodies dealing with environmental information. For further information see page 16 and http://www.eionet.europa.eu/about

5 The Shared Environmental Information System (SEIS) is a collaborative initiative of the European Commission and the European Environment Agency (EEA) to establish together with the Member States an integrated and shared EU-wide environmental information system. This system would tie in better all existing data gathering and information flows related to EU environmental policies and legislation. It will be based on technologies such as the internet and satellite systems and thus make environmental information more readily available and easier to understand to policy makers and the public. http://ec.europa.eu/environment/seis

6 For Eye on Earth : http://www.eyeonearth.org/

7 Summary of previous meetings see: http://epanet.ew.eea.europa.eu/fol189762 The public reports of EPA Network are acessible at http://epanet.ew.eea.europa.eu/fol249409

8 IMPEL, the European Union Network for the Implementation and Enforcement of Environmental Law, is an international association of environmental authorities in Europe. http://impel.eu/

9 ENCA-Network is network of the heads of European nature conservation agencies. http://encanet.eu/home/

10 This includes also information from previous analysis within EPA Network.

11 The IPPC directive (Integrated Pollution Prevention and Control) regulates industrial emission. http://ec.europa.eu/environment/air/pollutants/stationary/ippc/index.htm

12 The Commission has quite extensive information on sustainable development at http://ec.europa.eu/environment/eussd/
13 The European Food Safety Agency gives good examples of risk communication regarding food safety http://www.efsa.europa.eu/en/efsawhat/riskcommunication.htm
14 The World heath Oragnisation provides good examples of risk of other material like nanotechnology and GMO http://www.who.int/foodsafety/micro/riskcommunication/en/
15 The original reference appears to be Hooke, R.LeB(2000): On the history of humans as geomorphic agents. Geology 28 (9),843 – 846. and Wilkinson, B.H.(2005):Humans as geologic agents: a deep time perspective. Geology, 33 (18),161 – 164.
16 „Wicked problem" is a phrase originally used in social planning to describe a problem that is difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize. Moreover, because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems., see http://en.wikipedia.org/wiki/Wicked_problem and http://www.cognexus.org/id42.htm

References

Curtin, D.. (2005). 5 Delegation to EU Non – Majoritarian Agencies and Emerging Practices of Public Accountability. In N. P. Damien Géradin, Rodolphe Muñoz (Ed.), *Regulation through agencies in the EU. A new Paradigm of European Governance.* (pp. 88 - 119). Edward Elgar Publishing.

Egeberg, Morten, & Trondal, J. (2009). National Agencies in the European Administrative Space: Government Driven, Commission Driven or Networked? *Public Administration*, *87*(4), 779-790. doi:10.1111/j.1467-9299.2009.01779.x

European Commission. (2011). *A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy Communication From The Commission To The European Parliament, The Council, The European Economic and Social Committee and The Committee of the Regions* (p. 16). Brussels. Retrieved March 27, 2012 from http://ec.europa.eu/resource-efficient-europe/index_en.htm

European Commission Environment. (2008). *The environment and the European Commission environment The environment and the European Commission. Reproduction* (p. 26). Luxembourg: Office for Official Publications of the European Communities, 2008.

European Commission Environment. (2011). *Communication From The Commission To The European Parliament, The Council, The European Economic and Social Committee and The Committee of the RegionsThe Sixth Community Environment Action Programme FINAL ASSESSMENT (Text with EEA relevance). European Environment.*

European Commission Environment. (2012). Consultation on the EU environment policy priorities for 2020: Towards a 7th EU Environment Action Programme. Retrieved March 27, 2012, from http://ec.europa.eu/environment/consultations/7eap_en.htm

European Environment Agency. (2000a). *The dissemination of the results of environmental research* (pp. 1-38).

European Environment Agency. (2000b). *Late lessons from early warnings: The precautionary principle 1896 – 2000.* (D. Gee & S. G. Vaz, Eds.) (pp. 1-211).

European Environment Agency. (2009). *Progress towards the European 2010 biodiversity target. EEA Report No 4/2009.*

European Environment Agency. (2010a). *The European Environment State and outlook 2010 Synthesis* . (p. 228). Retrieved from http://www.eea.europa.eu/soer/synthesis/synthesis

European Environment Agency. (2010b). Status of marine fish stocks (Core Set Indicator 032). Retrieved February 22, 2012 from www.eea.europa.eu/data-and-maps/indicators/ status-of-marine-fish-stocks/status-of-marine-fish-stocks-1

European Environment Agency. (2011). *BLOSSOM — Bridging long-term scenario and strategy analysis: organisation and methods. EEA Technical report No 5/2011.*

European Parliament, General, D., Directorate Internal, F. O. R., & Safety, F. (2010). *Welcome Package on Environment.* (G. P. Meneghini, Ed.)*Public Health* (p. 178). Directorate General for Internal Policies Policy Department A: Economic and Scientific Policies Environment, Public Health and Food Safety.

Europolitics. (2011). Council to draw up guidelines for 7th EAP. *Europolitics*. Retrieved March 26, 2012, from http://www.europolitics.info/sectorial-policies/council-to-draw-up-guidelines-for-7th-eap-artb322250-15.html

Gilardi, F. (2002). 'Policy credibility and delegation to independent regulatory agencies: a comparative empirical analysis. *Journal of European Public Policy*, *9*(6), 873 — 893.

Gilardi, F. (2005). The institutional foundations of regulatory capitalism: The diffusion of independent regulatory agencies in Western Europe. *The ANNALS of the American Academy of Political and Social Science*, *March 1*(598), 102 - 124.

Gilardi, F. (2008). *Delegation in the regulatory state: independent regulatory agencies in Western Europe*. Eward Elgar Pub.

Hey, C. (2005). EU Environmental Policies: A short history of the policy strategies. In S. Scheuer (Ed.), *European Union Environmental Policy Handbook: A Critical Analysis of EU Environmental Legislation*. Brussels: European Environmental Buerau (EEB). Retrieved March 28, 2012 from http://www.eeb.org/publication/policy_handbook.html

Hoffmann, S. (2011). *The creation of the European Environment Agency and its impact on national administrations in Germany, France and Britain*. PHd thesis, University of Hull,. Retrieved January 27, 2012 from https://edocs.hull.ac.uk/muradora/objectView.action?pid=hull:5274

Jan Zalasiewicz, Williams, M., Fortey, R., Smith, A., Barry, T. L., Coe, A. L., Bown, P. R., et al. (2011). Stratigraphy of the Anthropocene. *Philosophical transactions of the*, *369*(1938), 1036-1055. doi:10.1098/rsta.2010.0315 Phil. Trans. R. Soc. A 13 March 2011 vol. 369 no. 1938 1036-1055

Joint European Environment Agency and FOEN Switzerland. (2011). *Landscape fragmentation in Europe EEA Report No 2/2011* (p. 87).

Jones, N. (2011). Human influence comes of age. *Nature*, *473*, 133. doi:doi:10.1038/473133a

Maggetti, M. (2007). De facto independence after delegation: A fuzzy-set analysis. *Regulation & Governance*, *1*(271 - 294). doi:10.1111/j.1748-5991.2007.00023

Majone, Giandomenico. (2001). Forum section Two Logics of Delegation. *European Union Politics*, *2*(200102), 103-122.

Majone, Giandimenico. (1994). Rise of regulatory state in Europe. *West European Politics*, *17*(3), 77 - 101. doi:10.1080/01402389408425031

Morgan, M. G. (1993). Risk analysis and management. *Scientific American*, *269*(1), 32 - 41.

Nugent, Neil and Paterson, W. (2003). The political system of the European Union. In A. Hayward, J. and Menon (Ed.), Governing Europe (pp. 92 - 109). Oxford: Oxford University Press.

P. Vercaemst, S. Vanassche, P. Campling, L. V. (VITO), P. Agnolucci, R. Salmons, B. Shaw, (PSI), J. Jantzen, H. van der W. (TME), & M. Grünig, A. B. (Ecologic). (2007). *Sectoral Costs of Environmental Policy*. *Environment* (p. 127). doi:(Contract ENV.G.1/ETU/2006/68)

Scott, C. (2005). Agenciesmfor EuropeanRegulatory Governance: A Regimes Approeach. In D. Geradin (Ed.), *Regulation throuhg Agencies in the EU. A new Paradigm of European Governance.* (pp. 67 - 87). Cheltenham: Edward Elgar Publishing.

Slovic, P. (1987). Perception of Risk. *Science New Series,*, *236*(4799), 280 - 285. Retrieved from http://www.jstor.org/stable/1698637

Thatcher, M. (2002a). 'Delegation to Independent Regulatory Agencies: Pressures, Functions and Contextual Mediation. *West European Politics*, *25*(1), 125 — 147.

Thatcher, M. (2002b). Regulation after delegation: independent regulatory agencies in Europe. *Journalof European Public Policy*, *9*(6), 954 — 972.

Thatcher, M., & Sweet, A. S. (2002). Theory and Practice of Delegation to Non-Majoritarian Institutions. *Politics*, *25*(1), 1-22.

Zito, R. (2009). Learning and Governance in the EU Policy-making Process. *Journal of European Public Policy*, *16*(8), 1224-1243. doi:10.1080/13501760903332795