

ANNEX 5

SUMMARY REPORT OF THE IMPACT TASK MEETINGS

10-13 November 1992; 9-13 October, 1994

Research Center for Eco Environmental Sciences
Beijing China.

by

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1. Background

The RAINS-ASIA project aims at the establishment of a national and regional policy analysis model for acid rain in Asia. The Regional Acidification, INformation and Simulation (RAINS) model for Asia enables the assessment of a variety of sulfur emission reductions schemes by investigating (1) energy demand and related SO₂ emissions, (2) atmospheric transport and deposition of SO₂, and (3) effects on vegetation-soil types. Three sub-projects, i.e. energy and emissions (ENEM), atmospheric transport (ATMOS) and environmental effects (IMPACT) are preparing the submodules of RAINS-ASIA.

The first phase of the RAINS-ASIA project, which is financed by the World Bank and the Asian Development Bank (ADB), has started in mid 1992. Evaluations of existing research material on acidification in Asia were made in yearly workshops organized at the Asian Institute of Technology (AIT) in Bangkok since 1989. These workshops established contacts between Asian and European institutes active in the field of energy and environmental sciences. These contacts are increasingly being strengthened by the organization of a network of Asian institutes.

For each of the three subprojects a network is built consisting of a Coordination Center (CC) and National Focal Centers (NFC). The tasks of the NFC's include verification, validation and improvement of the results obtained from a RAINS-ASIA submodule. The tasks of the CC is to help improve communication with and among NFC's about scientific methods and data and to help produce generalized Asian geographical representations of module results.

The Research Center for Eco-Environmental Sciences (RCEES) has been appointed Coordination Center for Effects in Asia. In collaboration with the National Institute of Public Health and Environmental Protection (RIVM) a second RAINS-ASIA impact meeting has been organized by RCEES in Beijing (China) from 9 to 13 October 1994. The first RAINS-Asia impact meeting was held from 10 to 13 November 1992. The last meeting gathered European and Asian scientists, most of whom also attended the first impact meeting. The major aim of both meetings was to involve Asian scientists with the development of the critical load methodology, establish contacts between effect oriented scientists of Asian countries and review results of the impact module, i.e. critical load maps and critical load distributions. The focus of the first impact meeting is summarized below:

- a. Provide guidelines and criteria for the identification of (potential) National Focal Centers: National Focal Centers could include (i) centers with knowledge of ecosystem or soil sensitivity to pollutants in general and to acid pollution in particular (ii) geological survey centers (iii) environmental research institutes. Most importantly should potential institutes be willing and able to organize a local network of scientists specialized in areas which are relevant to environmental impact assessments. Such areas include meteorology, biology, hydrology, environmental chemistry, and others involved in the investigation of the pathway of (acid) pollutants from their sources through the environment.
- b. Agree on methodologies for the estimation and assessment of the sensitivity of ecosystems in Asia and Asian countries: The sensitivity of Asian ecosystems to acid pollution can be established using quantitative and semi-quantitative methods. Quantitative methods apply mathematical models (e.g Steady State Mass Balance; MAGIC; PROFILE etc.) and other methods (Method of Relative Sensitivity) for the computation of critical loads and assessment of ecosystem sensitivity. A critical load is interpreted as the value of deposition below which no damage (i.e. changes of the chemical balance) will occur to a soil-ecosystem combination.
- c. Provide insight in available data: An overview of currently available data to be used in both methods is presented to allow for preliminary evaluation
- d. Establish a plan of action for the current and further work: A workplan is made For (i) the incorporation of the involvement of NFC's in the project, (ii) dissemination of geographical maps of background data, maps of preliminary critical loads and sensitivity (iii) identification of NFCs, and (iv) a second IMPACT meeting.

The objectives of the first meeting were met to a satisfactory extent. An active involvement of National Focal Centers should be improved for example by the installation of Geographical Information Systems at the NFC sites.

The objectives of the second impact meeting were chosen to be a logical follow up of the goal of the first meeting.

2. Objectives of the second impact meeting

Objectives of the second RAINS ASIA impact meeting included:

1. A scientific discussion about the importance and relevance of environmental effects in general and indirect and direct effects in particular: Attention was given to the potential risk of exceeding a critical load for an extensive period of time in comparison to the immediate risk of having too high air concentrations of SO₂ (i.e. exceeding critical levels). It was the general opinion that current damage found in China was most probably related to exceeding air concentrations. The need was expressed to include critical levels for vegetation and crops in future work of a potential second phase of the project. It was recognized that damage that is currently found due to concentration excess can be considered an early warning for the more important, because irreversible, damage which may occur due to critical load excess.
2. A detailed review by Asian specialists of the current RAINS-ASIA IMPACT results:

- Geographical displays and a data diskette of the results of the RAINS-ASIA impact work were sent to participants for their review before mid August 1994. The results were found to be in accordance with current expectations of the distribution of sensitive areas and ecosystems. However, it was stressed that future work would have to include funded participation of national scientists to verify the results in the field.
3. Demonstration and training of the RAINS-ASIA model: A full day was dedicated to enable scientists of becoming familiar with the RAINS-Asia model. The session consisted of a demonstration given by IIASA followed by hands on participation of the workshop attendants. The demonstration and use of the model was welcomed with great enthusiasm. It lead to discussions between participants of the causes of excess of critical loads and increased awareness of the importance of long range transport of SO₂.
 4. An inventory of the future work that country participants expect to undertake and the funding requirements.: In view of future work a call was made for research program requirements which National Focal Centers could take on in the future support of RAINS Asia impact work. Proposals were requested in writing and in relation to continuation of the project. Until now only Vietnam has responded (December 1994). All countries will be prompted for a follow up as soon as the future of the project becomes more transparent.

3. Overview of presentations and the critical load methodology at the second meeting.

The opening of the meeting included an overview of the objectives of the RAINS-Asia impact module and its results. These results were made available to the participants in advance in the form of maps and a data diskette. GIS software was used on the spot to allow insight in background data used to compute critical loads. Special attention was drawn to the regional distribution of sensitive areas in relation to the actual vegetation. With respect to the assumptions behind the critical load computation a presentation was given about the relationship between the base cation to aluminum ratio and growth reduction.

Following these general presentations the floor was given to national presentations.

Zhao, Xiong and Yang (China) presented the importance of air concentrations for damage assessment. It was concluded that the inclusion of critical levels in addition to critical loads should be an important focus of the RAINS-Asia impact module follow up. The Chinese presentation also included a comparison of different methods for the computation of critical loads and the temporal analysis of base cation to aluminum ratios as function of deposition scenarios. The Chinese paper is included as Annex 4 to the final report.

Shindo (Japan) presented, for a region in Japan, the results of a comparison between different mathematical formulations of critical load models which have been developed, mainly in Europe, over the past decade. A choice was made for one model which was expected to be best applicable in Japan (see Annex 3). It was concluded that the current RAINS-Asia impact model reflected the requirements for Japan.

Ahmad (Bangla Desh) showed results of recent investigations into the importance of humic acid to root systems. It was carefully suggested that the indirect effect of acidity could become a cause of concern for future yields.

Gian (Vietnam) stressed the importance of large point sources for the excess of environmental quality thresholds. Emphasis was given to the exorbitant air concentrations of

SO₂ which exceed WHO air quality guidelines by far. The conclusion was that further investigation of the importance of effects due to air concentrations (direct effects) was required in addition to the current emphasis on indirect effect. It was obvious that concern for human health exceeds the importance of environmental thresholds. It was pointed out that the need for application of appropriate abatement techniques is stepped up as far as current resources in Vietnam allow.

Kahn (Pakistan) presented a literature overview of the importance of direct effects in general for different pollutants. The conclusion was that a pollutant such as ozone may prove to be of great additional importance in explaining the causes of currently identified damage to i.e. crops in Asia. The conclusions were supported by other scientists at the workshop.

4. Conclusion

The main conclusions of the workshop, as described above, can be summarized as follows:

- a. There is need to extent the application of critical loads (sustainable threshold above which indirect environmental effects occur) with critical levels (sustainable threshold above which direct effects may occur).
- b. There are indications that currently found damage to vegetation (e.g. crops in China; a picture was shown) is due to direct effects which are related to episodic peaks of air concentrations of SO₂.
- c. There was consensus over the hypothesis that episodic damage due to exceeding air concentrations should be considered an early warning for the potential risk of soil chemical changes (indirect effects) due to the excess of critical loads in the long run.
- d. The current maps of critical loads as included in the RAINS-Asia module are state of the art. Further improvement by national contributions based on carefully designed field work should be included as an aim for future continuation of the project.
- e. The RAINS-Asia model was generally concluded to be an excellent tool to enhance scientific collaboration on Long Range Transboundary causes of current changes of environmental quality. The hands on training proved to be an excellent mechanism to stimulate discussions on air pollution and critical loads.
- f. The need was expressed for National Focal Centers to become more acquainted with Geographic Information Systems (GIS). The installation of GIS soft and hard ware at NFC-sites would improve the exchange of information (i.e. maps) with respect to environmental effects in Asia.
- g. Participants were requested to formulate a proposal for further NFC involvement in a future RAINS-Asia continuation.