

REPORT : WORKSHOP ON ATMOSPHERIC DEPOSITION

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Background

A Workshop on 'Atmospheric Deposition' (acid deposition) was held on 9 July 1986 in Pretoria under the auspices of the National Programme for Weather, Climate and Atmospheric Research (NPWCAR) as a follow-up to the Seminar on air pollution related research in the Eastern Transvaal Highveld (ETH) held in 1985.¹ Its primary objective was to assess the current state of knowledge regarding atmospheric deposition and its impacts in particular in the ETH and neighbouring regions. Approximately 50 delegates representing government departments, industries, control authorities and various research organisations were invited to participate in this Workshop. Papers were presented on various aspects such as the methodology for sampling and analysing atmospheric deposition, measurements of deposited chemical substances and assessment of environmental impacts. The proceedings were concluded with an open discussion session led by a panel consisting of Dr D van As (Atomic Energy Corporation), Dr N Boegman (N Boegman (Pty) Ltd), Mr E Braune (Hydrological Research Institute, Department of Water Affairs), Prof A H P Engelbrecht (Rand Afrikaans University), Dr D F Toerien (National Institute for Water Research, CSIR) and Prof T M van Rooyen (University of South Africa).

This report gives a brief account of the progress made with collaboration between the participating organizations, highlights the main findings and significance thereof and also reflects the essence of the views presented during the open discussion session at the abovementioned Workshop.

PROGRESS WITH COLLABORATION

Notable progress has been made towards achieving a closer collaboration between the various participating organizations. It was, for example, encouraging to note that guidelines for the sampling and analysis of atmospheric deposition have been drawn up jointly by the CSIR, ESCOM and the Hydrological Research Institute and that these were accepted by the Workshop.

In addition, arrangements have been made concerning intercalibration of the analytical equipment of the abovementioned organizations which will be co-ordinated by the Atmospheric Sciences Division, CSIR.

Finally, an agreement was reached which will allow a ready exchange of data between the major participants.

MONITORING, OCCURRENCE AND PREDICTION OF ACID DEPOSITION

Indications of acid deposition have been found in the ETH, the Sabie/Nelspruit forestry plantations and the Kruger National Park. However, it was cautioned that the present set of data was rather limited and that more extensive observations should be made. Furthermore, a very careful interpretation of available data which takes into account the local climatology is needed, whereas the extent to

which manmade and natural pollution sources, respectively contribute to the relatively low pH values recorded for rainfall over the ETH also requires to be established. In order to meet the latter requirement rainfall analysis should not be confined to measurement of pH, but also involve determination of the main ion constituents.

It was considered important that rainfall is collected on an event basis and that collection of composite samples be avoided as this could introduce interferences and hence lead to conflicting results. A suggestion was made that consideration should also be given to the use of sequential sampling during rainfall events because this approach should allow the gaining of insight into the atmospheric chemical processes over the ETH.

The present acid deposition monitoring network does unfortunately not account for the actual total (i.e. wet and dry) deposition. Wet and bulk deposition respectively are measured directly whereas dry deposition is in some cases determined indirectly (i.e. as the difference between bulk and wet deposition) which is not sufficiently accurate. Although it was recognised that dry deposition is a difficult parameter to measure quantitatively, it was felt that it should be addressed since there is good reason to believe that it plays an important role in the removal of acidic substances from the atmosphere under the dry and stable climatological conditions prevailing in the ETH.

There appears to be a strong case for geographically expanding the existing acid deposition monitoring network in order, firstly, to establish the actual extent of acid deposition in the ETH and neighbouring regions and secondly, to include suitable 'background' areas, i.e. the Kalahari Gemsbok Park and the Karoo National Park where realistic baseline (reference) data can be obtained to aid the detection of any trends in atmospheric deposition. Moreover, additional monitoring stations should be established in the Kruger National Park as well as in the forestry plantations of the Eastern Transvaal which, from an environmental point of view, can be regarded as the more sensitive regions.

Finally, it was quite clear from the discussions that local expertise on modelling is not anywhere near the prediction of either long range transport or deposition of pollution in the ETH. Clearly, this seems to be an aspect which requires serious attention in future.

IMPACTS OF ACID DEPOSITION

No definite impacts of acid deposition have as yet been detected in the ETH and neighbouring regions. However, it needs to be stressed that impact related studies in these regions have been carried out for only relatively short periods. These studies entail impacts on human health, agricultural crops under simulated field conditions, exotic forests, biotic and chemical components in water streams and materials. Bearing in mind the experience in overseas countries as well as local conditions, it is expected that the effects on aquatic ecosystems, forests and soils in the ETH

1) Louw C W, Report : Seminar on mesoclimate air pollution related research in the Eastern Transvaal Highveld. The Clean Air Journal, 6, 4-6 (November 1985).

and neighbouring regions will be subtle and are most likely to show up only over long time periods. Consequently, it was suggested that the present studies should be continued in the long-term. In addition, there seems to be justification for using biomonitoring methods employing lichens to supplement the current chemical measurements and impact related studies. With regard to soils, it was pointed out that even at the highest levels of acid deposition the acidification effects in the ETH would be insignificant over at least the short to medium-term and virtually impossible to detect in the presence of much greater causes of soil acidification such as natural decaying of vegetation, ploughing, cultivation, fertilising and cropping. However, in view of possible effects that might show up only in the long-term a plea was made for implementing an appropriate baseline monitoring programme for the pH of soils in the ETH.

CONCLUSION

The ETH and neighbouring regions such as the Kruger Nation-

al Park and the forestry plantations along the escarpment should be regarded as being potentially sensitive to acid deposition in view of the relatively large pollution emissions as well as the unfavourable atmospheric conditions for the dispersion of pollution which prevail over these regions. Consequently it was deemed imperative that the present monitoring of acid deposition as well as its impacts should be continued in the long-term to allow the building up of a solid data base which would be needed for future decision making purposes.

A considerable amount of data related to atmospheric deposition situation in the ETH and to enable the development of appropriate environmental impact scenarios as well as the analysis of cost-benefit ratios relevant to control measures. A Workshop has been proposed and is currently being planned for the second half of 1987 to address this need. It is envisaged that as an outcome of this Workshop, a state-of-knowledge report will be prepared and made available to policymakers, control authorities, industries, researchers as well as other interested organizations and persons.