

Coordinating European nitrogen policies between international conventions and intergovernmental organizations

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Executive summary

Nature of the problem

- International treaties, such as multilateral environmental agreements (MEAs), have sought to protect the environment by intergovernmental action on many issues.
- The MEAs and intergovernmental organizations (IGOs) have, between them, targeted most known environmental problems, but none has tackled nitrogen management holistically since the nitrogen issue is much broader than any of the individual interests.
- Even so, several conventions have taken action to develop nitrogen policies in their specific areas of interest, but they are often limited in their options to increase their scope of action beyond their agreed mandates and may be reluctant to coordinate action with those of others.
- As a result, there remains a need to develop an integrated, holistic approach for nitrogen management; an international treaty targeted explicitly on nitrogen would have the potential to bring the different elements of the nitrogen problem together.

Approaches

- Some coordination between MEAs and IGOs already occurs with regard to different nitrogen threats, but the focus is inevitably on areas of overlapping interests. This chapter explores the potential for available mechanisms to be applied further across these institutions to harmonize work and to promote effective coordination on nitrogen-related threats and abatement options.

Key findings/state of knowledge

- Coordination between MEAs and IGOs on various topics, often not related to nitrogen policy, has been achieved through, *inter alia*, formal agreements, joint participation in meetings or projects, and actions by convention secretariats. All these approaches, and others, have the potential to stimulate coordination of nitrogen issues, but perception of overlapping interests and recognition of the benefits of coordination are key to success.
- The European Union (EU), itself established by international treaties, has a major role in Europe harmonizing policy in EU Member States and coordinating their actions regionally and globally.
- Scientific knowledge and understanding is usually the pre-requisite to formal agreement between States for action on environmental issues. For nitrogen, the different measuring and modelling activities between air, land and water need to be brought together and harmonized.
- Scientific and technical cooperation between MEAs has proved especially important in identifying the many links between reactive nitrogen threats, with the international scientific community able to provide a role in harmonizing information supply to different forums and promoting coordination.
- Coordination of national policies by individual countries can ensure harmonized national action and help stimulate the work of MEAs and IGOs in coordinating nitrogen related policies; effective dialogue between national delegates to institutions with overlapping interests can ensure consistent and harmonized national and international action.
- In the long term, a new international treaty on nitrogen could be a powerful mechanism for coordinated global or regional nitrogen management; but this could be complex to negotiate. Meanwhile, continued efforts using existing MEAs and IGOs to coordinate action shows success in some quarters.

Major uncertainties/challenges

- A new legal instrument, new convention or joint protocol, for nitrogen management would need to be harmonized with existing agreements.
- Influencing decisions by MEAs, IGOs and the EU can be difficult if it involves new initiatives or changes to existing plans. Influencing coordinated decisions between MEAs and IGOs multiplies these difficulties.
- Coordinating the work of the scientific community to address the needs of several forums requires effort and resources, especially in the case of nitrogen management, which faces considerable technical challenges in linking between environmental media on multiple scales.
- International agreements are concerned with implementation of measures such as limits, regulations and guidelines, at the international and national levels, but at the local level action to comply with such measures may still present major challenges.

Recommendations

- The immediate recommendation is to exploit established mechanisms and institutions to develop new coordinating links on nitrogen management between MEAs and IGOs. National coordination should be encouraged to harmonize action programmes at national and international levels.
- In the longer term, possible options for a new framework convention or inter-convention joint protocol should be explored to assess the potential benefits of such an instrument.
- The Global Partnership on Nutrient Management (GPNM), established under the United Nations Environment Programme (UNEP), and the International Nitrogen Initiative should be encouraged to develop policy and scientific cooperation, respectively, at a global level.
- Regionally, the scientific bodies of the Convention on Long-range Transboundary Air Pollution and its Task Force on Reactive Nitrogen are in a good position to take a lead on some aspects of coordination; they should be encouraged to work to link atmospheric with other nitrogen threats. At another level, there is the opportunity for the United Nations Economic Commission for Europe (UNECE) Committee on Environmental Policy to develop the nitrogen management links between the UNECE Conventions.
- There is a pressing need to coordinate different nitrogen measurement and modelling activities between air, land and water. Opportunities should be sought to bring together relevant, multi-media nitrogen science to provide cross-cutting information to underpin policy decisions. In the first instance, approaches should be made to other UNECE environmental conventions in order to explore possibilities for collaboration.

25.1 Introduction

Multilateral environmental agreements (MEAs), such as conventions and protocols, have successfully tackled many of the known environmental problems and continue to address the many outstanding issues of international concern. They have done much to harmonize the efforts of governments and have provided important driving forces for international and national action on environmental matters including the management of nitrogen. The development and interests of several environmental conventions have already been outlined in relation to current European policies on nitrogen (see Oenema *et al.*, 2011a, Chapter 4, this volume).

There is no single MEA that covers nitrogen management holistically. The need to consider air, land and water as well as a wide range of sectors, including industry, agriculture and transport makes it difficult for any one convention to deal with all issues when their mandates for action are usually limited. Of further concern is that the lack of coordination of action can lead to simply shifting the environmental problem from one area to another, for example, nitrogen management problems can be shifted from water to air and *vice versa* (Bleeker *et al.*, 2009; Spranger *et al.*, 2009; Cellier *et al.*, 2011 and Svirejeva-Hopkins *et al.*, 2011, Oenema *et al.*, 2011b – Chapters 11, 12 and 23, this volume).

Where environmental problems are relatively simple and well-defined, some MEAs have had major successes. The Convention on Long-range Transboundary Air Pollution (CLRTAP) of the United Nations Economic Commission for

Europe (UNECE) has, through its protocols on sulphur, cut emissions of sulphur in Europe by more than 70% (55 Tg to 15 Tg from 1980 to 2004) (Vestreng *et al.*, 2007). Unfortunately, nitrogen management is not such a simple, easily defined problem.

There are several MEAs and intergovernmental organizations (IGOs, see Sections 25.2.1 and 25.2.2 for definitions) with vested interests in nitrogen management. Such organizations could encourage the international community to work together on environmental issues, and between them they have potential for coordinating further action on mitigating reactive nitrogen (N_r) emissions and effects. For this, they will need to collaborate and coordinate their individual activities in a way that has proved difficult in the past. Though some coordination already exists on nitrogen management, for example, through EU policy and legislation (Oenema *et al.*, 2011a, Chapter 4, this volume) there is scope for increased links and coordination between institutions such as MEAs and IGOs. Cooperation tends to be focused on areas of overlapping interests, but more needs to be done with such existing links and mechanisms to broaden the collective approach.

Links between MEAs and IGOs can take place at a range of different levels, from formal to informal, and from using high-level overarching bodies to individual governments and stakeholders, such as industry and environmental non-governmental organizations (NGOs). But each MEA or IGO has its own priorities and interests and it can be difficult to bring them together to focus on common goals. Some stakeholders

can play a useful role in linking MEAs and IGOs, since they attend meetings of several bodies under different agreements; but the nature of their special interests, e.g., motor manufacturer or chemical industry, means their real role in any one body is very limited.

The need for interlinkages between MEAs to address many of the problems that we face today is widely recognized. The Interlinkages Initiative of the United Nations University (2002) was started in the 1990s to draw attention to the need to build links between MEAs. The Initiative drew attention to the lack of an over-arching, unitary structure for global environmental governance (United Nations, 1999). Existing over-arching bodies, such as the United Nations (UN) Economic and Social Council (ECOSOC) and the Commission on Sustainable Development (CSD) have proved incapable since their mandates are vague and UN States have been reluctant to invest the necessary power in these bodies. In addition, there is apparent weakness in international law and the ability of international institutions to create or enforce rules. The Initiative recorded that no amount of coordination of MEAs would overcome these fundamental shortcomings.

One over-arching body, the United Nations Economic Commission for Europe (UNECE), through its Committee on Environmental Policy (CEP), has made several attempts to develop interlinkages between its five regional MEAs.¹ In 2000, a review of synergies to be derived from closer cooperation (Economic Commission for Europe, 2000) was discussed by CEP and its recommendations endorsed. Subsequently, CEP agreed guidelines for strengthening compliance with and implementation of multilateral environmental agreements in the UNECE region (Economic Commission for Europe, 2003a) that were endorsed by the fifth Ministerial Conference 'Environment for Europe'; more recently, CEP submitted information and recommendations on implementation of UNECE multilateral environmental agreements (Economic Commission for Europe, 2007a) to the sixth 'Environment for Europe' Ministerial Conference. Despite such continued action and improvements in implementation across all five conventions, there are few interlinkages of note. There remains good potential for interaction since:

- the secretariats for all five conventions operate within a single UNECE division so convention meetings and activities can be coordinated and joint discussions arranged easily;
- the conventions have only Parties from the UNECE region – the 56 member States of Europe, North America and Central Asia – so cultural, economic and geographic differences are not so great as with global agreements.

¹ The 1979 Convention on Long-range Transboundary Air Pollution (CLRTAP), the 1991 Convention on Environmental Impact Assessment in a Transboundary Context, the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (the Water Convention), the 1992 Convention on Industrial Accidents, and the 1998 Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (Aarhus Convention).

However, there is reluctance by UNECE convention bodies to spend time and effort where they believe there is little to be gained. The only real coordination has taken place where there are specific overlapping interests and UNECE continues to look at its MEAs collectively to see where overlaps and common challenges, e.g., implementation, might be exploited (Schrage *et al.*, 2007).

While it might be considered disappointing that interaction between institutions is generally lacking, some believe that such decentralized, fragmented governance is a good thing, since it avoids burdensome overarching bureaucracy and may encourage competition and opportunities for learning. However, if specific problem issues fall within the remit of many MEAs and IGOs, there are great risks of duplication of effort and inconsistencies in decision making. With increasing proliferation of MEAs in recent years these risks have much increased.

The UNU (United Nations University) Interlinkages Initiative highlights that we have failed to prepare socio-economic systems to deal with inter-linked problems. Due to institutional, historical, financial or capacity reasons, our laws, conventions, treaties, institutions, mechanisms and information have developed in isolation and focus on separate topics or themes. So although we know that we have to deal with the environment and development at the same time, most institutions still focus mainly on one or the other.

More recently, the UN's Joint Inspection Unit (JIU) has carried out a 'Management review of environmental governance within the UN System' (see Inomata, 2008). The review aimed 'to strengthen the governance of and programmatic and administrative support for MEAs by UN organizations by identifying measures to promote enhanced coordination, coherence and synergies between MEAs and the UN system, thus increasing the UN system's contribution towards a more integrated approach to international environmental governance and management at national, regional and international levels'. The review notes the institutional fragmentation and specialization and the lack of a holistic approach to environmental issues and sustainable development, as well as the lack of interaction of UN entities responsible for development with MEAs. The review makes a number of recommendations to the UN Secretary-General and the UN General Assembly regarding future action; these focus, in particular, on mechanisms to improve the functioning of MEA secretariats and intergovernmental bodies. Such high-level action is not easily influenced by individual MEAs or parties to such agreements.

The next part of this chapter looks at the nature of MEAs and IGOs to consider coordination at a more general level; it then assesses the available options for interaction and coordination between institutions on common environmental issues, such as nitrogen. While there are reasons that international organizations and agreements often work in isolation or with limited interaction with others, there are quite a number of mechanisms that can overcome these barriers; these are explored through existing examples where they have proved effective.

Table 25.1 Overview of Multilateral Environmental Agreements (MEAs) and Intergovernmental Organizations (IGOs) with interests in nitrogen management

MEA/IGO	Scope	Main nitrogen management interest
United Nations Framework Convention on Climate Change (UNFCCC) ^a	Global	Nitrogen containing greenhouse gases and ozone. Carbon sequestration
Convention on Biological Diversity (CBD) ^a	Global	Nitrogen and ozone impacts on biodiversity
Convention on Long-range Transboundary Air Pollution (CLRTAP) ^a	Europe, Central Asia and North America	Nitrogen oxides, and ammonia emissions, ozone and impacts on human health and the environment
Water Convention ^a	Europe, Central Asia and North America	Water quality and management
Helsinki Commission (HELCOM) ^b	Baltic Sea States	Eutrophication of Baltic Sea
Oslo Paris Commission (OSPARCOM) ^b	North Atlantic Sea States	Eutrophication of areas of the Atlantic Ocean and North Sea
United Nations Environment Programme (UNEP) ^c	Global	Broad interests in the environment. Global Partnership on Nutrient Management
World Health Organization (WHO) ^c	Global	Human health impacts of air and aquatic pollution. Food and nutrition
Food and Agriculture Organization (FAO) ^c	Global	Agriculture and forestry
World Meteorological Organization (WMO) ^c	Global	Weather and climate. Air pollution monitoring
Intergovernmental Panel on Climate Change (IPCC) ^c	Global	Scientific aspects of climate change. Ozone and N greenhouse gases. The nitrogen/carbon cycles
Arctic Council ^c	Arctic region States	Effects of nitrogen in the Arctic region

^a Multilateral environmental agreement (MEA).

^b Governing body of MEA.

^c Intergovernmental Organization (IGO).

For further details see Oenema *et al.* (2011a, Chapter 4, this volume).

25.2 The functions and operations of multilateral environmental agreements and intergovernmental organizations

The activities of many of the organizations and agreements that have interests in nitrogen management are described in Oenema *et al.*, 2011a (Chapter 4, this volume) and summarized briefly here in Table 25.1. Note that several of these organizations are UN-based, e.g. open for membership by UN States. They are seen as part of the UN ‘family’, but they have their own, separate constitutions and independent governing bodies; the UN does not act as an over-arching body.

While considering some of the current interests of MEAs and IGOs, it becomes clear that there are problems in developing coordinated approaches. Each institution or body has specific goals in line with their given mandates, and this inevitably limits their scope of work. Coordination is therefore essential to develop sound policy for nitrogen management, and here we look generally at the institutional set-up of MEAs and IGOs to see what basis there is for developing coordination between bodies.

As noted previously, there is no single MEA specifically addressing nitrogen management issues. Yet, even if there was,

there would still need to be coordination between it and the various other institutions with overlapping interests in nitrogen. The absence of an over-arching institution and the wide range of activities under existing treaties and IGOs, means there is no holistic approach to nitrogen management and there is no obvious existing institution that can take the lead to coordinate the activities of others. For effective coordination, each and every MEA and IGO with nitrogen interests needs to play an active role. Here we consider the nature and mechanisms of international agreements and organizations in order to explore what options exist for promoting interlinkages in the future.

25.2.1 Treaties, conventions and protocols

A *treaty* is an agreement under international law that may take the form of a convention, protocol, exchange of letters, etc. Such a treaty is established between ‘Sovereign States’ and possibly international organizations through their signing and agreeing to comply with the terms of a written agreement. Failure to comply has the consequence of being held liable under international law, though enforcement of international law for many issues, such as environmental ones, is not necessarily strong.

Table 25.2 Institutions associated with a Multilateral Environmental Agreement (MEA)

Meeting/conference of the Parties
Secretariat
Bodies for scientific and technological advice
Bodies for technical assessment of information
Bodies for assessing compliance and reporting non-compliance
Financial institutions
Capacity-building institutions

MEAs are a special form of treaty that target environmental issues and are often looked upon as being separate from other types of treaty.

For MEAs, the initial or framework treaty is usually called a *convention*. It is often the culmination of long negotiations between states, usually held within the framework of relevant political gathering of states, such as that provided by UNEP globally or UNECE regionally. Such negotiations may be initiated by an individual state or group of states with particular concerns on an environmental issue and that have sufficient persuasive arguments to convince the gathering of states of the importance of embarking on further investigation or negotiations.

A *protocol* is a supplement to such a convention. A convention may have several protocols under it. In many instances these protocols detail specific actions to be taken by the parties which address the general aims of the convention. For example, the 1984 Protocol on Sulphur to CLRTAP requires its Parties to cut emissions of sulphur by 30% thus addressing article 2 of the Convention by reducing and preventing air pollution.

Quite a number of MEAs have been established in recent decades by States coming together, either regionally or globally, to sign up to treaties aimed at specific environmental goals, such as biological diversity, climate change and air pollution. The texts of the agreements spell out what these goals are and how the parties to the agreement will reach them, including, for example, how a secretariat will be established and how a governing body will operate, as well as specifying which States might become parties and how they should do this, i.e., the procedures for becoming a signatory and for ratifying the agreement.²

One way to consider possible coordination mechanisms is to consider the types of institutions built up within, or sometimes external to, MEAs (Table 25.2). Coordination is possible at all these levels and options for some of these will be explored in detail in Section 25.3.

Interlinkages between the various institutions of different MEAs can be both through formal and informal channels. Formal links are those recognized by the parties to an

MEA through collective decisions taken within its framework. Informal links might result, for example, from the memberships of a state to several MEAs; delegates of that state can develop national coordination through their awareness of the need for harmonization, exchange of information, etc. This 'individual coordination' might also take place fairly formally at the national level, through establishing national coordinating bodies, or even formally between groups of governments of several parties, e.g., the Nordic States.

Overall, the interlinkages between an MEA and other institutions depend to a great extent on the views of the parties and how proactive they are in seeking links and coordination. Sometimes the adopted text of an MEA will include a requirement to collaborate with another body, e.g., the text of the Kyoto Protocol makes repeated reference to IPCC. Mostly though, interlinkages with other institutions are developed during the implementation of an MEA as parties become aware of the need to share knowledge and information, and to harmonize approaches to common issues. Such harmonization is often of major interest to states that are party to more than one agreement, which have similar requirements or obligations. A good technical example of this is the emission reporting requirements under the CLRTAP and UNFCCC protocols. These requirements were harmonized through cooperation between their respective technical bodies. In this way emission experts harmonize their reports on air pollutant and greenhouse gas emissions and avoid the unwanted task of calculating and reporting emissions using two different methods.

Secretariats also have an important role to play. Most are aware of the activities of other MEAs and IGOs with similar interests and they may participate as observers at meetings of other bodies. They may share information on meetings and activities, and they are the usual focal point for sending official invitations to other MEAs and IGOs inviting them to participate or contribute to meetings or work.

As noted in Oenema *et al.*, 2011a (Chapter 4, this volume), several conventions have taken action individually to develop nitrogen policy in their specific areas of interest. However, again as previously noted, the scope of their individual actions is limited by the terms of their treaties. While governing bodies can act autonomously and decide upon a course of action to expand their scope of work, treaty texts may specify geographic limits (e.g., regional seas) or limits to the environmental interests (e.g., air pollution) and parties will be unable, or reluctant, to step outside the provisions of the original agreement even if they are aware of the broader issues. So issues such as nitrogen management are only tackled piecemeal because of the restricted mandates.

One area where there is much scope for developing interlinkages and coordination is in the scientific and technical work of MEAs (an example on emissions reporting has been given above). Science is seen as a fundamental starting point for environmental law and policy, and various authors have drawn attention to the importance of strong links between science and policy. The global science development is coordinated under the flag of the International Council for Science (ICSU),

² Ratification of a treaty by a State, which often takes place months or years after the signing, indicates its agreement to be bound by its terms. Signing a treaty simply shows agreement with the principles of the treaty text.

currently developing a vision on Earth sciences. There are several Interdisciplinary Bodies and Joint Initiatives under ICSU that address nitrogen issues, such as the Global Environmental Change Programmes:

- International Programme of Biodiversity Science (DIVERSITAS)
- International Geosphere-Biosphere Programme (IGBP)
- International Human Dimensions Programme on Global Environmental Change (IHDP)
- WMO-ICSU-IOC World Climate Research Programme (WCRP)

and the monitoring and observations programmes:

- Global Climate Observing System (GCOS)
- Global Ocean Observing System (GOOS)
- Global Terrestrial Observing System (GTOS).

In a similar way, the scientific links between the different interests of MEAs can be an important driving force for better policy coordination. Using the same science as a starting point for different interest areas can greatly improve the consistency of policy development and provide the basis for coordinating important policy-related activities, such as monitoring, reporting, and impacts assessment.

25.2.2 Intergovernmental organizations

Intergovernmental organizations (IGOs) are also created between States by international agreement, treaty or charter, which provide the goals and scope of the interests of the organization. They are legal entities and important parts of public international law. They often have a much broader remit than MEAs and with less specific targets. While they might take decisions that have implications for international and national law, they are not law-making bodies and are generally open to participation by states, not just to parties that have signed up to the agreements. Even so, states might need to declare membership to indicate they wish to participate in IGOs activities, and IGOs often champion MEAs in order to establish international law in their areas of interest. For example, CLRTAP was negotiated under the auspices of UNECE.

Similar to MEAs, IGOs also have governing bodies that, through collective decision by the participating states, determine how the organization will operate and agree its work. IGOs might too have subsidiary bodies and set up scientific or technical groups to carry out specific tasks. They also have secretariats whose range of activities can be quite extensive and who may carry out much of the work of the organization.

Funding of IGOs is provided by its members and funding mechanisms can be strong enough to support significant institutional structures. For example, the UN has a system of Trust Funds, some voluntary but others that member States are obliged to contribute to according to an agreed sharing of costs. Such sharing is often based on the UN scale of assessment; this is set by the UN General Assembly and is broadly based upon States ability to pay. Some MEAs make use of a similar cost-sharing mechanism, though mostly they depend upon voluntary contributions.

25.3 Mechanisms for future coordination of action on nitrogen by MEAs and IGOs

For any environmental issue, there are a variety of ways that MEAs and IGOs can coordinate and harmonize their actions. Coordination can operate at different levels of formality and be implemented by parties or states individually or collectively. But key to success is a perception of over-lapping interests and recognition of benefits from the coordination process. Cooperation and coordinated action will inevitably require resources and effort and these will need to be balanced against the benefits achieved.

Over-arching institutional interlinkages are one way to bring individual MEAs and IGOs together. As noted in Section 25.1, the UNECE Committee on Environmental Policy, itself responsible for initiating negotiation of several MEAs, has tried to bring together the five UNECE MEAs to explore synergies and prompt interlinkages on implementation. Mostly, such efforts have achieved little, since the areas of common interest identified so far have been limited. However, all five conventions have interests in capacity building in certain countries, e.g., states in Central Asia, so there has been value in coordinating action to achieve UNECE and MEA goals.

Broadly speaking, we can conclude from the above that there are three possible ways that nitrogen management might be addressed more holistically.

- (a) Start a new process to develop a new MEA or IGO for nitrogen; this would be a difficult option, but, if achievable, it has much potential for tackling the nitrogen management issue.
- (b) Work from an existing MEA/IGO and broaden its scope gradually to involve other bodies for addressing specific nitrogen issues. This would not be a fully integrated approach and would need changes to, or work around, existing institutional structures in order for it to be effective.
- (c) Use current MEAs and/or IGOs and put effort into establishing links and cooperation. Formally, for example through a joint protocol, this might be difficult to negotiate, but less formally, for example through exchanges of letters or joint technical bodies, this might have some potential.

To see how institutions with interests in nitrogen management might harmonize their work and coordinate their activities with one another, we here explore existing mechanisms used. Various options are discussed below broadly based upon the 'level of activity' within a MEA or IGO, ranging from high-level, formal and international down to low-level, informal and national. Even so, no matter which level is targeted, few approaches are simple and easy, and some would require considerable amounts of work and effort.

25.3.1 A new MEA or IGO for nitrogen management

A new international treaty, such as a convention on nitrogen could be a powerful mechanism for nitrogen management at

the regional or even global level. As outlined in previous chapters of this assessment, current policies related to the mitigation of nitrogen effects have not been fully successful, typically addressing different aspects, with little overall coordination. For this reason much more effort is needed to develop more holistic, integrated approaches to nitrogen management (Oenema *et al.*, 2011a,b, Chapters 4 and 23, this volume). Developing a coordinated strategy under an international treaty targeted explicitly on nitrogen has the potential to bring the different elements of the nitrogen problem together. Thus it could consider both the benefits of reactive nitrogen for food and energy security etc. (Jensen *et al.*, 2011, Chapter 3, this volume) and the five key societal threats: water quality, air quality, greenhouse gas balance, ecosystems / biodiversity, and soil quality (Grizzetti *et al.*, 2011; Moldanová *et al.*, 2011; Butterbach-Bahl *et al.*, 2011; Dise *et al.*, 2011; Velthof *et al.*, 2011; Chapters 17–21, this volume). In the long term, a new international treaty on nitrogen could provide a solution for coordinated global or regional nitrogen management.

Against the possible attractiveness of such a treaty must be balanced the overlap with existing MEAs and IGOs, which would be considerable. The requirement for coordination and formal interlinkages with existing bodies would make both negotiation and implementation difficult. Nitrogen involves many policy sectors and there would be strong pressures for any instrument to be harmonized with actions by existing MEAs and IGOs. Furthermore, many countries are concerned about the proliferation of MEAs and are reluctant to negotiate new instruments that consume national resources both in setting up and for implementing nationally. As well as this, some countries do not, as yet, perceive nitrogen to be a major environmental problem. The case for a new instrument would need to be very strong even to initiate discussions on possible negotiations.

Even so, possibilities for a framework or coordinating convention could still be explored. This could lay down basic principles that might facilitate inter-MEA and IGO action coordination.

Another alternative, also worthy of consideration, is a joint protocol between two or more conventions. Such an approach has the advantage of building on the work of existing MEAs and IGOs, while focusing on the common links between them specifically related to nitrogen. This option is explored further below, under formal high-level agreements between MEAs and IGOs (Section 25.3.2).

A new international body for coordinating or promoting cooperation on nitrogen management is perhaps a more feasible option than a full MEA dedicated to nitrogen management. This could bring together the various institutions that have interests in nitrogen management and promote discussion and cooperative action. The UN has established such a body for water issues, 'UN Water', which brings together 26 bodies from the UN system, as well as external partners representing organizations and civil society (UN-WATER, 2010). It was established following the 2002 World Summit on Sustainable Development with the aim of supporting States to reach the water-related Millennium Development Goals.

Another UN coordinating body with a much broader remit is the Environmental Management Group (EMG). This is a UN system-wide body with a membership consisting of the specialist agencies, programmes and organs of the UN including the secretariats of the MEAs (Environmental Management Group, 2010). It is chaired by the Executive Director of UNEP and supported by a secretariat provided by UNEP. The EMG aims to further cooperation in support of the implementation of the international environmental and human settlements agenda. On specific issues it does this through Issues Management Groups (IMGs), for example, a report of an IMG on atmosphere and air pollution was submitted to the fourteenth session of the Commission on Sustainable Development (CSD) in 2006 (Environmental Management Group, 2006). One of the conclusions of this report was that organizations at the technical level lacked awareness of one another's activities and programmes. While this was referring to air pollution, it also highlights the dilemma faced in dealing with the nitrogen problem. The report suggested a UN Technical Forum on Air Pollution Activities from Urban to Global Scales to be held every few years. A similar forum could be useful for nitrogen management.

A recent initiative which could provide future potential for cooperation is the Global Partnership on Nutrient Management. It was launched at the time of the seventeenth session of the Commission on Sustainable Development in May 2009 with the support of the United States and Dutch governments and leading stakeholders, and with UNEP providing secretariat support. It is open to States and organizations with interests in nutrients, including nitrogen. The Partnership recognizes the need to optimize the use of nutrients to realize food security, while minimizing negative impacts on the environment and human health. It aims to raise awareness of these issues, to build political and stakeholder interest and impetus, to assist countries through exchange of knowledge and good practices, and to foster action (United Nations Environment Programme, 2009). At a more scientific level, the International Nitrogen Initiative (INI) has promoted interest in the global nitrogen problem (INI, 2010). Both of these institutions could provide the necessary stimulus for a more formal global agreement in the future.

25.3.2 Formal high-level agreements between MEAs/IGOs

The highest level of agreement between MEAs, or between IGOs, is that taken by formal agreement between the governing bodies concerned. The resulting action might be high level or take place at a more practical level, but it is seen to have the backing of the governing bodies through the decisions of the parties.

It is possible, for example, for two MEA governing bodies to decide upon action to develop a separate, new MEA that has particular relevance to them both. There is no example for this in nitrogen management, but an example of such possibilities is given with the case of the governing bodies of the UNECE Water Convention and the UNECE Industrial Accidents Convention. These negotiated jointly and adopted the 2003

Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters (Economic Commission for Europe 2003b).

The relationship between UNFCCC and IPCC is an example of an interlinkage between an MEA and an IGO which has some relevance to nitrogen management. While the Convention text merely indicates ‘The head of the interim secretariat... will cooperate closely with the Intergovernmental Panel on Climate Change to ensure that the Panel can respond to the need for objective scientific and technical advice’, some would believe the link is much stronger. The Convention’s Kyoto Protocol makes stronger reference to IPCC and also recognizes other MEAs (1987 Montreal Protocol) and IGOs (e.g., International Maritime Organization).

While such links might be formally agreed, it does not mean that they will be effective. The relationship between UNFCCC and IPCC has been criticized since it affords poor links with natural, economic and social sciences and the assessment process of IPCC is slow and unable to respond quickly to the demands from UNFCCC (Raes and Swart, 2007).

Formal links between an MEA and IGO can also be established through adoption of a specific MEA. For example, the UNECE Water Convention negotiated its 1999 Protocol on Water and Health in collaboration with WHO (Economic Commission for Europe, 1999a). Continued collaboration is ensured through a joint UNECE/WHO secretariat as well as meetings of delegates from both water and health sectors.

Inter-MEA/IGO collaboration need not be through adoption of a protocol. From its early years, the CLRTAP governing body, the Executive Body, looked to WHO to provide information on the impacts of air pollution on human health, though without making any formal decision on this. However, in 1997, the Executive Body decided to establish, with WHO agreement, the Joint Task Force on the Health Effects of Air Pollution – a task force of the Executive Body and WHO.

There is a strong link between the UNECE Water Convention and FAO, since it is recognized that run-off from agriculture can strongly influence the quality of water in rivers and lakes. FAO as an organization could even be seen as a possible coordinator of a more integrated approach. However, while its scope is large, it is, by definition, limited to the agricultural sector, so while specific inter-institutional links might help coordinate particular aspects of nitrogen management, they are unlikely to offer the more holistic solutions of other approaches.

Collaborative agreements between MEAs and/or IGOs, on, for example, exchange of data or joint action, often take the form of memorandums of understanding (MOUs) or even simple exchanges of letters. Such simple mechanisms could do much to promote collaborative action on nitrogen management between MEAs and IGOs. There are plenty of examples of these in other areas, for example, CLRTAP has collaborative agreements with the European Environment Agency and the Oslo and Paris Commission for the Protection of the North-East Atlantic (OSPAR, 2010).

The Convention on Biological Diversity (CBD), which is also concerned about nitrogen impacts on biodiversity, is

particularly interested in interlinkages and cooperation. The Conference of the Parties (COP) has adopted numerous decisions directly pertaining to cooperation with other conventions, organizations and processes, and significant elements of cooperation are included in goal 1 of its Strategic Plan. So, for example, the Convention has signed Memorandums of Cooperation and Joint Work Programmes with many of its partners and it hosts a joint website of biodiversity-related conventions (Convention on Biological Diversity, 2010). CBD is also discussing a target for 2020, where Parties bring pollution from excess nutrients (nitrogen and phosphorus) below critical ecosystem loads; this initiative could be the basis for coordinating activities with other bodies.

Under CLRTAP there have been discussions on the benefits of using biodiversity as an indicator of achievement, particularly with respect to nitrogen impacts, as discussed in Chapter 20 (Dise *et al.*, 2011, this volume). Until now, critical loads maps of Europe have been used to identify the benefits of emission control and these proved a persuasive argument for policy action (Bull, 1995). Using biodiversity indicators would link CLRTAP more closely to the efforts of the CBD. This would require more coordination between the two MEAs, which might be achieved through a simple collaborative agreement.

CLRTAP has long had an awareness of nitrogen management problems and how they relate to air pollution. It established the Sofia Protocol on emissions of nitrogen oxides in 1988, and the multi-pollutant Gothenburg Protocol in 1999 which included both NO_x and NH₃ emissions (Bull and Sutton, 1998; Economic Commission for Europe, 1988, 1999b). The convention has since focused increasing attention on the aspects of nitrogen management that fall within its scope, and promoted scientific and technical work to support its decision making. In December 2007, the Executive Body for the Convention established its Task Force on Reactive Nitrogen (Economic Commission for Europe, 2007b; TFRN, 2010). The Task Force was given the long-term goal of ‘developing technical and scientific information, and options which can be used for strategy development across the UNECE, to encourage coordination of air pollution policies on nitrogen in the context of the nitrogen cycle and which may be used by other bodies outside the Convention in consideration of other control measures’. This is an example of option (a) referred to in Section 25.3 where an MEA is seeking to extend its scope to link with other MEAs/IGOs, though still exercising due care to ensure it is not seen to attempt to encroach on the work of other bodies, but simply to make information available for use.

The UNECE Water Convention actively collaborates with other institutions that have interests in the management and protection of water. For example, it participates in UN-Water through UNECE, which is a member organization, and has invited the Ramsar Convention on Wetlands to participate in its programme ‘Nature for Water’. Both activities have some relevance for nitrogen management albeit relatively minor. UN Water is particularly relevant as an example institution, however, since it demonstrates how it is possible to draw together a wide range of UN organizations to discuss common issues such as water (UN-WATER, 2010). UN-Water is not an

implementing body, its specific activities and programmes are hosted by individual member agencies on behalf of UN-Water, but it is a good example of a body promoting cooperation and coordination. A permanent Secretariat, hosted by the United Nations Department for Economic and Social Affairs (UNDESA) in New York, provides administrative, technical and logistical support.

Finally, there is the case of institutions like the EU that are regional economic integration organizations, which have competence to act on behalf of their member States. Using its regional economic integration status the EU has been an active participant and a major driving force in regional and global policy-making through its membership of IGOs, and through being party to many regional and global MEAs. It is therefore in a key position to promote cooperation and coordinate action on nitrogen in Europe.

Each of the above high-level approaches, including those mentioned in Section 25.3.1, has the potential to form strong coordination links between organizations and their institutions. While they do not automatically ensure that cooperation and coordination will take place, they do provide mechanisms to enable institutions, their various bodies and their member countries to develop practical links and to take the necessary action for coordination to be effective. Even so, persuading governing bodies of MEAs and IGOs to enter into such agreements is seldom easy, and the difficulties are compounded when more than one organization is involved in the decision-making process. New initiatives or changes to existing plans are often viewed with scepticism by many countries and there is always caution when such steps involve the need for additional resources.

Usually it is a question of appropriate timing for action to be successful. Kingdon (1995) has drawn attention to the need for a 'policy window' or 'window of opportunity' where the problem stream (identified by the science), the policy stream (the policy action, e.g., legal instrument) and the political stream (political will) need to come together at the same time for high-level action to be taken. This multiple stream theory, in contrast to a stage by stage concept, is widely applicable and goes a long way to explain why some items find their way on to the political agenda and others do not.

Kingdon has noted that at critical points in time, the streams are coupled by 'policy entrepreneurs'. He has suggested that the combination of all three streams into a single package enhances dramatically the chances that an issue will receive serious attention by policymakers. The key to understanding Kingdon's argument is to see streams not as additive, but as interactive. Choice is determined not by the effects of each stream in isolation, but by the impact of one depending on critical values of the others.

Kingdon's theory has been applied widely, even outside environmental issues (e.g. Blackman (2005) examined tobacco control in California drawing upon Kingdon's model). Of more relevance to the issue of nitrogen management, Brunner (2008) considered multiple streams in relation to emissions trading in Germany. In relation to MEAs, the signing of CLRTAP in 1979 demonstrated the need for political attention and awareness,

even when the scientific evidence for action was overwhelming and the policy action needed was clear.

In conclusion, it is clear that there are many opportunities for high-level agreements to bring MEAs and IGOs together to address the nitrogen issue, but the arguments for such agreements must be persuasive and timely if they are to succeed.

25.3.3 Links through participation in meetings or joint actions

While joint meetings between MEA and/or IGO bodies are unusual they can occur and they could provide a mechanism for discussing and agreeing action on issues of common interest. Moreover, they have possibilities for developing mutual understanding of common issues between delegations that are usually focused upon the particular interests of just one MEA or IGO. Such joint meetings, because of their unusual nature, are more likely to lead to further joint agreements or agreed joint action, and hence promote much better cooperation and coordination of activities.

More commonly, an MEA or IGO will invite participants from other MEAs and IGOs to attend its meetings that it believes are of common interest. The other MEAs and IGOs might be represented by one or more of its officers, delegations or experts charged with representing the MEA/IGO, or by a member of its secretariat.

Similarly, non-governmental organizations (NGOs) may also be invited to attend MEA or IGO meetings, and these too may play an important role in linking MEAs and IGOs through participation in the bodies of several institutions. NGO networks can be particularly effective in drawing attention to common interests, synergies or trade-offs between institutions. For example, the Global Atmospheric Pollution (GAP) Forum, registered as an NGO with CLRTAP, promotes inter-regional collaboration between the various regional air pollution networks, including CLRTAP, in the absence of any other forum for bringing all the regions together.

Such MEA/IGO links as described above can be particularly effective mechanisms for exchanging views and information, and a significant help to coordination between institutions. The greater degree of informality in such arrangements makes them more acceptable, or even welcomed, by participating countries. However, the effectiveness of such mechanisms once again relies upon the availability of resources and in particular the willingness of individuals from one institution to commit time, not only to attend meetings of others, but also to make appropriate contributions to their work. In addition, it is important that the institution or body inviting participation ensures that it gives due consideration to the information presented by those invited.

25.3.4 Links through scientific and technical bodies

Because of the importance of the scientific underpinning of MEAs, science can provide a persuasive mechanism for cooperation between bodies and for coordination of subsequent action.

The role of science in environmental regimes has been a topic for a number of studies (Lidskog and Sundqvist, 2002; Farrell *et al.*, 2001; Tuinstra *et al.*, 2006) and the links between the science and the policy within an institution have much bearing on the contribution science can make to policy development. Lidskog and Sundqvist even suggest that co-production of science and policy is a prerequisite for creating effective environmental regimes. How scientific assessments learn and develop also influences how the links between science to policy are forged and how influential science can be to policy decisions. Comparison between CLRTAP and IPCC in the past has highlighted the differences between the two institutions and the importance of issues such as storage of knowledge, dissatisfaction and conflict, media coverage, formal and informal communication, as well as the state of the art in science (Siebenhüner, 2002).

Science usually provides the underpinning for the development of MEAs and IGOs, indeed scientific knowledge and understanding is normally the prerequisite to get any formal agreement between States to take action on environmental issues. CLRTAP and UNFCCC both evolved after a great deal of scientific work and debate, though the creation of the MEAs provided a much needed focus for further scientific studies to give underpinning to subsequent action in the form of protocols.

Partly as a result of the decisions taken by parties to an MEA, scientific and technical work will evolve in a way that provides the required evidence of an environmental problem and provides underpinning for further decision making. Recognizing the disparity of scientific development under different institutions, the options below have the potential for creating interlinkages to address nitrogen management.

Scientific and technical links between MEAs/IGOs may occur through either formal and/or informal mechanisms. Parties to MEAs will sometimes encourage formal cooperation between their scientific and technical bodies and those of other organizations. This is especially the case when they have an awareness of possible common interests or where there might be practical benefits to the parties, e.g., the harmonization of reporting to avoid duplication of effort and to maximize available national resources. Such cooperation at a formal level is only likely to be successful where there are clear common interests and scientists are willing to participate, since parties will need to be convinced that resources should be used in this way. For example, OSPAR encourages cooperation with many international and regional organizations on science and research, monitoring and assessment, as well as the promotion of actions where the competence for such actions is vested with other organizations or is most efficiently taken in their frameworks.

Even so, the science of the nitrogen cycle remains a challenge, so scientific interest continues. This ensures that nitrogen, at least in scientific circles, has a high profile and stands a better chance of finding its way onto the political agenda. Even so, there are barriers to overcome in particular those related to a lack of coordination. The different nitrogen measurement and modelling activities between air, land and water need to be brought together and harmonized. The relevant, multi-media nitrogen science is needed to provide cross-cutting information to underpin policy decisions.

In Europe, there has been major progress through two coordination programmes, COST 729 and ESF NinE, which are both created from scientific research to work towards integrated nitrogen approaches and policies at the European level. COST (European Cooperation in Science and Technology) is an intergovernmental framework that complements the activities of the EU framework programme, and the COST 729 project on assessing and managing nitrogen fluxes in the atmosphere-biosphere in Europe has provided an excellent mechanism for bringing scientists together from across Europe to tackle the common issues related to nitrogen management (COST 729, 2009). The European Science Foundation (ESF) Nitrogen in Europe (NinE) project is a research networking programme that addresses nine interacting problems affected by excess nitrogen in the environment (e.g., aquatic, coastal, terrestrial, ozone; see Sutton *et al.*, 2011, Chapter 5, this volume). Again this has provided an important networking facility for scientists involved in the nitrogen problem in Europe (NinE, 2010).

One key to coordination is to make effective use of the 'programme centres' established by MEAs. These generally work under scientific or technical bodies to provide additional, centralized resources for their scientific and technical activities, and can provide a good cooperation mechanism. Such centres might hold the parties' common databases or might provide expert guidance to the parties' scientific community, e.g., for monitoring. They are often an important resource for implementing an MEA and the parties may support funding mechanisms for a centre's activities. However, a centre might also provide, with the parties' approval, important data and information to other institutions where there are overlapping scientific interests. CLRTAP centres have shared information with other regions and have shared data with other regional MEAs such as the regional sea commissions and the Nordic Council's Arctic Monitoring and Assessment Programme (AMAP) (e.g. AMAP, 2006; OSPAR, 2007; Bartnicki *et al.*, 2008). This not only adds to the credibility of a programme centre, but ensures that harmonized data and information are used by the different institutions – an obvious benefit to developing harmonized national and international policy. Centres, or individuals from them, might even publish reports drawing attention to linkages and synergies between different MEAs to stimulate cooperation (Amann, 2003).

Scientific bodies of international institutions involve national expert scientists, who usually have much broader scientific interests than those of a single institution. There is often a wealth of scientific knowledge in a scientific body that broadens the base of understanding of the science of that body and increases the possibilities for exchange of information between institutions. Overlapping or similar interests are readily identified, and recommendations for collaboration and coordination with other institutions can be forwarded from the scientific body to an institution's decision-making body.

Some scientific organizations have been set up specifically to bring together and coordinate the work of other institutions; such a coordinating institution might be seen as an attempt to create an over-arching coordinating body. Reference was made above to UN Water, but there are other examples. The Group for Earth Observations (GEO) was set up at the first

THE GLOBAL EARTH OBSERVATION SYSTEM OF SYSTEMS



Figure 25.1 The Global Earth Observation System of Systems (GEOSS). (Image courtesy of 'The Group on Earth Observations')

Earth Observation Summit in 2003 with a view to establishing a comprehensive and sustained earth observation system or systems (GEO, 2009). GEO is coordinating international efforts to build a Global Earth Observation System of Systems (GEOSS) and develop instruments and systems for monitoring and forecasting changes in the global environment (Figure 25.1). It currently has 79 member countries (and the EU) as well as 56 participating organizations, including UNEP, CLRTAP and WMO. In a similar way, a new international coordinating body for nitrogen management could bring together many of the MEAs, IGOs and other stakeholders with an interest in the topic; such a body could be scientifically or policy focused. As noted earlier, the Global Partnership on Nutrient Management may have potential to develop into a global coordinating body for nitrogen management issues.

Some organizations that bring scientific networks together do so through funding projects that have common interests. As noted above, the ESF NinE programme and COST 729 have played key roles in linking networks in Europe. Globally, the International Council for Science (ICSU), the Scientific Committee on Problems of the Environment (SCOPE) and the International Geosphere-Biosphere Programme (IGBP) play important roles in developing scientific networks in a variety of scientific areas, with the International Nitrogen Initiative being a joint project of these organizations (SCOPE, 2010; IGBP, 2010; ICSU, 2010).

The international scientific community at large and the extensive numbers of formal and informal scientific networks are a valuable resource to all MEA/IGO scientific bodies. Sometimes, when an MEA establishes a scientific body, it recognizes that there needs to be interaction with other communities and networks with similar interests and common goals. The CLRTAP Task Force on Reactive Nitrogen includes in its mandate the need to coordinate with other bodies under the Convention. But the mandate also recognizes that 'different aspects of the nitrogen cycle are considered separately under different regulatory frameworks' and that 'the nitrogen cycle is

multimedia in nature, and that it may be beneficial to have fully informed or coordinated regulatory frameworks to address various aspects and issues' (Economic Council for Europe, 2007b). While CLRTAP parties make reference to specific inter-institutional links in the Task Force mandate, it is implicit that such interlinkages need to be explored and developed where needed.

If an MEA is to 'step outside' its mandate it may be able to explore 'external' opportunities for cooperation. Parties are likely to find this more acceptable if it is done at the scientific level. The CLRTAP Task Force on Hemispheric Transport of Air Pollution (TFHTAP) is a good example of this. Established under one of the Convention's main scientific bodies, the Steering Body of EMEP³, the Task Force seeks to understand the movement of air pollution at the hemispheric scale. While the Convention has limited its policy interests to transboundary air pollution between countries in the UNECE region, the Task Force has successfully engaged with national experts and international institutions from outside the region to help it understand the hemispheric movement of pollutant emissions (see TFHTAP, 2007). The Parties to the Convention agreed to this as they were persuaded that such understanding was needed in order to explain pollution levels within the UNECE region.

Science has played an important role, not just in the development and implementation of many MEAs, but also in promoting coordination between them and other institutions. It is easy to underestimate the effort and resources needed for scientists and scientific organizations to play effective roles across more than one scientific forum. It is possible to forget the importance of scientific literature and scientific conferences, seminars and meetings; these may not appear to be directly linked to the activities of MEAs/IGOs yet, nevertheless, they enable scientists to share information and forge links that have relevance to more than one institution. Nitrogen management is a particular challenge to science and, because of the

³ Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe.

complexity of its biogeochemistry and the need to consider science across several policy sectors, it is especially demanding on scientific resources and effort.

25.3.5 Common parties or membership

There are many scientific networks, some not even specifically linked to MEAs and IGOs, which may promote effective sharing of scientific knowledge between MEAs and IGOs. However, analogous policy networks are far fewer and less able to offer links between different institutions. Nevertheless, policy coordination is essential if such institutions are to make sound decisions that are complementary, consistent and non-conflicting.

An apparently obvious way to achieve links between policies and institutions is through national delegations where a country belongs to more than one institution. However, delegations to different institutions are seldom the same individuals and they may even be drawn from different government departments or divisions. But it is important, for both national and international policy development, that there is effective dialogue between delegates to institutions with overlapping interests. While this is seemingly obvious, in practice it requires effort and planning, especially when government structures do not lend themselves to national coordination. For example, with the increasingly perceived importance of climate change, governments are setting up new ministries or departments to tackle climate issues; this is likely to separate those working with UNFCCC and the Kyoto Protocol from those working in areas which have possible synergies or interlinkages with climate change, such as air pollution, forestry and biodiversity – and all these are relevant to nitrogen management. It is in a country's own interests that its national policies are coordinated and harmonized with respect to the international agreements by which it is bound. Conflicting obligations can result in major problems in implementation and it is better to deal with such conflicts at the institutional level while agreements are being drawn up. National delegations are key to ensuring consistent and harmonized action.

Non-governmental organizations (NGOs) also have an important role in linking MEAs and IGOs through their participation in the bodies of several institutions where they can highlight common interests between institutions. NGOs and other stakeholders, such as industry, may have much to offer in helping to address nitrogen management issues.

25.3.6 Links through secretariats

The secretariats of MEAs and IGOs are often a key to successful cooperation and coordination. As well as organizing the day-to-day operations of governing and subsidiary bodies, secretariats are in a good position to have an overview of the work of their institution and identify how it relates to the work of others. They are also in an excellent position to inform the appropriate body of the institution of possible action needed and to initiate such action when appropriate. Using the mechanisms and bodies of institutions, secretariats can, provided that they have the necessary resources and appropriate expertise,

stimulate and encourage cooperation at all levels and keep the parties and member states informed of action taken.

For example, OSPAR has established a direct institutional link through its Secretariat between the OSPAR Commission (OSPAR, 2010) and the North Sea Conferences (NSC, 2010). Through this, OSPAR has taken on the follow-up to the last Gothenburg Conference in 2006; the North Sea Network of Investigators and Prosecutors (NSN) established under the North Sea Conferences, which works to protect the marine environment from pollution by shipping; and the 1983 Bonn Agreement (1998) for cooperation in dealing with pollution of the North Sea by oil and other harmful substances. Similarly, CLRTAP has charged its secretariat with 'outreach' activities, and in particular to 'coordinate the dissemination of information and take an active part in raising awareness in other regions' (Economic Commission for Europe, 1999c). Through this mechanism the knowledge and experience of the Convention is being shared with regions outside Europe and North America.

25.4 Conclusions and recommendations

- (a) International treaties, such as conventions and their protocols, and especially MEAs, have done much to protect the global environment through promoting intergovernmental action on many environmental issues. MEAs and IGOs between them have, in recent years, targeted most of the known environmental problems, but none has targeted nitrogen management policy holistically.
- (b) There is no formal over-arching body to coordinate global action on nitrogen management between the various MEAs and IGOs that have interests in the matter, though the Global Partnership on Nutrient Management (GPNM) and the International Nitrogen Initiative (INI) might provide a stimulus for this in the future from policy and scientific perspectives, respectively. A new international treaty on nitrogen might seem an effective solution for global or regional nitrogen management, but this would be complex to negotiate. It would involve many policy sectors and it would need to be harmonized with ongoing and planned work by existing MEAs and IGOs. Even so, a simple framework agreement or joint protocol between two or more MEAs could offer a way ahead and should be further explored.
- (c) The development of a new treaty starts with the scientific underpinning of the issues and approaches. Many successful MEAs have developed from scientific concerns on perceived environmental problems. For nitrogen, this European Nitrogen Assessment helps stimulate the process and it is worthwhile extending this to more regions and the global level. In Europe, COST 729 and the ESF NinE programme have initiated integrated nitrogen approaches by bringing the science together, which helped stimulate the establishment of the TFRN. Globally the same approach was done by INI which helped establish the GPNM.

- (d) While several conventions have taken action individually to develop nitrogen policy in their specific areas of interest, they have been unable or unwilling to increase their scope of action beyond their agreed mandates. Even so, there are many established mechanisms for developing inter-MEA/IGO links (see points (e) to (j) below) and these should be further explored to help develop new linkages and provide more harmonized and coordinated approaches to nitrogen management.
- (e) Coordination between MEAs and IGOs already occurs in a variety of ways and at different levels, but the focus is inevitably on areas of overlapping interests. Existing mechanisms for coordination, for example through formal agreements, joint participation in meetings or projects, and actions by convention secretariats, might be applied in relevant bodies with nitrogen management interests. They have the potential to improve harmonization and promote effective coordination. However, it can be difficult to influence action taken by conventions, IGOs and the EU, especially if it involves new initiatives or changes to existing plans. Political willingness is an important factor and this can be influenced by timely scientific and public pressure.
- (f) Scientific and technical cooperation between MEAs has proved especially important; the international scientific community is able to provide harmonized information to different forums and thus promote coordination. Even so, there remain problems in coordinating different nitrogen measurement and modelling activities between air, land and water. There is a need to bring together relevant, multi-media nitrogen science to provide cross-cutting information to underpin policy decisions. Coordinating the work of the scientific community to address the needs of several forums requires effort and resources and is not achieved easily, especially since there are still scientific challenges for effective nitrogen management. In addition, the links between science and policy need to be effective if science is to be truly influential.
- (g) For the UNECE region (Europe, North America and Central Asia), the scientific bodies of the Convention on Long-range Transboundary Air Pollution (CLRTAP) and its Task Force on Reactive Nitrogen (TFRN) provide some coordination of efforts for addressing nitrogen management. They are in a good position to promote more cooperation and take further steps on some aspects of coordination to link atmospheric with other nitrogen threats.
- (h) Considering a wider view of the UNECE, five MEAs have been established on different aspects of the environment, and there remains the potential for nitrogen management to be taken up as an opportunity for linking these issues. The overarching Committee on Environmental Policy (CEP) and the linked series of ministerial conferences 'Environment for Europe', could play an important role in developing the momentum for establishing more joined-up approaches.
- (i) The EU, itself established by international treaties, has a major role in Europe to harmonize policy in EU Member States and coordinate their actions regionally and globally. By being proactive in its interlinkages role, it can utilize the resources of other institutions and help coordinate the development of policy with existing MEAs/IGOs.
- (j) National policy coordination, already developed by some countries, can not only ensure that national policies are developed consistently, but can also play an important role, through national delegations, in coordinating international action between MEAs and IGOs.

Acknowledgements

The authors are especially grateful to Andrea Weiss for providing information on OSPAR, to Jan Willem Erisman for many useful suggestions on the manuscript, and to various stakeholders for contributions during the 5th ENA workshop on 'European Nitrogen Policies and Future Challenges'. This work was in part supported by the Nitrogen in Europe (NinE) programme of the European Science Foundation, COST Action 729, NitroEurope IP (funded by the European Commission), and the Task Force on Reactive Nitrogen, with the latter supported by the UK Department for Environment Food and Rural Affairs (Defra) and the UK Centre for Ecology and Hydrology.

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