

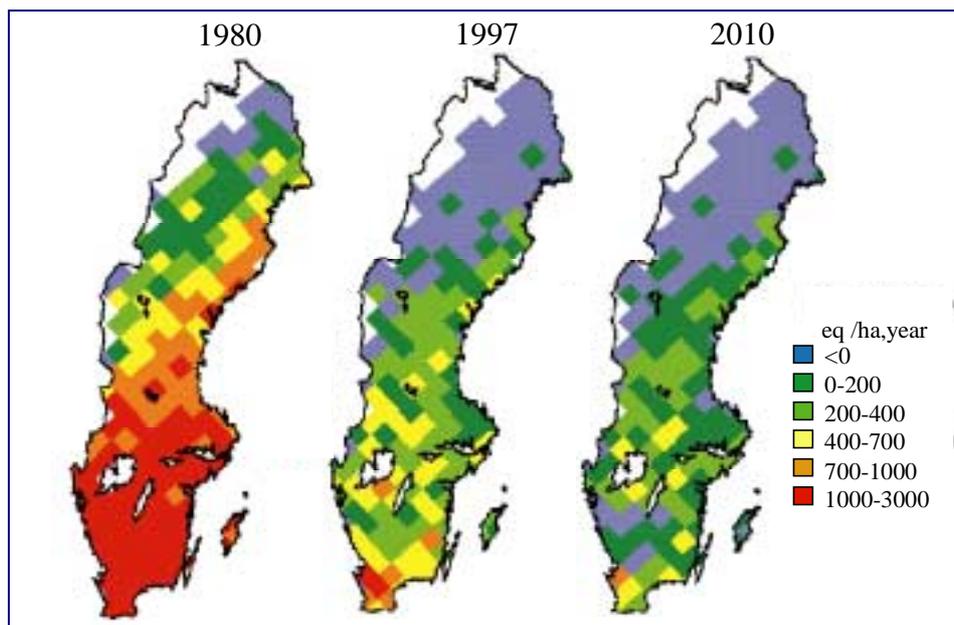


**International and National Abatement Strategies for Transboundary Air Pollution**

*International and National Abatement Strategies for Transboundary Air Pollution*

*Phase II: 2003-2006*

**Programme plan for 2004**



Exceedance of critical loads for acidification in Sweden 1980- 2010.



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# 1 Introduction

The ASTA programme started in 1999 with the aim to support the revisions of the international agreements under the Convention on Long- Range Transboundary Air Pollution (CLRTAP) and the European Union. The revisions are expected to take place within 2005-2006.

ASTA is striving to play an active role in setting the agenda for scientific support to the revisions of the Gothenburg Protocol and the EU air quality directives (in particular the NEC directive). This role includes basic research in order to develop new knowledge within crucial areas, e.g. particulates and biodiversity. It also includes more directed research and model development to support synthesis and integrated assessments, forming the basis for the international agreements and the EU legislation. New concepts for critical loads for acidification and critical levels for ozone effects on vegetation have been developed. ASTA is also making use of its direct channels into the process, by the organisation of international workshops on subjects crucial for the abatement strategies.

The first phase of the programme ended in 2002 and the programme was supported for a second phase between 2003 and 2006. ASTA is today a key actor as a supplier of scientific knowledge for the development of the European air pollution strategies. ASTA will during 2004 intensify its activities to support policy through synthesis of results from basic research and, in particular, through model development and application. We will also make use of the knowledge on science-policy relations (the social science part of the programme), in particular for the development of communication strategies between science and policy. Increased integration of social and natural science is a major challenge within ASTA.

ASTA:s role does not only include research directly under ASTA but also a role of ensuring that other relevant scientific findings are linked into the policy development process. This means that ASTA has been particularly active in organising workshops and expert meetings, educating and transferring results and tools to CLRTAP and EC bodies (in particular CAFE, Clean Air For Europe) and relevant organisations in the different countries under the Convention. This role will continue and may even be intensified during the coming two years.

In addition, ASTA will support national Swedish actors on issues related to transboundary air pollution.

## 2 Overall objectives and benefits to stakeholders

The overall goals for Phase II of the ASTA programme are:

1. To support the LRTAP Convention, especially the revision of the Gothenburg protocol, with scientific results and analysis tools, evaluations and assessments.
2. To support the CAFE programme of the European Commission, in particular the revision of the National Emissions Ceilings directive (NEC) and the air quality directives/strategies with scientific results, analysis tools, evaluations and assessments.
3. To support national Swedish negotiators and policy makers, active in the CLRTAP and CAFE processes, with appropriate scientific information, tools and assessments for the national strategy.
4. To provide relevant information for the revision of the national Swedish environmental quality objectives, of which is the first is expected to take place in 2003/2004 and possibly a second in approximately 2007.
5. To provide scientific information concerning transboundary air pollution, CLRTAP and CAFE to Swedish societal sectors and organisations (forestry, energy etc), which

support the ASTA programme, as well as to make it available to the Swedish community and its citizens in general.

6. To include the interactions between long-range transport of air pollutants and forestry (whole-tree harvesting, wood-ash recycling, compensation fertilisation) in the scientific basis used in national assessments of land-use and forestry alternatives.
7. To improve the general scientific understanding of transboundary air pollution and its effects, and to communicate this to stakeholders and others interested.

## 2.1 Potential benefits to stakeholders

As already mentioned, the most important activities for ASTA are to support the LRTAP Convention and the CAFE programme of the EU. ASTA will closely follow all the work under these bodies and contribute where appropriate. ASTA will continue to take initiatives to workshops, assessments, improvements of manuals etc. The ASTA board will continuously take decisions on such activities.

The ASTA programme has today activities and competence making it possible to follow and interact with most of the bodies under CLRTAP and EU CAFE. The relations with CLRTAP's different bodies are illustrated in Figure 1. In Table 1, the expected time schedule of CLRTAP and CAFE is put into perspective of the suggested activities of the ASTA programme.

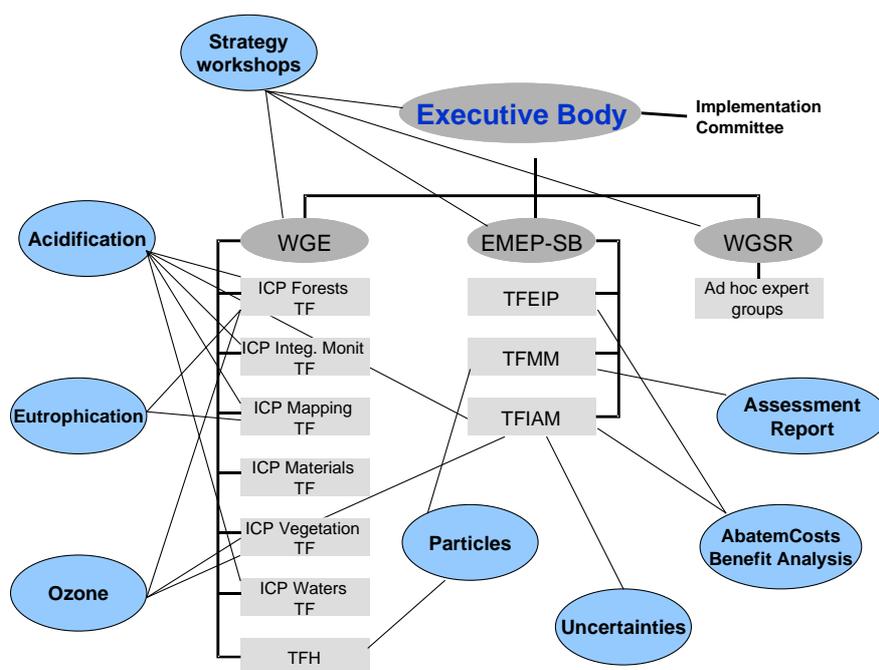


Figure 1 The relations with CLRTAP's different bodies and ASTA research. ASTA activities are marked in blue.

Table 1 Activities within LRTAP and CAFE, and the related activities within the ASTA programme during the period 2003-2007.

Year	Major ASTA activities	LRTAP	EU/CAFE
2002 autumn	<p>Workshop on dynamic modelling, Sitges Nov</p> <p>Identification of important air quality indicators for monitoring and modelling.</p> <p>Modelling development and evaluation of PM</p> <p>Active participation in workshop on critical loads for nitrogen, Switzerland, November</p> <p>Organisation of Level II ozone critical levels workshop, Gothenburg, November</p> <p>TFEIP Workshop on validation on emission inventories, Gothenburg October</p>	<p>Acidification targets based on dynamic modelling</p> <p>EMEP PM model revision</p> <p>Revision of critical loads for N effects on diversity</p> <p>Finalising Level 2 Critical Levels for ozone</p> <p>Preparation for TFEIP</p>	<p>Participation in CAFE WG on particles. Guidance on sampling of PM.</p> <p>Support for Measurements and atmospheric modelling group.</p> <p>Preparation for IAM</p>
2003	<p>Active support to revision of mapping manual for dynamic modelling, nitrogen, O<sub>3</sub></p> <p>Active support of mapping of CL for acidification etc. Expert meetings on dynamic modelling and CL for ozone</p> <p>Identification of important air quality indicators for monitoring and modelling.</p> <p>Modelling development and evaluation of PM.</p> <p>ASTA CAFE meeting: "Regional scale particle models – results, evaluation and implications"</p> <p>Examination of baseline scenarios and abatement cost data</p> <p>Joint Expert Group on dynamical modelling, Sitges November 2003</p> <p>Workshop on deposition of base cations</p>	<p>Revision of Mapping Manual</p> <p>Mapping</p> <p>EMEP monit. protocol. Monitoring strategy</p> <p>EMEP PM model revision</p> <p>Support to TFMM</p> <p>IAM model developm.</p> <p>Review of model concepts for Target Loads.</p> <p>Mapping CL</p>	<p>Participation in CAFE WG on particles.</p> <p>ASTA organises CAFE workshop on particles</p> <p>Support to Measur. and atm. modelling group.</p> <p>IAM model developm. Baseline scenarios</p>
2004	<p>Validation of maps</p> <p>Assessment report. Together with EMEP.</p> <p>ASTA conference (workshop) on the concepts and support of CAFE and CLRTAP strategies (Saltsjöbaden 2)</p> <p>Report on uncertainties in source receptor relationships</p>	<p>Updated maps</p> <p>Report on long term changes in atmospheric composition and deposition (collaboration with ASTA)</p> <p>Collaboration with CLRTAP bodies in particular with TFIAM and WGSR.</p> <p>Workshop. Report to CLRTAP.</p>	<p>Collaboration with CAFE. Broad communication and discussion on possible strategies.</p>

	Joint Expert Group on dynamical modelling, Sitges November 2004.	Review of results of call for dynamical modelling results (Target Loads)	
2005	ASTA conference: "Legitimacy- scientific and social – in air pollution abatement in Europe" ASTA conference: "Costs and benefits of the implementation of abatement strategies against transboundary air pollution"  Benefit module for environmental effects.	Negotiations will start  Information on costs and benefits	Thematic strategy of CAFE  Proposal from Commission of revised directives and strategies for local and regional air pollution  Info on costs and benefits
2006	Book on effect quantification, critical loads and levels  Final reports of the ASTA programme	Negotiations  Revision of Gothenburg protocol	Processing through the Council and the Parliament
2007			Final decision by Council and Parliament

### 3 Significant overall developments during 2003

Short progress reports of the ASTA activities during 2003 are given in connection with the description of each activity later in the Programme Plan. Here we only want to mention a few results, of particular importance for the international air pollution strategies:

- The participation and organisation of the CAFE workshop on the position paper on particles. The workshop was very important in the process of establishing an abatement strategy for health effects due to particles.
- The start of CBA activities. The project has started with an evaluation of the environmental costs and benefits on agricultural crops and forest production due to ground level ozone.
- The strengthening of the critical levels concept for ozone. ASTA scientists were during the first half year of 2003 very active in the preparation of the scientific material for mapping critical levels and their exceedances in Europe.
- The further development of concepts for dynamic modelling for acidification and support to the implementation. ASTA has been active in the preparation of the manual for mapping dynamic critical loads for acidification and also taken part in the application of the new concepts and calculations of Target Loads in several countries in Europe.

### 4 Directions for 2004

The interaction between science and policy will increase during the remaining part of ASTA and ASTA will act as an important communication partner throughout the preparation and negotiation process. The coming year will therefore have a few activities of particular importance for the scientific support to policy. These activities include:

- The finalisation of the EMEP Assessment Report. ASTA initiated the report and has taken a lead in the preparation of the Pan-European evaluation of the development of regional air pollution situation. The report will be finished in 2004. It will be an important contribution to the understanding of the outcome of air pollution policies during the last two decades and thus form a basis for further negotiations.
- The organisation of the so-called Saltsjöbaden 2 workshop. The aim of the workshop is to review and assess the air pollution policy under development within CAFE and CLRTAP. ASTA will be the main organiser.

- Presentation and evaluation of a dynamic model on biodiversity effects due to S and N deposition.

#### 4.1 Organisation of the work

ASTA Phase II is organised in four interdisciplinary, principal Themes:

Theme 1: Source-effect relationships, indicators and target setting

Theme 2: Realisation, costs and benefits

Theme 3: Uncertainties, transparency and communication

Theme 4: Support to national strategies

A schematic sketch of the ASTA Phase II organisation is presented in Figure 2.

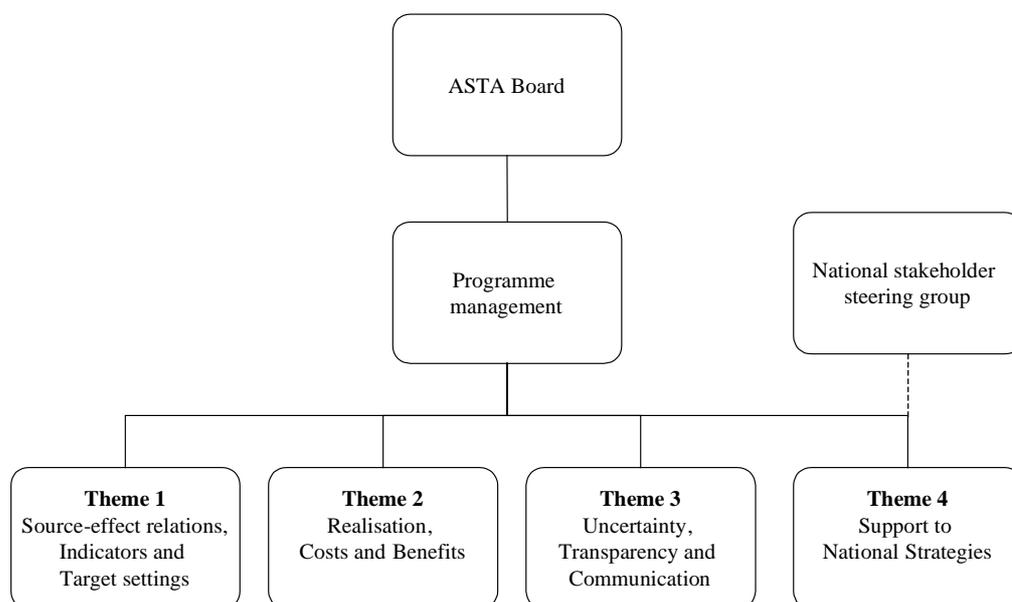


Figure 2 The organisation of ASTA Phase II

#### 4.2 Organisation

ASTA has benefited from a very active and highly qualified board, which to a large part has remained intact over the first phase. This board will largely remain during Phase II. The members of the board are presented in Table 2.

Table 2 ASTA board members.

Function	Name
Chairman of the Board	Lars Lindau
Board Member	Gunnar Hovsenius
Board Member	Anton Eliassen
Board Member	Anna Lundborg (adj)
Board Member	Hillevi Eriksson
Board Member	Eva Thörnelöf (adj)

Table 3 Management and secretariat.

<b>Function</b>	<b>Name</b>
Programme Director	Peringe Grennfelt
Deputy Programme Director	John Munthe
Co-ordinator Theme 1	Håkan Pleijel
Co-ordinator Theme 2	John Munthe
Co-ordinator Theme 3	Peringe Grennfelt
Co-ordinator Theme 4	Olle Westling
Steering Group Member	Göran Sundqvist
Steering Group Member	Harald Sverdrup
Steering Group Member	Hans Christen Hansson
Steering Group Member	Annika Nordin
Programme secretary	Jenny Arnell

## **5 National and international collaboration**

### **5.1 Scientific collaboration**

The scientific groups within ASTA are already well established in different European scientific networks, some of them with EU funding. ASTA will continue to make use of these networks, in particular for scientific discussions and for the formation of consensus on crucial environmental issues.

ASTA will intensify its international scientific collaboration with CLRTAP Centres and ongoing international projects. This collaboration includes in particular a close collaboration with the Centre for Integrated Assessment Modelling at IIASA, the Co-ordinating Centres for Effects on implementation of the new concepts on critical loads and levels and MSC-W on particulates. ASTA scientists also participate in several international projects directly aimed at supporting the policy development. One such project is the NEPAP network with the aim to support the CAFE programme with scientific expertise.

On the national, Swedish scale, there will be strong links between ASTA and other research activities. Collaboration with some other MISTRA programmes, such as MARE, SUFOR, SWECLIM, LUSTRA and RESE, is developed and will be further developed e.g. through an initiative to co-ordinate MISTRA-funded research activities on nitrogen. The well established collaboration with SUFOR will continue and result in model tools that in a more appropriate way may be able to support decisions on forest production and environmental policy.

The collaboration with the Swedish research programs, BHM and SNAP, will further increase the value of the research activities on particles.

## **6 Sub-programmes**

The four proposed sub-programmes were outlined in the overall programme plan for Phase II (<http://asta.ivl.se>)

## **7 Budget**

### **7.1 Budget for 2004**

The budget for 2004 is estimated to 10.100 MSEK. In addition, there will be a balance of +180 kSEK under "Reserve" from 2003. The distribution on different activities is presented in Table 4. The budget will be financed through contributions from Mistra with 9.530 MSEK and from STEM by 570 kSEK. This budget does not include Theme 4.

Tabell 4 Proposed budget for 2004

Budget ASTA 2004									
	SUM 04	UU/SLU	LU K	IVL	GU S	GU M	SLU M	ITM/LUKä	SMHI
<b>Summa per institut</b>		650	1200	4350	850	550	0	1200	280
Tema 1									
1.1 Experimentellt kväve. Slutförande lingon exp.	200	200							
1.2 Försumning									
1.2.1 Dynamiska modeller SAFE. Internationell förankring och tillämpning	300		300						
1.2.2 Dynamiska modeller MAGIC. Internationell förankring och tillämpning	400			400					
1.3 Ozon. Färdigställande effekter på skog. Förankring	400			200		200			
1.4 Partiklar	1200							1200	
1.5 Biodiv									
1.5.1 Modellutveckling	500		500						
1.5.2 Data, parametrering	200	200							
<b>Summa Tema 1</b>	<b>3200</b>								
Tema 2									
2.1 EMEP Assessment	400			400					
2.2 Cost benefit									
2.2.1 Underlag Försumning	400		200	200					
2.2.2 Underlag Ozon skog	400			200		200			
2.2.3 CBA, beräkningar	900			900					
2.3 Baselines/NTM	600			600					
<b>Summa Tema 2</b>	<b>2700</b>								
Tema 3									
3.1 Samhällsvetenskap	800				800				
3.2 Osäkerheter									
3.2.1 Kväve/ Biodiversitet	200	200							
3.2.2 Försumning	450		200	250					
3.2.3 Ozon	350			250		100			
3.2.4 Atmosfärskemi	280								280
3.3 Kommunikation									
3.3.1 Planering ASTA bok	150	50		50		50			
3.3.2 Årsrapport och websida	400			400					
3.3.3 Årsmöte	100			100					
3.3.4 Planering samhällsvet konf	50				50				
3.3.5 Saltsjöbaden 2	200			200					
3.4 Strategier	200			200					
<b>Summa Tema 3</b>	<b>3180</b>								
Reserv	320								
Adm och koordinering	700								
Total summa	10100								

## 8 Compilation of Themes and projects under ASTA – Progress report 2003 and activities during 2004

### Theme 1. Source- effect relationships, indicators and target setting

Co-ordinator: Håkan Pleijel

<b>Project 1.1: Models for assessing biodiversity changes in terrestrial ecosystems</b>
<b>Project leader:</b> Annika Nordin
<b>General Objective:</b> To develop and apply quantitative models describing the impacts of nitrogen deposition on vegetation changes in forest ecosystems.
<b>Status:</b> This area is currently under development. Currently used European models are not relevant to conditions in Sweden and the Nordic countries. Basic work on the development of new empirical concepts to describe and predict vegetation changes as a function of nitrogen deposition needs to be performed.
<b>Stakeholder:</b> WGE and CAFE
<b>Acceptance:</b> A large effort needs to be made on gaining acceptance of any new concepts for biodiversity predictions in Europe. Scientific evaluation and workshop
<b>Activities:</b> Main activities for the period 2003 to 2006 are: 1.1.1 Development of concepts for empirical and mechanistic critical loads for relevant vegetation species in forests 1.1.2 Reporting to Task Force on Modelling and Mapping meeting in May, 2003. Contribution to synthesis and national workshop in November 2003. 1.1.3 Experimental studies of lingonberry response to nitrogen deposition in nutrient-poor Boreal forests (2003-2004) 1.1.4 Experimental studies and evaluation of vegetation recovery after nitrogen load reduction (2003-2004) 1.1.5 Testing and application of critical load concept for indicator species in Boreal forests (2004)
<b>Time constrains:</b> New concepts and models need to be presented at latest in early 2004 to have an influence on the negotiations within CLRTAP and CAFE. In 2004 and 2005 the new models and concepts must be applied to different scenarios of N-deposition on National and European scales.
<b>Organisation:</b> SLU Umeå, Umeå Univ. in cooperation with LTH
<b>Co-operation:</b> Project 1.5.
<b>Main Deliverables:</b> Model concept and test results for impacts of nitrogen deposition on vegetation diversity in Boral and Nemoral ecosystems.
<b>Budget 2003:</b> 950 kSEK (SLU: 500 Umeå Univ: 450)
<b>Budget 2004:</b> 200 kSEK
<b>Activities 2003:</b> 1.1.1 Development of concepts for empirical and mechanistic critical loads for relevant vegetation species in forests. 1.1.2 Reporting to Task Force on Modelling and Mapping meeting in May, 2003. Contribution to synthesis and national workshop in November 2003. 1.1.3 Start-up of experimental studies of lingonberry response to nitrogen deposition in nutrient-poor Boreal forests 1.1.4 Experimental studies and evaluation of vegetation recovery after nitrogen load reduction
<b>Deliverables 2003:</b> D 1.1.1 Report to Task Force on Mapping and Modelling on concepts for critical load modelling including refined empirical critical load and parameterisation for mechanistic models. D 1.1.2 Contribution on empirical critical loads to national synthesis report. D 1.1.3 Scientific report(s) on experimental results.
<b>Comments to deliverables 2003:</b>

**Progress report:**

In November 2002 an expert workshop on empirical critical loads of nitrogen was held in Bern, Switzerland. Joachim Strengbom from Umeå University was appointed as rapporteur for the forest habitat working group of this meeting and thus he took part in writing the workshop proceedings published by the Swiss Agency for the Environment, Forests and Landscape (SAEFL) in 2003. This workshop proposed a revised empirical critical load for nitrogen for different habitats and also identified a number of areas that need more empirical research. In particular low dose nitrogen experiments in areas with low background nitrogen deposition are urgently needed.

In the beginning of 2003 the research groups from Umeå University and the Swedish University of Agricultural Sciences in Umeå summarized empirical data from the nitrogen experiments conducted 1995 – 2000. These data were delivered to Harald Sverdrup from Lund University to be used in the parameterisation of a mechanistic model of how nitrogen deposition impacts the biodiversity of forest ecosystems. A very productive meeting was held in Umeå March 17 to discuss the most optimal way to use the empirical data in the construction of this model.

In May Annika Nordin and Lars Ericson participated in the Task Force Meeting on Mapping and Modelling in Tartu, Estonia. We contributed a poster and an oral presentation both titled “Biodiversity and eutrophication – a mechanistic model approach”.

In June, a nitrogen experiment was set up in a *Vaccinium vitis-idaea* dominated pine forest. The experiment has a full factorial design and besides nitrogen availability, temperature and snow depth are manipulated. Hopefully this experiment will deliver results already next spring on how the different experimental manipulations will affect the interaction between *V. vitis-idaea* and a common parasite on this plant, i.e. *Eupropolella vaccini* (snowblight fungus).

During the summer, vegetation data was also collected from the long-term nitrogen experiments in the *Vaccinium myrtillus* dominated spruce forest ecosystem. In these experiments we study both the effects of low nitrogen doses and the recovery after nitrogen application has been terminated. The growing season of 2003 was characterized by a massive outbreak of *Lepidoptera* larvae that has great potential to impact the future effect of nitrogen on the vegetation. Moreover, one of the major results from the experiment was that a nitrogen dose of 6 kg N ha<sup>-1</sup> and yr<sup>-1</sup> during four years causes a doubled abundance of grass (*Deschampsia flexuosa*). During the fall experimental data will be summarized, in order to be used in the parameterisation and validation of the mechanistic model by Harald Sverdrup.

The following scientific reports have been published in international peer reviewed scientific journals in 2003:

Strengbom J, Walheim M, Näsholm T & Ericson L. 2003. Regional differences in the occurrence of understorey species reflect nitrogen deposition in Swedish forests. *Ambio* 32: 91-97.

Strengbom J, Olofsson J, Witzell J & Dahlgren J. 2003. Effects of repeated damage and fertilization on palatability of *Vaccinium myrtillus* to grey sided voles, *Clethrionomys rufocanus*. *Oikos* 103: 133-141.

Persson J, Högberg P, Ekblad A, Högberg MN, Nordgren A & Näsholm T. 2003. Nitrogen acquisition from inorganic and organic sources by boreal forest plants in the field. *Oecologia* 137: 252-257.

Persson J. & Näsholm T. 2003. Regulation of amino acid uptake by carbon and nitrogen in *Pinus sylvestris*. *Planta*: 217: 309-315.

Dahlman L, Persson J, Näsholm T. & Palmqvist K. 2003. Carbon and nitrogen distribution in the green algal lichens *Hypogymnia physodes* and *Platismatia glauca* in relation to nutrient supply. *Planta*: 217: 41-48.

Witzel J, Gref R. & Näsholm T. 2003. Plant -part specific and temporal variation in phenolic compounds of boreal bilberry (*Vaccinium myrtillus*) plants. *Biochemical Systematics and Ecology* 31: 115-127.

Doctoral thesis:

Jörgen Persson: Organic Nitrogen Uptake by Boreal Forest Plants. *Silvestria* 265. ISSN 1401-6230, ISBN 91-576-6349-1

**Activities 2004:**

During 2004 we will collect experimental data on nitrogen effects on biodiversity in three different ecosystems. These data will be reported in scientific journals and delivered to the parameterisation of the mechanistic model. The different ecosystems are the *V. myrtillus* dominated spruce forest, the *V. vitis-idaea* dominated pine forest and an ombrotrophic bog.

In February we will participate in the national nitrogen workshop in Uppsala organized by ASTA.

During the year we will also participate in finalizing the plan of the ASTA book and a special issue in *Ambio* about the ASTA program.

**Deliverables 2004:**

Report of experimental data to the parameterisation and validation of the mechanistic model on nitrogen effects on biodiversity in forest ecosystems.

Contribution to revising and refining the assessment of the national critical load of nitrogen, i.e. participating in the national nitrogen workshop and in the ASTA work on insecurity of critical load assessments.

Participation in the work with the final report of the ASTA program, i.e. in authoring a book and a special issue of *Ambio*.

Scientific reports on experimental results.

<b>Project 1.2: Dynamic models for recovery from acidification</b>
<b>Project leader:</b> Filip Moldan and Mattias Alveteg
<b>General Objective:</b> To develop and apply dynamical models for acidification/recovery of forest soils and surface waters on the European scale
<b>Status:</b> Finalisation of model concepts and links to RAINS model is expected during 2003.
<b>Stakeholder:</b> CLRTAP-WGE, CAFE and National authorities.
<b>Acceptance:</b> Dynamical models for acidification/recovery are well established in the CLRTAP community.
<b>Activities:</b> Main activities for the period 2003 to 2006 are: 1.2.1 Finalisation of dynamical model concepts including output presentations, links to RAINS and comparability with critical load concepts for soils and freshwater. (2003) 1.2.2. Finalisation and evaluation of experimental research in the Covered Catchment project. (2003) 1.2.3 Application of dynamical models to evaluate present and future recovery of soils and surface waters in selected areas in Europe. Establish bilateral co-operation with selected countries and on-going research programmes (e.g. RECOVER). Focus on recovery process and critical load defined in activity 1.2.1 and links between chemistry in soils and surface water (2003-2004) There might be needs for additional workshops in the area and ASTA may be involved as an organiser.
<b>Time constrains:</b> Activity 1.2.1 and 1.2.2 to be finished by the end of 2003. Activity 1.2.3 in 2003 and finish in 2004.
<b>Organisation:</b> Team of Mattias Alveteg, Filip Moldan, Liisa Martinsson, Veronika Kronnäs, Harald Sverdrup, John Munthe
<b>Co-operation:</b> ICP Forest, ICP Freshwaters, National Agencies, NIVA, CEH, IIASA, Univ. Virginia
<b>Main deliverable:</b> Model tools and concepts and their application for assessment of recovery times of soils and surface waters in selected parts of Europe.
<b>Budget 2003:</b> 1,3 MSEK (IVL 900, LTH 400)
<b>Budget 2004:</b> 700 kSEK (IVL 400, LTH 300)
<b>Activities 2003:</b> 1.2.1 Finalisation of dynamical model concepts including output description, links to RAINS and comparability with presently used critical load concepts for soils and freshwater. Further development of presentation techniques for the dynamical model outputs based on modelling work in ASTA phase 1. Work with multiple future scenarios. Further work towards compatibility of the DM outputs with RAINS model by calculating e.g. target load functions. 1.2.2. Finalisation and evaluation of experimental research in the Covered Catchment project. Completion of two years long follow-up monitoring of the Covered Catchment after the roof was removed in summer 2000. Evaluation of the experimental data. 1.2.3 Initiate work on application of dynamical models for recovery soil and surface waters in selected areas in Europe. Developing contacts with national research groups and programmes working on dynamic modelling of future status of soils and surface waters. Taking part in their efforts and synthesising the results.

**Deliverables 2003:**

D 1.2.1a Report from the 3rd JEG meeting in Sitges 2002

Finished, report available at:

<http://www.unece.org/env/documents/2003/eb/wg1/eb.air.wg1.2003.13.pdf>

D 1.2.1b Report on methodology for coupling of dynamical models SAFE and MAGIC to RAINS and examples.

Report: Dynamic modelling of soil and water acidification: display and presentation of results for policy purposes, Moldan, F., Beier, C., Holmberg, M., Kronnäs, V., Larssen T., Wright, R., 2003. NIVA, Oslo, REPORT SNO 4733-2003, 63 p. Report available at: [www.ivl.se/om\\_ivl/partners/nmr/rappporter/Dynamic\\_modelling.pdf](http://www.ivl.se/om_ivl/partners/nmr/rappporter/Dynamic_modelling.pdf)

D 1.2.2 Final report of Covered Catchment project: 14 years of experimental research on recovery.

Manuscript accepted for publication in WASP.

D 1.2.3 Report on modelling of European surface waters at selected sensitive areas in Europe (ASTA and RECOVER:2010 project)

Accepted for publication. A MODELLING ASSESSMENT OF ACIDIFICATION AND RECOVERY OF EUROPEAN SURFACE WATERS. A. Jenkins, L. Camarero, B.J. Cosby, R. Ferrier, M. Forsius, R. Helliwell, J. Kopacek, V. Majer, F. Moldan, M. Posch, M. Rogora, W. Schöpp, R.F. Wright, Hydrology and Earth System Science. will be out in 2003

D 1.2.4 Report on modelling of European soils at selected sensitive areas in Europe

**Comments to deliverables 2003:** Dynamic modelling tools. User interface and Target Loads calculations in SAFE

Manuscripts:

Martinson L, Alveteg M, Warfvinge P: Parameterization and evaluation of sulfate adsorption in a dynamic soil chemistry model, Env Poll 124, 119-125

Martinson L, alveteg, M, Mörth C-M, Warfvinge, P The effect of changes in natural and anthropogenic deposition on modelling recovery from acidification, Hydrology and Earth System Sciences in press

Martinson L, Alveteg M, The importance of including the pH dependence of sulfate adsorption in a dynamic soil chemistry model, submitted to Water, Air and Soil Pollution

**Progress report:** Activity 1.2.1 Concepts finalised and presented for Working group on effects (WGE) at three occasions (training sessions at Tartu and in Prague, Joint Expert Group on Dynamic Modelling (JEG) meeting in Spain), concepts accepted and included in the recent call for data issued by the CCE. Activity 1.2.2. - The monitoring and data collection done as planned, results being evaluated, one manuscript submitted, one more in preparation. In short the recovery process initiated in 1991 by constructing the roof was not markedly reversed after the roof was removed. Water quality achieved between 1991 and 2001 has deteriorated only slightly since the roof was removed. This is largely due to a combination of much lower ambient deposition now comparing to 1980 - 1990 and due to the ten years of clean precipitation treatment, which simply have allowed the catchment to recover to a certain extent. Activity 1.2.3. Work on waters undertaken in co-operation with the RECOVER:2010 project and reported in HESS (in press). ASTA co-organised the fourth meeting of JEG. Modelling 16 sites in Sweden using SAFE and MAGIC, Preparations for national assessment

**Activities 2004:**

Application of dynamic model on surface waters, calculating regional target load functions, co-operation with national focal centre towards reporting the target load functions to CCE. Organising the 5th meeting of JEG.

**Deliverables 2004:**

Reporting the regional target load functions for surface waters.

Report to WGE from the 4th JEG meeting.

PhD thesis (Liisa Martinson) containing the following papers:

1. Martinson L, Alveteg M, Warfvinge P: Parameterization and evaluation of sulfate adsorption in a dynamic soil chemistry model, Env Poll 124, 119-125
2. Martinson L, Alveteg M, Mörtz C-M, Warfvinge P The effect of changes in natural and anthropogenic deposition on modelling recovery from acidification, Hydrology and Earth System Sciences in press
3. Martinson L, Alveteg M, The importance of including the pH dependence of sulfate adsorption in a dynamic soil chemistry model, submitted to Water, Air and Soil Pollution
4. Application of SAFE to the Solling roof covered site
- 5 Modelling recovery on 16 sites in Sweden
- 6 Target Loads

**Manuscripts:**

Martinson. L, Malek, S Modeling recovery in the Istebna catchment in Southern Poland using SAFE

Langan, S, Martinson L; Application of SAFE to 10 sites in the UK

Report; Modeling 16 sites in Sweden using SAFE and MAGIC.

<b>Project 1.3 Implementing level II for ozone</b>
<b>Project leader:</b> Håkan Pleijel and Per Erik Karlsson
<b>General Objective:</b> To finalise the development of flux-response relationships for crops and forest trees and the derivation of critical levels from these To actively support the implementation of the new critical levels for ozone in the negotiations on a European level
<b>Status:</b> there will be an important workshop in Sweden November 2002 where the direction of future work will be discussed in detail (organised by ASTA); important implementation work expected in 2003-early 2004
<b>Stakeholder:</b> WGE CCE, ICP Vegetation, ICP Forests,
<b>Acceptance:</b> Level II models based on leaf/needle ozone uptake is the main candidate for a new concept in this field although several approaches are possible within the frames of this concept.
<b>Activities:</b> 1.3.1 Finalisation and scientific publication of Level II model concepts and methodologies for ozone impact on crops and forests (2003). Quantitative examination of the possible effects of open-top chamber enclosure on the dose-response relationships between ozone exposure and growth effects (2003). 1.3.2 Method validation, field validation and support to experimental work. Includes support to, and participation in, field validation activities (Karlstad University, SLU Asa (forest) and an agricultural experiment site (crops)) (2003) 1.3.3 Contribution to assessment of ozone impact and critical levels for forests on European scale for the preparation of background material for the renegotiation of the Göteborg protocol and for the café programme (2004). 1.3.4 Contribution to assessment of ozone impact and critical levels for crops on European scale for the preparation of background material for the renegotiation of the Göteborg protocol and for the café programme (2004).
<b>Time constrains:</b> Modelling tool/concept to be finished during 2003.
<b>Organisation:</b> IVL and GU
<b>Co-operation:</b> Botan, Asa, Karlstad, Finland, and certain other research groups in several European countries, which contribute data to the European scale analyses performed within ASTA for crops and forest trees
<b>Main Deliverable:</b> Ozone Level II model, including stomatal conductance models and evaluations of the open-top chamber technique, and assessments of ozone impact on crops and trees on National and European scales:
<b>Budget 2003:</b> 1,2 MSEK (IVL 700, GU M 500)
<b>Budget 2004:</b> 400 kSEK (IVL 200, GU M 200)
<b>Activities 2003:</b> - Final calibration of ozone uptake based dose-response relationships for wheat, potato, spruce and birch under Swedish conditions - Final calibration of pan-European, ozone uptake based dose-response relationships for wheat, potato and several tree species in active collaboration with scientist outside Sweden - Field validation of stomatal conductance models for spruce, birch and wheat - Analysis the effects the open-top chamber exposure technique based on existing data from the Östad field station Active contribution to the process within LRTAP by direct contacts with modellers and mappers and by visiting important meetings and workshops.
<b>Deliverables 2003:</b> D 1.3.1a Report on model concept and application for ozone impact on crops. D 1.3.1b Report on model concept and application for ozone impact on forest trees.
<b>Comments to deliverables 2003:</b> Some deliverables are about to finish and will be reported during. The Mapping Manual has been dominating the work under 2003.

**Progress report:**

The activities during late 2002 and 2003 have been strongly focussed on the process within LRTAP to generate a new generation of ozone critical levels to protect the vegetation in Europe. In fact, the activities within the ASTA programme have generated the numerical values for the new ozone critical levels for agricultural crops, for forest trees and for the short-term critical levels to protect plants from visible injury. We have contributed strongly to the new text suggested for the revised chapter 3 of the Mapping Manual within LRTAP. Finally, we have contributed strongly to the parameterisation of the stomatal simulation models used within the EMEP model to estimate the stomatal ozone flux. This has been achieved by the participation at several important meetings and workshops, all at which Håkan Pleijel and Per Erik Karlsson have given oral presentations.

Workshop/meeting	Delegates	Important decisions
CLRTAP Expert Panel Meeting. Harrogate, UK. Jun. 2002.	37 delegates, 12 countries	First application of flux-based CL is possible.
CLRTAP Workshop. Gothenburg, Nov. 2003.	95 delegates, 19 countries	First set of flux-based CL for wheat and potato
ICP Vegetation TFM Slovenien, Jan. 2003	45 delegates, 14 countries	Complementary decisions
CLRTAP Editorial Meeting, Manchester, UK. Apr. 2003	14 delegates, 5 countries	Finalizing Mapping Manual text.
ICP Modelling and Mapping TFM Estonia, May 2003	62 delegates, 22 countries	New CL into the Mapping Manual

In November 2002 ASTA organised the workshop “Establishing Ozone Critical Levels II” in Hindås, outside Göteborg, with complementary financial support from the Swedish Environmental Protection Agency and the Nordic Council of Ministers. This workshop represented the first step in establishing new ozone critical levels based on ozone flux, i.e. the ozone uptake to leaves and needles. The workshop report, with close to 400 pages, was finished during the summer 2003. In addition, Håkan Pleijel and Per Erik Karlsson are, together with Mike Ashmore and Lisa Emberson, guest editors for a special issue of Atmospheric Environment, which will contain several of the papers presented at the workshop. Finally, we have in collaboration with the Botanical Institute, Göteborg University and Karlstad University, organised field measurements of the stomatal conductance of Norway spruce, Silver birch and wheat, which will be used during the year 2004 to further evaluate the simulation models for stomatal conductance under field conditions.

**Activities 2004:**

- Validation of stomatal conductance models for spruce, birch and wheat
- Analysis of the effects the open-top chamber exposure technique based on existing data from the Östad field station
- Active contribution to the process within LRTAP by direct contacts with modellers and mappers and by visiting important meetings and workshops.
- Scientific publication of the methodology presented in Mapping Manual 2003

**Deliverables 2004:**

- D 1.3.1c Report on the effects of the open-top chamber technique
- D 1.3.2a Report on field validation of conductance model for wheat
- D 1.3.2b Report on field validation of conductance model for Norway spruce and birch (results from Karlstad University) and the Botanical Inst. GU).
- D 1.3.2c Report on field validation of ozone impact on spruce (results from SLU Asa,)
- D 1.3.1d Final report on methodology for Level II assessment of ozone damage to crop yield, including some yield quality aspects.
- D 1.3.1e Final report on methodology for Level II assessment of ozone damage to forest trees.

<b>Project 1.4 Source-receptor relationships for long range transported particles</b>
<b>Project leader:</b> Hans-Christen Hansson
<b>General Objective:</b> To establish the primary reference on particle composition and origin in background air over N Europe to support model development and health risk assessment
<b>Status:</b> Regional monitoring of particles is today limited to simple parameters (e.g. PM10). Scientific understanding and model development needs a much more detailed description of composition and its variation in time and space. ASTA has initiated and supported such measurements in background air and also encouraged collaboration between the modelling and monitoring communities in order to improve data quality and model performance.
<b>Stakeholder:</b> EU CAFE working group on particles. EMEP: TFMM, MSC-W and CCC.
<b>Acceptance:</b> Health effects from particles is a main topic for the EU CAFÉ programme and there is a large political interest for a co-ordinated European policy.
<b>Activities:</b> Measurements will go on for some time during the second phase but then most of the efforts will be concentrated to data evaluation and synthesis. 1.4.1 Continued field studies of composition of atmospheric aerosols in rural air. 1.4.2 Evaluation of data with respect to particle composition and origin. 1.4.3 Establishment of a database for further evaluation and model development/validation. 1.4.4 Participation in international expert groups on particle composition, monitoring and assessment. 1.4.5. Expert support to EMEP model development and validation.
<b>Time constrains:</b> EMEP needs to have model on particles by which source receptor relationships can be established before the autumn 2003.
<b>Organisation:</b> ITM and Lund University
<b>Co-operation:</b> Norwegian Meteorological Institute (MSC-W), Norwegian Institute for Air Research (NILU), University of Helsinki, Gothenborg University, Finnish Meteorological Institute
<b>Main Deliverable:</b> Evaluation of the module on particles in the EMEP model. PhD thesis. (Peter Tunved). Characterisation of the background aerosol over N Europe. Data set on particle size distributions, chemical composition, solubility and phenomenology of particles. PhD thesis (Adam Kristensson). Support to EMEP model development with data for development and validation.
<b>Budget 2003:</b> 1,5 MSEK
<b>Budget 2004:</b> 1,2 MSEK
<b>Activities 2003:</b> 1.4.1 Continued studies of composition and transport of particulate air pollution over Scandinavia. 1.4.2 Support to development and validation of models.
<b>Deliverables 2003:</b> D 1.4.1 Minimum three scientific papers on composition and origin of particles in Scandinavia D 1.4.2 Support to model development and validation through studies of changes in atmospheric composition during transport over Scandinavia.
<b>Comments to deliverables 2003:</b> Six papers have been produced on emission strength, formation, growth and deposition parameters. This knowledge is to a large extent already implemented in the EMEP model. Several contributions were made both to the Second Position paper on PM and the CAFE workshop discussing the paper.

**Progress report:**

The measurements have continued on the two sampling sites. The data evaluation has continued with deepened analysis on specific processes. The samples have been sorted as far as possible to isolate specific processes thus facilitating quantification of each process. These experimental results are directly employed into the modelling development. Essential lacking experimental information for the model has been identified and the work has started. Specifically the organic component influence on cloud processes and thus deposition has been investigated and a simple parameterisation has been developed.

**Activities 2004:**

The key measurements identified will be concluded during 2004 to answer specific urgent key questions on the influence of certain sources and processes. The success depends on additional funding. The implementation in the model will proceed based on the further evaluation on existing data.

**Deliverables 2004:**

Another three papers and two PhDs will be concluded during 2004 or early 2005. The implementation in the model will continue now more focusing on organic and elemental carbon.

<b>Project 1.5 Development of a dynamic model for the assessment of combined ecosystem effects</b>
<b>Project leader:</b> Harald Sverdrup
<b>General Objective:</b> To develop a customised model for the assessment of the combined ecosystem effects of regional air pollution (acidification, N deposition, particles, and ozone), climate and land use practices.
<b>Status:</b> A number of basic concepts have been suggested and tested on a research basis in Netherlands and Sweden, but no operational system is available. Parameterisation methods and data exists for some experimental plant groups, but many important types are not yet represented. Full integration of the dimensions (1) nitrogen, soil water, temperature. An existing prototype has been tested in the Netherlands, but no parameterisation is yet available for Scandinavian conditions.
<b>Stakeholder:</b> European National Focal Centres for mapping critical loads for sulphur and nitrogen under the CLRTAP UN/, WGE, CAFE, Swedish forest management research; HEUREKA, SUFOR, Swedish Agricultural University colleagues
<b>Acceptance:</b> Within the effects assessment groups within ECE and IIASA, effects modules are very much demanded. A large effort needs to be made on gaining acceptance of any new concepts for vegetation predictions in Europe among people in basic research.
<b>Activities:</b> 1.5.1 Programming of the conceptual models derived for Boreal forest species in project 1.1. Parameterisation of plant group properties and response functions based on published dose-response relationships The vegetation response package will be included into the existing FORSAFE model A regional input database will be developed and test runs on sites and subregions will be made (2003) 1.5.2 Reporting to Task Force on Modelling and Mapping meeting in May, 2003. Contribution to synthesis and national workshop in November 2003. 1.5.3 Preliminary assessment of critical loads for nitrogen using the model , using the 650 SAFE sites (2004) 1.5.4 Use of the FORSAFE-VEG model regionally in Sweden (2004) 1.5.5 Transfer of the FORSAFE-VEG model into Europe, test on ICP-Forest sites and national critical loads databases used for dynamic assessment (2004). 1.5.6 Climate and forest management scenarios (2005-2006)
<b>Time constrains:</b> New concepts and models need to be presented at latest in early 2004 to have an influence on the negotiations within CLRTAP and CAFE. In 2004 and 2005 the new models and concepts must be applied to different scenarios of N-deposition on National and European scales.
<b>Organisation:</b> Lunds Universitet Key persons; Harald Sverdrup, Annika Nordin, Han van Dobben, Wim de Vries
<b>Co-operation:</b> Project 1.1, Alterra Green World Institute Nederländerna
<b>Main Deliverables:</b> Model concept, operational model and test results for impacts of nitrogen deposition on ground vegetation aspects, diversity in European terrestrial ecosystems, where variability in climate, acidification status and forest development effects also have been considered.
<b>Budget 2003:</b> 550 kSEK LTH
<b>Budget 2004:</b> 700 kSEK (500 LTH, 200 UU/SLU)
<b>Activities 2003:</b> 1.5.1 Programming of the conceptual models derived for Boreal forest species in project 1.1. Parameterisation of plant group properties and response functions based on published dose-response relationships The vegetation response package will be included into the existing FORSAFE model A regional input database will be developed and test runs on sites and subregions will be made (2003) 1.5.2 Reporting to Task Force on Modelling and Mapping meeting in May, 2003. Contribution to synthesis and national workshop in November 2003.

<p><b>Deliverables 2003:</b>  D 1.5.1 Report to Task Force on Mapping and Modelling on mechanistic model concepts for critical load.  D 1.5.2 Contribution on mechanistic critical load models to national synthesis report .  D 1.5.3 Status report on model performance in Boreal forest ecosystems</p>
<p><b>Comments to deliverables 2003:</b>  We work according to plan</p>
<p><b>Progress report:</b>  Lower activity than planned in 2003, increased activities have been planned for 2004 instead. Done so far is:</p> <ul style="list-style-type: none"> <li>• FORSAFE <ul style="list-style-type: none"> <li>○ Adaption of tree response modules in FORSAFE. The module to emulate needle loss has been adapted, where the BC/Al function restricts root uptake capacity for Ca, Mg and K, to cooperate with effects of soil moisture degree on root capacity. Initial tests at Gårdsjön is capable of recreating needle loss levels and dynamics.</li> <li>○ FORSAFE model is near completion. Integrated model to handle acidification, nitrogen cycle and carbon cycle together in a mechanistic and integrated fashion. Can be used for mass balance based N critical loads, avoiding calibration of the result and considering feedbacks in the system. Beta-version ready.</li> </ul> </li> <li>• VEG <ul style="list-style-type: none"> <li>○ Establishment of basic model structure for the system blueberries, cranberries, grass and the blueberry parasite <i>Valdensia</i>. Initial structure programmed in STELLA system. Basic behavior can be reproduced</li> <li>○ Establishment of vegetation “model plants” which represents major plant response types (blueberry, cranberry, heather-ling, agrostis type grass, deschampsia type grass, poa type grass, herbs typical of grazed meadows, herbs typical of richer forest clearing vegetation). This in order to be able to apply to whole Sweden. Establishment of nitrogen, BC/Al and water functions.</li> <li>○ Draft for a FORTRAN routine written for VEG</li> </ul> </li> </ul>
<p><b>Activities 2004:</b></p> <ul style="list-style-type: none"> <li>• VEG <ul style="list-style-type: none"> <li>○ Finalize 12 vegetation classes. Parameterize further water stress responses, light sensitivity classes and temperature dependencies on competition strength.</li> <li>○ A testable ground vegetation model in the STELLA system. Tests at Fårahall, Gårdsjön and other localities</li> <li>○ Finalize initiation and calibration frameworks in FORSAFE</li> </ul> </li> <li>• FORSAFE  Inclusion of VEG in FORSAFE</li> </ul> <p>See further activities for 2004 under project 1.1</p>
<p><b>Deliverables 2004:</b></p> <ul style="list-style-type: none"> <li>• Prototype of VEG</li> <li>• Running version of FORSAFE</li> <li>• 3 manuscripts describing FORSAFE principles, test and use</li> <li>• Manuscript describing basic principles in VEG</li> <li>• Manuscript describing tests with VEG and possibilities for making ground vegetation based critical loads for N with consideration of pH and climatic stresses</li> </ul> <p>See further deliverables for 2004 under project 1.1</p>

## Theme 2. Realisation, costs and benefits

Co-ordinator: John Munthe

<b>Project 2.1: Realisation of international agreements and their effects on emissions, exposures and ecosystems</b>
<b>Project leader:</b> Gun Lövblad
<b>General Objective:</b> The objective is to follow-up and to evaluate the result of the earlier protocols and undertaken measures. This project also aims to support the assessment report of EMEP's monitored and modelled data.
<b>Status:</b> The outcome of control measures in order to control European air pollution emissions so far is not well studied. ASTA took a couple of years ago the initiative to an all-European assessment of the development of emissions, atmospheric concentrations and deposition over Europe during the more than 20 years' of EMEP. The initiative has now developed to a main task for the TFMM and a large number of countries are today involved in making their own assessments. The final assessment report will be available in 2004.  There is still a large lack in knowledge to what extent protocols and other international agreements have caused the emission reductions in transboundary air pollutants and to what extent there are other causes. Information on these issues is considered as important for our understanding on how other environmental forces and structural changes in the society may interact with environmental agreements exclusively directed towards transboundary air pollution.
<b>Stakeholder:</b> WGE, CAFE, EMEP, TFMM, European countries etc.
<b>Acceptance:</b> To gain acceptance for future international negotiations it is necessary to follow-up the outcome from previous agreements and to verify the data quality.
<b>Activities:</b> Main activities for the period 2003 to 2006 are: 2.1.1 Assessment work on monitored and modelled data. ASTA organises the assessment work on the 20 years time series of data provided by EMEP. The work started in 2002. 2.1.2 Evaluation the role of the international protocols on emission reductions including the relative importance of different measures, the status of the protocols as driving force and the effect of globalisation of e.g. energy markets. (2003-2005)
<b>Time constrains:</b> The assessment work will be reported 2004.
<b>Organisation:</b> IVL, GU
<b>Co-operation:</b> IIASA, EMEP
<b>Main Deliverables:</b> EMEP Assessment report to be delivered to EMEP Steering Body in September 2004.
<b>Budget 2003:</b> 400 kSEK
<b>Budget 2004:</b> 400 kSEK
<b>Activities 2003:</b> 2.1.1 Co-ordination of the EMEP Assessment Report 2.1.2 Production of preliminary texts for chapters on countries and on the situation in N Europe.
<b>Deliverables 2003:</b> D 2.1.1 Co-ordination of the work. Progress reports to EMEP Steering Body and TFMM.
<b>Comments to deliverables 2003:</b> Progress report sent to EMEP in September 2003.

**Progress report:**

The work with the European assessment will accelerate during the autumn. So far work is proceeding within a group of lead authors and contributing authors. The lead authors of the different chapters have made an outline and the work has started. In addition, a number of related research and assessment activities will be included in the final report. The main contribution is the statistical evaluation of measured data and their trends in different regions made by the Centre for Ecology and Hydrology in Edinburgh in co-operation with the University of Glasgow. This evaluation is expected to provide additional knowledge on the development of pollution over Europe and the accuracy of measured trends.

There has been a good progress for the national contributions. At present 22 parties from all “corners” of Europe are actively involved. Gaps are mainly seen in the south-eastern parts. The conclusions from the national reports are summarised in the Progress report to EMEP Steering Body. There has been a significant reduction in SO<sub>2</sub> emissions in most countries, often more than 50%. Some countries have managed to reduce their emissions even further, by 80-90% from 1980 to 2000. The favourable development is validated with monitoring data for sulphur dioxide and sulphate particles in air as well as sulphate and pH in precipitation. Almost all of the data on SO<sub>2</sub> concentrations in air indicate reductions in concentration by 50 – 90%. In addition to emission reductions, there has been a tendency of a slightly different climatic situation during the 1990s, than earlier, which most likely have added to the improvements. The importance of this factor will be evaluated in the further work. A less favourable development is seen for the nitrogen oxides emissions. In total the decrease has been around one third from 1990 to 2000. The reduction has been more pronounced in countries where large point sources contributed to the emissions, than in countries where traffic has been the main source.

**Activities 2004:**

Producing the final report, as a first draft in February, as a first version in March/April and as a printed report in September after approval by EMEP Steering Body

**Deliverables 2004:**

Final Report

<b>Project 2.2: Valuation of effects</b>
<b>Project leader:</b> Mohammed Belhaj
<b>General Objective:</b> To evaluate economic and other benefits for ecosystems etc. of additional control measures for air pollutants in relation to the control costs.
<b>Status:</b> Cost Benefit Analysis has become a more widely used tool for assessment within the environmental field, both international as well as national. Knowledge on how to value biologic diversity and how to incorporate the dynamic processes are still underdeveloped.
<b>Stakeholder:</b> WGE, WGS, CAFE and Swedish Environmental Protection Agency.
<b>Acceptance:</b> Within the EU, recommendations for standardisation of CBAs are currently underway. The Swedish EPA has carried out an investigation of CBAs as a future area of research and development in relation to environmental policy.
<b>Activities:</b> Main activities for the period 2003 to 2006 are: 2.2.1 Creation of a detailed programme plan for theme 2. Including defining scientific approach to be used in duration of ASTA Phase 2 and networking with national/international actors. (2003) 2.2.2 Improvement of the concepts of economic valuation. Evaluation of which benefits can be valued in economic terms and for which other indicators are needed. Assessment of current valuation methods for air pollution effects and refining to include dynamical aspects of effect/recovery of ecosystems. Possibilities and difficulties with benefit transfer will also be further discussed. (2003-2005) 2.2.3 Assessing costs and benefits of reduced emissions for acidification and ozone effects on crops and forests. The calculations will be based on results from ASTA phase I and Theme 1 and might include valuation studies (2003-2006). 2.2.4 Take part in a workshop on "Costs and benefits of the implementation of abatement strategies against transboundary air pollution". (2005)
<b>Time constrains:</b> Results from this project have to be presented mainly during 2005 to have an influence on the review of the protocols within CAFE and CLRTAP.
<b>Organisation:</b> IVL, GU, LU
<b>Co-operation:</b> IIASA, Swedish Environmental Protection Agency
<b>Main Deliverables:</b> <ul style="list-style-type: none"> <li>• Reports on improvements of the concepts of economic valuation of the environment.</li> <li>• CBA for acidification and the recovery of the environment.</li> <li>• CBA for ozone effects on crops and forests.</li> <li>• Conclusions from the Workshop on CBA.</li> </ul>
<b>Budget 2003:</b> 1 MSEK (IVL 950, GU 50 kSEK)
<b>Budget 2004:</b> 1.7 MSEK (IVL 1300, GU M 200, LU K 200 kSEK)
<b>Activities 2003:</b> 2.2.1 The first task for 2003 is to create a well working network for theme 2, both national and international, which will include a new environmental economist. The scientific approach that will be used under ASTA phase II will be formulated within this network and a detailed plan will be presented. 2.2.2 The work on how to improve the concept of economic valuation will start during 2003. A project dealing with how to value different effects in monetary terms will carried out and the work with how to take into account dynamic effects in CBA will start.
<b>Deliverables 2003:</b> D 2.2.1 A deepened programme plan for theme 2. D 2.2.2a Report on which effects that can be valued in monetary terms and ought to be included in the CBAs. D 2.2.2b Journal paper on how to include the dynamic process in CBA.
<b>Comments to deliverables 2003:</b> D 2.1.1 has been completed. D2.2.2a and D2.2.2b will be completed in 2004.  During 2003, an assessment of the costs of ozone damage on crops has been carried out. This study will be completed and reported in early 2004.

**Progress report:**

The first activity of this project was to develop a plan for the work in this area. This was completed in spring 2003. After this, the work on assessment of ozone damage to crops was started. The work has been carried out in 2 basic steps where the first one consisted of a detailed case study for Östad and the second extrapolation to national level. (based on Östad and EMEP data). The Östad case study was based on the very detailed measurements of ozone concentrations and meteorological parameters which are required for a detailed assessment of damages (dependant on uptake and AOT). The scaling up to national requires a certain degree of simplification mainly due to lack of data (ozone, meteorology, agricultural statistics etc) on a sufficiently detailed level. For this reason, several different methods have been applied and will be reported.

Some preliminary planning of the valuation work for ozone damage to trees and ecosystem damage by acidification has also been made.

**Activities 2004:**

2.2.1 Complete the ozone damage study for crops.

2.2.2 Prepare report on which effects of transboundary air pollution can be assessed in monetary terms. This report will consist of a brief review of relevant damages and how they can be quantified and possibly described in monetary terms.

2.2.3 Assess the costs of ozone damage to trees. This will be done by coupling dose-response relationships to production-oriented models. The main task here are to quantify the reduced growth in Sweden and to assess the economic impact of a reduced growth - i.e. how the market would react to increased/decreased production.

2.2.4 Assess the costs of acidification impacts on ecosystems. Here we will analyse the economical impacts or restoration (liming of lakes and forest soils), reduced fish populations etc. We will also analyse how the dynamical aspects of recovery will affect the valuation.

**Deliverables 2004:**

D2.2.1 Completion of ozone damage study.

- Scientific paper on ozone effects on crop loss in south Sweden
- Contribution to the development of models for ozone induced crop loss applicable on a European scale

D2.2.2 Report on which effects can be valued in monetary terms.

D2.2.2b Review of quantitative assessment of the ozone impact on forests

D2.2.3 Assessment of costs of ozone damage to trees.

D2.2.4 Completion of report on which ecosystem damages can be quantified in monetary terms.

<b>Project 2.3: Scenarios and non-technical measures</b>
<b>Project leader:</b> John Munthe
<b>General Objective:</b> To support the validation process of the baseline scenarios used in CAFE and CLRTAP, using non-technical measures as a starting point.
<b>Status:</b> The choice of baseline scenario is likely to become critical for future environmental strategies including air pollution, and all countries in the Convention are requested to give feedback and input to the scenarios created at IIASA. The use of non-technical measures in the baseline scenarios and in the cost curves has become more important due to their importance for the climate change as well as for other air pollutants.
<b>Stakeholder:</b> WGS, CAFE, TFIAM, Swedish EPA
<b>Acceptance:</b> Validation of the baseline scenarios are essential for the credibility of their use. The use of non-technical measures in the scenarios or in the cost curves are slowly becoming accepted also for reduction of transboundary air pollution.
<b>Activities:</b> Main activities for the period 2003 to 2006 are: 2.3.1 Assessments of the scenarios used on the international arena and support to the validation of the baseline scenarios. (2003-2004) 2.3.2 Valuation of non-technical measures and increase the use of non-technical measures in international negotiations. (2003-2005)
<b>Time constrains:</b> Input to the scenarios created at IIASA has to be provided during 2003-2004 and the validation of their proposed scenarios need to be carried out during 2004.
<b>Organisation:</b> IVL, Swedish EPA
<b>Co-operation:</b> IIASA
<b>Main Deliverables:</b> <ul style="list-style-type: none"> <li>• Report on consequences of the choice of baseline scenarios.</li> <li>• Report on possible measures to be included in the international scenarios or cost curves.</li> </ul>
<b>Budget 2003:</b> 700 kSEK
<b>Budget 2004:</b> 600 kSEK
<b>Activities 2003:</b> 2.3.1 Initial work on assessment of baseline scenarios. IIASA will create the baseline scenarios during 2003. The support to the validation process of these scenarios will start as soon as they have been sent out to the countries in the Convention. Evaluate possibilities and methods for including non-technical measures. 2.3.2 Initial work on valuation of non-technical measures. ASTA will participate in the workshop in Vienna in January 2003 that will deal with this question. Overview of non-technical measures and available cost estimates will be performed.
<b>Deliverables 2003:</b> D 2.3.1 Paper on possible non-technical measures to be included in the international scenarios or cost curves.
<b>Comments to deliverables 2003:</b> The progress of this work has been reduced due to maternity leave and the deliverables for 2003 have not been fully completed. Delays are also partly due to late deliverables expected from other involved parties such as IIASA. In the mean while, a case study of already implemented NTMs in the Gothenburg region has been added as a step towards the final assessment of NTM at national level.
<b>Progress report:</b> A report on possible non-technical measures in different sectors has been compiled from literature surveys. This report and further discussions with IIASA, IER and others have been used to set priorities for the continued work. The analysis of non-technical measures carried out here will focus in a first stage on the transport sector and will be extended to other sectors as much as possible. The work with the national calculations will be preceded by a pilot case study at regional level, namely the Gothenburg region. Attention is constantly paid regarding the possibility of integrating the NTM cost calculations into the REKOLuft database.

**Activities 2004:**

During 2004 we will complete an assessment of non-technical measures in the transport sector. The first step will be a case study of the Gothenburg area which will be based on results of already implemented non-technical transport measures in the region. These results will then be used as reference for the national scale study. The results will also be used to derive input to the international work e.g. carried out at IIASA.

**Deliverables 2004:**

D2.3.1 Report on NTMs in the transport sector. Case study for Gothenburg

D2.3.2 Report on NTMs. Assessment at national level.

D2.3.3 Recommendations for inclusion of NTMs for the transport sector in international applications.

### Theme 3. Uncertainties, transparency and communication

Co-ordinator: Peringe Grennfelt

<b>Project 3.1: Scientific credibility in a complex society</b>
<b>Project leader:</b> Göran Sundqvist
<b>General Objective:</b> To evaluate the influence of uncertainties and scientific credibility on the process of international agreements on emission control
<b>Status:</b> During the first phase, knowledge has been created on science-policy relation in the development of LRTAP Convention up to today. In the second phase attention is devoted to the future revision of the Gothenburg protocol and EU directives for transboundary air pollution.
<b>Stakeholder:</b> The scientific community involved in the LRTAP work
<b>Acceptance:</b> Knowledge on how science interacts with policy is still underdeveloped. With the introduction of new concepts and models in the international regulation it is of great importance to gain knowledge on how science and policy interact, communicate and influence each other. Stakeholders have demanded an assessment of uncertainties in the revision of the Gothenburg protocol and the NEC directive. EU is requiring more transparency in the work of expertise in order to increase the credibility of expert knowledge. A close collaboration between the social science and the natural science expertises in ASTA may facilitate further interactions between science and policy in CLRTAP and CAFE communities.
<b>Activities:</b> 3.1.1 Evaluation on how uncertainties are managed and utilised by different stakeholders in the policy process (2003). In 2004 results from this activity will be developed in a study together with project 3.2 on the possible connections between the policy actors' view on uncertainties and how scientists calculate uncertainties in source effects relationship (Harald Sverdrup, Lars Lindau). 3.1.2 A study on how scientific experts try to establish the concept of recovery in the IAM work and in the policy process (to be developed together with project 1.2 – IVL, LU) (2003-2004). 3.1.3 A study of the social process of standardisation and negotiation (within CLRTAP/EMEP and EU/CAFE) related to long-distance transport of particles and their health impacts (2003-2004). Links to project 1.4 and 1.5 and activity 3.3.5 (HC Hansson). 3.1.4 A study on how to integrate scientific and public assessment in environmental regulation in which LRTAP constitutes a case (co-operation with Örebro University and Lancaster University). 3.1.5 The development of a new classification model on the science-policy interface in the LRTAP field (co-operation with IVL)
<b>Time constrains:</b> The knowledge gained is important for the work in introducing new concept and models in the preparation for the negotiations within LRTAP and CAFE.
<b>Organisation:</b> Göteborg University (Göran Sundqvist, Rolf Lidskog, Martin Letell), IVL Peringe Grennfelt
<b>Cooperation:</b> Lancaster University (Centre for the Study of Environmental Change), Örebro University (Centre for Urban Research/Centre for Man-Technology-Environment),
<b>Main Deliverables:</b> Letell, Martin (2004) <i>On the Limits of Negotiation? Health, Particles and Transboundary Air Pollution</i> (diss.) Sundqvist, Göran & Lidskog, Rolf (2005) <i>Scientific Knowledge, International Politics and National Implementations: The case of transboundary air pollution</i> (monograph) Papers in international scientific journals
<b>Budget 2003:</b> 1 050 kSEK
<b>Budget 2004:</b> 800 kSEK
<b>Activities 2003:</b> (See deliverables for 2003)

**Deliverables 2003:**

D 3.1.1 A report on the management of uncertainties in the policy process of LRTAP report from project 3.1.1)

D 3.1.2 A paper on the work to establish the concept recovery in the IAM work (report from project 3.1.2)

Sundqvist, G. (2003) "Recovery in the Acid Rain Story: Transparency and Credibility in Science-Based Environmental Regulation". *Journal of Environmental Policy & Planning* 5: 57-79.

D 3.1.4 A paper on the condition for integrating stakeholders in environmental regulation (report from project 3.1.4)

Lidskog, Rolf (2003) "Internationell miljöpolitik och ekologisk modernisering. Exemplet långväga luftföroreningar", forthcoming in Boström, Magnus & Sandstedt, Eva (red.) *Är vi på rätt väg?* Stockholm: Formas förlag.

Lidskog, Rolf (2003) "Making science matters. The acid rain case", forthcoming in *European Spatial Research and Policy*.

Sundqvist, G. "Medborgaren och den demokratiserade expertisen. Fallet långväga luftföroreningar". Paper to be submitted (January 2004) to a Swedish social science journal.

D 3.1.5 A paper on the development of a new classification model on the science-policy interface in the LRTAP field (final report from project 3.1.5)

Lidskog, R., Sundqvist, G. "From Consensus to Credibility: New Challenges for Policy-Relevant Science". Paper submitted to *Innovation: The European Journal of Social Sciences*.

Grennfelt, P, Sundqvist G. Paper on the interplay between science and policy in regulation of transboundary air pollution, to be submitted Feb-March 2004.

**Comments to deliverables 2003:**

More deliverables than expected from projects 3.1.4 and 3.1.5 and less from project 3.1.1.

**Progress report:**

During the year 2003 we have focused mostly on the intertwined issue of democratised expertise and stakeholders' involvement. Today, this is considered a crucial issue on the European policy agenda. In the projects, we have studied the ongoing activities in this field, generally and in connection to the air policy agenda. Examples: the EU white paper on Governance, the LRTAP communication strategy, The CAFE programme's focus on dissemination, transparency and stakeholder involvement, the EEA indicator activities. Our focus is on the communication between experts and stakeholders (not least citizens). A stakeholder typology has been constructed from these studies, based on the different expectations that experts have on stakeholder contributions to knowledge enrichment, policy-making and implementation.

In activity 3.1.3 interviews with some key European actors have been conducted. A few international CLRTAP and EC meetings have also been attended and observed. In parallel, the sociological analysis of the review processes within the Convention and the Commission has evolved. The analysis focuses on processes of stabilisation/destabilisation of the socio-technical networks that sustains the association between air-borne particulates and adverse health effects. Included in this analysis are various power mechanisms. The main deliverable from this project, a dissertation, is expected in late 2004.

In Spring 2003, we started to plan an international workshop: *New conditions for environmental regulation*. The workshop is organised by Lidskog, financed by the Swedish Research Council and will be hosted by the Centre for the study of environmental change (CESEC), Lancaster University. The background for the workshop is the growing interest to investigate the integration of scientific knowledge and public perceptions in the decision-making process.

What has been changed during 2003 is that project 3.1.1 has been given less efforts than planned. This is based on an assessment that communication and stakeholder involvement is a more important issue than uncertainties, and a field where we could make more important contributions. However, the uncertainty issue is of importance when studying communication between groups of actors. Uncertainties are often considered and managed in communication, and different views on uncertainties and their importance are involved. The uncertainty issue has therefore been subordinated to the issue of communication between experts and stakeholders.

**Activities 2004:**

Activities 3.1.3, 3.1.4 and 3.1.5 will continue also in the year 2004. The activity 3.1.1. is included as a part of these activities. In activity 3.1.3 participatory observations and interviews will continue during 2004. Through participation in a five-week modelling course, at Lund Tekniska Högskola, a linkage to the modelling activities (Harald Sverdrup) in ASTA is created.

The workshop *New conditions for environmental regulation*, Lancaster University, will take place in April 2004 and include participants from the Centre for the study of environmental change (CESEC), Lancaster University; Centre for the analysis of risk and regulation (CARR), London School of Economics; Stockholm Centre for Organizational Research (SCORE), Stockholm University; Man-Technology-Environment Research Centre (MTM), Örebro University; Science and Technology Studies, Göteborg University; and some other international researchers.

The workshop *Democratised science-based abatement strategies* (see 3.3.3) will during 2004 be planned in close co-operation to projects 3.1.4 and 3.1.5.

**Deliverables 2004:**

D 3.1.3 Letell, M. *On the Limits of Negotiation? Health, Particles and Transboundary Air Pollution* (monograph, diss.)

D 3.1.4 Lidskog, R., Pleijel, H. "Making policy by measuring nature. Representing and regulating ground level ozone", to be submitted to an international journal, Spring 2004.

D 3.1.5 Sundqvist, G., Letell, M. "Strategic Experts and Missing Citizens: Democratised expertise as a challenge for European air policy". Invited paper to Acta Sociological Special Issue on "Politics and expertise".

D 3.1.5 A paper on Democratised science-based abatement strategies (a background paper to the planned workshop).

<b>Project 3.2 Uncertainties in source effects relationships</b>
<b>Project leader:</b> Peringe Grennfelt (Mattias Alveteg, Filip Moldan, Veronika Kronnäs, Joakim Lagner, HC Hansson, Erik Swietlicki, Olle Westling)
<b>General Objective:</b> To evaluate the uncertainties in key models of importance in international agreements on emission control
<b>Status:</b> The need for assessing uncertainties in source-effect data is large. Any form of assessment of uncertainty needs to be based on scientific data. Uncertainty assessments will be needed in connection with the development of abatement scenarios.
<b>Stakeholder:</b> TFIAM, WGSR, WGE, EMEP, Industry, NGOs,
<b>Acceptance:</b> Policymakers and stakeholders have requested that uncertainties should be assessed in connection with the revisions of the Göteborg Protocol and the NEC directive.
<b>Activities:</b> 3.2.1 Uncertainties in measured and modelled deposition values in Europe. Data from ICP Forest sites will be used together with EMEP monitoring data to assess the uncertainties in output from the EMEP 50x50 km model. (2003) 3.2.2 Determining model uncertainties in predictions of recovery from acidification with dynamic models MAGIC and SAFE and their influence on control strategies. Focus will be on uncertainties related to model input data and parameterisation of main processes in model (2003-2004). Furthermore, impacts of future scenarios of e.g. climate change will be investigated. 3.2.3 Uncertainties in source-receptor relationships for particles due to model formulation and input data (2003-2004) 3.2.4 Support to EMEP MSC-West - Assessment of uncertainties in Eulerian model. The MATCH model will be run by SMHI and model output from MATCH and the EMEP Eulerian model will be compared with measured concentrations and fluxes. The results will be used to assess uncertainties of the EMEP model and to suggest further improvements.
<b>Time constraints:</b> Data need to be available in 2004 (CAFE) or 2005 (CLRTAP)
<b>Organisation:</b> The work will be carried out by IVL, SMHI, LU Chemical Technology, SLU MA.
<b>Co-operation:</b> IIASA, CCE and MSC-W
<b>Main Deliverables:</b> An assessment of the uncertainty of models describing recovery of acidified soils and freshwaters, atmospheric deposition of pollutants, source-receptor relationships for and formation of particles.
<b>Budget 2003:</b> 1,280 MSEK (LTH 250, IVL 500; SLU MA 250; SMHI 280)
<b>Budget 2004:</b> 1,280 MSEK (UU/SLU 200, LTH 200, IVL 500, GU M 100, SMHI 280)
<b>Activities 2003:</b> Evaluation of deposition data from the ICP Forest Level II network. Model runs on source receptor relationships with the MATCH model. Model runs on uncertainties in recovery.
<b>Deliverables 2003:</b> D 3.2.1 Assessment of uncertainties in EMEP model deposition. <i>Report Nov. 2003. Oral presentation at the TFMM workshop 3-5 Nov. 2003.</i> D 3.2.2 Preliminary assessment of uncertainties in dynamical models of recovery of soils and surface waters. <i>Presentations were made at the annual meeting and at the meeting with the Expert Group on Dynamic modelling at Sitges in November.</i> D 3.2.3 Status report on uncertainty of source-receptor relationships for particles. D 3.2.4 Status report on MATCH/EMEP model assessment work. <i>Project results were presented at the TFMM workshop in Oslo 3-5 Nov. 2003.</i>
<b>Comments to deliverables 2003:</b> D 3.2.2 Part of this activity got a slightly different approach since the actual scientist was accepted as a summer student at IIASA. Her studies at IIASA were mainly directed towards the possibility to go into finer scales (20*20 km instead of 50*50km, sector-specific emissions and sector-specific abatement strategies) when applying IAM. The results will give insight into the scale problem and those uncertainties associated with grid sizes and also an assessment if treating the sectors separately potentially results in more cost-effective abatement strategies.

**Progress report:**

D 3.2.1: An intercomparison between the data from the forest plots and the EMEP model showed very good agreement confirming a good performance of the EMEP model. The intercomparison was an important contribution to the evaluation of the EMEP model since the data had never been used for these purposes before.

D 3.2.2 Researcher from ASTA has during a 3 month stay at IIASA acquired knowledge on how the RAINS model is used, what is the present form of the model and what is the planned development of the model. Work was initiated towards National (Swedish) version of RAINS model. Such version aim at optimising the emission reductions which Sweden is already committed (reduction per country in total) to achieve in such manner that these emission reductions will be most beneficial for Sweden. Geographically distributed emission data from SMED were used. These were for each pollutant divided into 7 sectors (industrial, agricultural, from transportation etc) Maps were constructed.

D 3.2.4 Intercomparisons between the EMEP model, the MATCH model and monitored data showed that good performance of the models. For oxidised N data from the EMEP model showed a slightly longer transport distance for N than what was indicated from monitored data and the MATCH model.

**Activities 2004:**

Model runs on source receptor relationships with the MATCH model. Model runs on uncertainties in recovery. Studies on the uncertainties in PM concentration estimates and its importance for control strategies.

Quantitative evaluation of uncertainties in response relationships due to experimental conditions and the importance of ozone exposure thresholds in exposure indices.

Quantitative evaluation of the importance of landscape variation in ozone dose.

**Deliverables 2004:**

D 3.2.2. Publication on uncertainties in dynamic modelling

D 3.2.3. Assessment of how data insufficiencies should be handled in control strategies.

D 3.2.4. Publication on the results from the calculations with the MATCH model.

- scientific manuscript on landscape variation in ozone exposure  
evaluation of the importance of thresholds in dose-response relationships

<b>Project 3.3 Communication</b>
<b>Project leader:</b> Peringe Grennfelt
<b>General Objective:</b> Ensure a customer-oriented and timely communication between ASTA and policy-relevant bodies and communities under CLRTAP, EU and other international organisations.
<b>Status:</b> The success of ASTA in terms of policy support depends strongly on the ability to customise and deliver the scientific material on time. Much of the material of importance for IAM must be delivered during 2003 or the first half of 2004 and there is a need that new concepts, manuals and data are available in time. There is also a continued need for material even after that material should have delivered for IAM and strategy development purposes.  ASTA has a strong interaction with the various bodies under CLRTAP and may be able to meet most requirements. Problems may however occur with respect to the data on effects of N deposition.  The decreased interest in transboundary air pollution in Europe may cause problems at negotiations. Other problems may be considered more important. Communication may therefore have the capacity to be visible in the general noise.
<b>Stakeholder:</b> All bodies under CLRTAP, EU organisations, industrial organisations, NGOs, Politicians
<b>Acceptance:</b> Many stakeholders, policy makers and the general public do not consider transboundary air pollution as a remaining environmental problem.
<b>Activities:</b> 3.3.1 Establish a communication strategy and platform with the aim to ensure a simple and cost-efficient communication between ASTA and policy-related bodies. An Intranet will be established where all information on meetings and deliverables will be available. Short reports from meetings will also be displayed on the Intranet. 3.3.2 Workshop: A second overall strategy workshop will be held in 2004. It will be a follow-up of the workshop in Saltsjöbaden 2000 and all bodies involved in the process will be invited as well central scientists and stakeholders. The objective is to set the scene for negotiations and to identify areas of common understanding as well as areas where there still are uncertainties and/or different opinions. 3.3.3 Workshop: "Democratised science-based abatement strategies" 2005. 3.3.4 Annual reports and ASTA website. ASTA is requested to produce yearly reports. 3.3.5 Participation in the preparation of CAFE Position paper on particles. Organisation of a Workshop on the position paper in June 2003. CAFE WG PM. 3.3.6 Book describing environmental effects of air pollutants and how these have been dealt with in international agreements on emission control. Science and policy discussions. The book should be considered as a final report and a testimony of ASTA. 3.3.7 Other activities which will identified by the ASTA board.
<b>Time constrains:</b> The schedule and deadlines for deliveries are very tight and definite and material not available on time may be without consideration in the further process.
<b>Organisation:</b> IVL and to some extent all the participants in the programme
<b>Co-operation:</b> The Mistra secretariat, Swedish Environmental Protection Agency, UNECE secretariat, Nordic Council of Ministers, EU CAFE etc.
<b>Main Deliverables:</b> Yearly reports.. Workshops and workshop reports. <i>Expert meeting on Dynamic modelling in Sitges. Report not available yet. Report from workshop on base cation deposition in Göteborg. Will be delivered in the beginning of the next year.</i> Dissemination strategies and customised communications with policymakers, stakeholders and the public.
<b>Budget 2003:</b> 800 kSEK IVL, GU S, ITM
<b>Budget 2004:</b> 900 kSEK (UU/SLU 50, IVL 750, GU S 50, GU M 50)

<p><b>Activities 2003:</b></p> <p>3.3.1 Establish communication unit</p> <p>3.3.2 Initial planning of Saltsjöbaden Workshop</p> <p>3.3.4 Annual reports and ASTA website</p> <p>3.3.5 Workshop on CAFÉ position paper on particles</p> <p>3.3.6 National expert meeting on nitrogen - vegetation issues</p> <p>3.3.7 ASTA annual meeting</p> <p>3.3.8 Workshop on base cation deposition</p>
<p><b>Deliverables 2003:</b></p> <p>D 3.3.1 Updated ASTA website including relations to international activities. <i>Done.</i></p> <p>D 3.3.2 Asta annual report <i>Printed in English and Swedish</i></p> <p>D 3.3.3 Report from workshop on CAFE position paper on particles. <i>The workshop was held in October 2003. The results are at present available on ITM's website. A link from ASTA will be established.</i></p> <p>D 3.3.4 Report from national expert meeting in nitrogen. <i>To be held in February 2004.</i></p> <p>D 3.3.5 Report from ASTA annual meeting. <i>Available on ASTA web site.</i></p> <p>D 3.3.6 Report from workshop on base cation deposition <i>Conclusions available on ASTA web site.</i></p>
<p><b>Comments to deliverables 2003:</b></p> <p>The workshop N is moved to February 2004, due to problems to assemble those interested in the problem during 2003.</p> <p>ASTA is organising a workshop together with CLRTAP and NMR on the deposition of base cations in November 2003.</p> <p>Several presentations of ASTA's research programme were given; TFIAM May 2003; TFMM, April 2003; Swedish Environmental Protection Agency, May 2003, Department of Environment October 2003.</p>
<p><b>Progress report:</b></p> <p>The yearly report had as a theme the link between science and policy and contained a number of aspects on that theme.</p>
<p><b>Activities 2004:</b></p> <p>The increased speed in the production of material for policy during 2004, may urge for a strong focus on communication of results and discussions with stakeholders and responsible organisations.</p> <p>The yearly report for 2003 will contain a presentation of the most important results from the research within ASTA with the ambition to strengthen the scientific credibility. -</p> <p>A special issue of a scientific journal on results from ASTA:s research is planned for spring 2005. Manuscripts will be prepared during 2004.</p> <p>The Saltsjöbaden 2 workshop will be a main event for the ASTA programme.</p>
<p><b>Deliverables 2004:</b></p> <p>D 3.3.1 Updated ASTA website including relations to international activities.</p> <p>D 3.3.4 Report from national expert meeting in nitrogen. Originally scheduled for 2003.</p> <p>D 3.3.6 Asta annual report for 2003.</p> <p>D 3.3.7 Report from ASTA annual meeting 2004.</p> <p>D 3.3.6 Background material and workshop report for Saltsjöbaden 2.</p> <p>D 3.3.7 Manuscripts for a special issue on transboundary air pollution.</p>

<b>Project 3.4 Overall development and evaluation of regional air pollution strategies</b>
<b>Project leader:</b> Peringe Grennfelt
<b>Objective:</b> Support the overall scientific work on strategies for regional air pollution.
<b>Status:</b> The upcoming strategies will contain several improvements in all compartment models and databases. There is a need to closely follow and evaluate the new concepts and models in terms of their scientific basis as well as in their ability to give results that are in accordance with the overall expectations. This activity aims to take a global view on all aspects of importance for the IAM strategies.
<b>Stakeholder:</b> CLRTAP, EU CAFE, National experts, Industry, Scientific community TFIAM
<b>Acceptance:</b> The acceptance of the chosen concepts and model approaches will very much depend on evaluations and assessments (E&A) of IAM compartments as well as the overall IAM. This project aim to support the E&A process.
<b>Activities:</b> 3.4.1 Examination of the overall approaches in the IAM for CAFE and CLRTAP. If necessary putting forward proposals for improvements. Participation in the work within TFIAM. 3.4.2 Specific evaluations of the outcome of different IAM calculations
<b>Time constrains:</b> Main activity in 2004 and 2005
<b>Organisation:</b> IVL
<b>Co-operation:</b> IIASA, NEPAP network
<b>Main Deliverables:</b> Assessment report on the concepts used Final report on how new concepts have changed objectives and outcomes of regional air pollution strategies.
<b>Budget 2003:</b> 200 kSEK IVL
<b>Budget 2004:</b> 200 kSEK IVL
<b>Activities 2003:</b> To be decided together with the ASTA board.
<b>Deliverables 2003:</b> Depends on the progress of the IAM work. Probably only a status report.
<b>Comments to deliverables 2003:</b>
<b>Progress report:</b> The development of the air pollution strategy has been followed and ASTA has participated actively in a number of meetings: <ul style="list-style-type: none"> <li>- TFIAM in May 2003, where the ASTA phase 2 was presented.</li> <li>- Evaluation of the new EMEP model in November 2003</li> <li>- Participation in CAFE working group on Target Setting and Policy Assessment sept 2003 and a presentation on "Underlying Science for Critical Loads and Levels – Significant Harmful Effects"</li> </ul> <p>With a basis in ASTA and the EU project NEPAP, a tender was submitted to DG Environment and the consortium will receive a contract for the evaluation. Results and experiences from the ASTA program will be of crucial importance for the evaluation.</p> <p>An initiative has been taken together with the Mistra secretariat on the possibility of linking N-related programmes in Mistra (there are 8 programmes) into joint activities. A workshop was held in May and a preliminary report was prepared. The idea is to prepare an assessment for 2020 based on scenarios and assumed control measures.</p> <p>The expected changes in the air pollution agenda during the coming years will be highlighted in a paper that is under preparation with Oystein Hov and Peringe Grennfelt as authors. The paper will be prepared within the framework of ASTA and NEPAP.</p>

**Activities 2004:**

The year will be very intense in relation to the preparation of policy material. ASTA will follow this process through participation in meetings and through examination of scientific and technical material. There will be several activities that will link to this project which are already financed such as: The evaluation of the RAINS model; The Saltsjöbaden 2 meeting; The NEPAP project

Another activity that engages ASTA is the Acid Rain 2005 Conference in Prague. ASTA participates in the organisation committee.

**Deliverables 2004:**

Manuscript on transboundary air pollution in past and future.  
Presentations and support to policy development.

## Theme 4 Support to national strategies

Co-ordinator: Olle Westling

<b>Project 4.1: Natural acidification only</b>
<b>Project leader:</b> Olle Westling
<b>General Objective:</b> To develop methods and tools for assessment of acidification of soils and surface water with different scenarios for deposition and forest management, including harvest of forest fuels (slash removal).
<b>Main Deliverables:</b> <ul style="list-style-type: none"><li>• Tools for scenario analysis of acidification of forest soils.</li><li>• Regional study of acidification and recovery with different scenarios for forest management.</li><li>• Support to following up the objective “Natural acidification only”.</li></ul>
<b>Progress report:</b> <p>The first versions of tools for national and regional assessment of acidification and recovery are in operation based on: critical load for acidity and mass balance of base cations in managed forest soils with high resolution (5*5 km) and dynamic modelling of forest plots with MAGIC and SAFE.</p> <p>A regional study of critical load with high resolution was conducted in the county of Halland.</p> <p>The project has supported the evaluation of the national environmental objective with extensive information.</p>
<b>Activities 2004:</b> <p>Synthesis of the acidification effect on forest soils of forest management (harvest) based on experiments and model calculations in ASTA. The aim is to improve the dynamic modelling in managed forests.</p> <p>Model calculations of effects of ash fertilisation on acidification and recovery of forest soils with whole tree harvest.</p> <p>Regional study with high resolution of acidification and critical load with different scenarios for forest management, whole country.</p>
<b>Deliverables 2004:</b> <p>See above (activities). Publishing of two scientific papers on steady state, one on calculations with high resolution and one on dynamic modelling of soils in managed forests.</p>

<b>Project 4.2: No eutrophication</b>
<b>Project leader:</b> Cecilia Akselsson
<b>General Objective:</b> With the use of scenarios assess the impact of different intensity in forestry on the future risk of accumulation and increased leaching of nitrogen from forest soils in Sweden.
<b>Main Deliverables:</b> <ul style="list-style-type: none"><li>• Tools for scenario analysis of the cycling of nitrogen in forest soils.</li><li>• Regional study of accumulation and leaching with different scenarios for forest management.</li><li>• Support to following up the objective “No eutrophication”.</li></ul>

<p><b>Progress report:</b>  A scenario (deposition and harvest scenarios) tool for calculation of mass balance of nitrogen in Sweden with high resolution (5*5 km) is developed.</p> <p>A first regional study of accumulation and leaching with different scenarios for forest management is conducted.</p> <p>The project has supported the evaluation of the national environmental objective with extensive information.</p>
<p><b>Activities 2004:</b>  Dynamic modelling of nitrogen in managed forests by application of FORSAFE on forest plots in different regions in Sweden.</p>
<p><b>Deliverables 2004:</b>  Progress report on dynamic modelling. Publishing of two scientific papers on accumulation and leaching of nitrogen from forest soils.</p>

<p><b>Project 4.3. Limited influence on climate</b></p>
<p><b>Project leader:</b> Olle Westling</p>
<p><b>General Objective:</b> Estimation of carbon sequestration, with scenarios describing different nitrogen deposition and forest management, based on the calculations of nitrogen accumulation in forest soils in Sweden.</p>
<p><b>Main Deliverables:</b></p> <ul style="list-style-type: none"> <li>• A regional study of carbon sequestration with different nitrogen deposition and forest management.</li> </ul>
<p><b>Progress report:</b>  A regional study of carbon sequestration with different nitrogen deposition and forest management with two different methods is conducted in co-operation with CNER and BITÖK.</p>
<p><b>Activities 2004:</b>  Publishing of two scientific papers</p>
<p><b>Deliverables 2004:</b>  Se above (activities)</p>

<p><b>Project 4.4. Clean air</b></p>
<p><b>Project leader:</b> Per-Erik Karlsson/ Olle Westling</p>
<p><b>General Objective:</b> Support to i) calculations of the contribution from combustion of biofuels to the emissions of particles to air in Sweden. ii) apply new methods to calculate growth reductions of crops and trees in Sweden, caused by surface ozone.</p>
<p><b>Main Deliverables:</b></p> <ul style="list-style-type: none"> <li>• Support to a national mapping of emissions of particles to air from combustion of biofuels.</li> <li>• Support to a national mapping of growth reductions of crops and trees in Sweden, caused by surface ozone.</li> </ul>
<p><b>Comments to deliverables 2003:</b>  Support to a national mapping of emissions of particles to air from combustion of biofuels was not conducted.</p>

<b>Progress report:</b> Data from the land use database developed in T4 was used as support to a national mapping of growth reductions of crops and trees in Sweden, caused by surface ozone.
<b>Activities 2004:</b> No planned activities
<b>Deliverables 2004:</b> No planned deliverables

<b>Project 4.5: Tools and databases</b>
<b>Project leader:</b> Cecilia Akselsson/ Olle Westling
<b>General Objective:</b> Support to the different activities of Theme 4 in developing tools and databases for regional model calculations and scenario activities.
<b>Main Deliverables:</b> <ul style="list-style-type: none"> <li>• A user-friendly tool for regional mass balance calculations of nutrients in forest soils.</li> <li>• Tools for identifying the need for compensatory fertilisation after whole tree harvest.</li> <li>• National database with land use and complementary data.</li> </ul> Data on weathering with high resolution in Sweden.
<b>Progress report:</b> The work during 2003 comprises all main deliverables above. A national data base with land use, tools for regional mass balance calculations and a new mapping of weathering rates with high resolution is now in use in the projects of T4.
<b>Activities 2004:</b> Further work on tool for regional mass balance calculations New additions to the data base, especially leakage of base cations from forest soils in Sweden.
<b>Deliverables 2004:</b> Se above (activities)

<b>Project 4.6. Communication of results</b>
<b>Project leader:</b> Olle Westling
<b>General Objective:</b> Communication with stakeholders to identify relevant case-studies and scenarios. Dissemination of results as a basis for strategic decisions in different sectors and following up of environmental objectives and targets.
<b>Main Deliverables:</b> <ul style="list-style-type: none"> <li>• Seminars/workshops with stakeholders.</li> <li>• Special reports and evaluations initiated by stakeholders.</li> <li>• Scientific papers and a doctoral thesis, "Interactions between Air Pollution and Forest Management – Tools for Regional Assessment and Predictions of Acidification and Eutrophication Effects".</li> </ul>
<b>Progress report:</b> The main communication during 2003 was support to the evaluation of the national environmental objectives. Special reports were produced to the National Board of Forestry about forest liming and fertilisation.
<b>Activities 2004:</b> Special reports and evaluations initiated by stakeholders
<b>Deliverables 2004:</b> Scientific papers and a doctoral thesis, "Interactions between Air Pollution and Forest Management – Tools for Regional Assessment and Predictions of Acidification and Eutrophication Effects".

## 9 Abbreviations

ASTA	International and National <u>A</u> batement <u>S</u> trategies for <u>T</u> ransboundary <u>A</u> ir Pollution
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CAFE	Clean Air For Europe (EU)
CCE	Coordination Centre For Effects (CLRTAP)
WGE	Working Group on Effects (CLRTAP)
WGS	Working Group on Strategies
EGAc	Expert Group on Acidification (CLRTAP)
ICP	Integrated Cooperative Program. Vegetation, Crops, Forests etc (CLRTAP)
TFMM	Task Force on Measurements and Modelling (CLRTAP)
MSC-W	Meteorological Synthesising Centre West (CLRTAP)
EMEP	Cooperative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe (CLRTAP)
CCC	Chemical Coordination Centre (CLRTAP)
TFIAM	Task Force on Integrated Assessment Modelling (CLRTAP)
CIAM	Centre for Integrated Assessment Modelling (CLRTAP)
JRC	Joint Research Centre (EU)
IAM	Integrated Assessment Modelling
EEA	European Environmental Agency (EU)
RESE	Remote Sensing for the Environment (Mistra)
LUSTRA	Land Use Strategies for Reducing Greenhouse Gas Emissions (Mistra)
SUFOR	Sustainable Forestry In Southern Sweden (Mistra)
UN ECE NEG-TAP	United Nations Economic Commission for Europe National Expert Group on Transboundary Air Pollution: Acidification, Eutrophication and Ground-Level Ozone in the UK
IIASA	International Institute for Systems Analysis
FIMCI	Forest Intensive Monitoring Coordinating Institute (EU)
HEUREKA	(Mistra)
NGOs	Non-Governmental Organisations