

The Fifth Session of the Working Group  
on Future Development of EANET  
12-14 September 2007, Pathumthani, Thailand

## **PRIORITY PROJECTS FOR SUBMISSION TO POTENTIAL FUNDING AGENCIES**

### **Introduction**

1. At the Fourth Session of the Working Group on Future Development of EANET (WGFD4) held in Pathumthani, Thailand in June 2007, a Draft Set of Procedures to be followed by EANET in the preparation of proposals for potential donors was presented by the Secretariat.
2. The Network Center (NC) presented a preliminary list of project proposals for discussion and review by the Session. The NC also presented a draft format to be used for submission of project proposals from participating countries for consideration of the Working Group on Future Development of EANET (WGFD) and endorsement by the National Focal Points (NFPs) in accordance to the decision of the Eighth Session of the Intergovernmental Meeting (IG8). It was agreed that the format will be used in the preparation of concept papers/proposals.

### **Priority Projects Identified**

3. Based on the common interest of the participating countries and according to the priorities identified by the Strategy on EANET Development (2006-2010), the following four projects were selected as priority projects at WGFD4:
  - i. Establishment of new monitoring sites to improve the capability for EANET monitoring in the participating countries
  - ii. Capacity Building Workshop for the Policy Makers of the Participating Countries of EANET
  - iii. Investigation on potential effects of acid deposition and oxidants/ozone on ecosystem including agriculture
  - iv. Pilot project on emission inventories for interested participating countries
4. WGFD4 decided that concept papers on the above four projects will be developed for submission to the NFPs for their endorsement. Member countries were invited to contribute additional input for the development of the concept papers in order that their interests are considered in the development of the proposals. China provided inputs to three of the projects while Indonesia submitted two new proposals.

5. Based on the discussions during WGFD4 and the comments/inputs received by the NC after the Session, the NC developed the four draft concept papers in Annex 1 for initial review and discussions at the Fifth Session of the Working Group on Future Development of EANET (WGFD5). In accordance to the Draft Set of Procedures to be followed by EANET in Preparation of Proposal for Potential Donors and the decision of IG8, the concept papers shall be sent to the NFPs for their endorsement after WGFD5.
6. The list of new project proposals submitted by participating countries of EANET is attached as Annex 2 for consideration of WGFD5.

### **Meeting with Potential Funding Agencies**

7. It was agreed at WGFD4 that the Secretariat in cooperation with NC will approach the following potential donor agencies for support to the priority projects identified:
  - Asian Development Bank (ADB)
  - Global Environment Facility (GEF)
  - United Nations Development Programme (UNDP)
  - Japan International Cooperation Agency (JICA)
  - Korean International Cooperation Agency (KOICA)
  - Swedish International Development Agency (SIDA)
  - United Nations Economic Commission for Europe (UNECE)
  - Other relevant international, regional agencies
8. Following the endorsement of the concept papers by the NFPs, the Secretariat will communicate with potential agencies on the projects and make arrangements for face-to-face meetings with some of the agencies/donors.

**Annex 1**

**Establishment of new monitoring sites to improve the capability for EANET monitoring in the participating countries – Concept Paper**

Title of Project	Establishment of new monitoring sites to improve the capability for EANET monitoring in the participating countries
Objectives	<ul style="list-style-type: none"> <li>i. To complete the necessary monitoring parameters as required by EANET, in some monitoring sites</li> <li>ii. To carry out monitoring of inland aquatic environment and soil and vegetation in some current EANET monitoring sites</li> <li>iii. To establish new monitoring sites for wet and dry deposition monitoring, inland aquatic environment monitoring and soil and forest vegetation monitoring to improve the density and spatial distribution of sites in the EANET region</li> </ul>
Background Information	<p>Six years have passed since the start of regular phase of EANET, but some monitoring data on parameters stated in the Technical Manuals of EANET, which are important for the assessment of acid deposition are still unavailable at some monitoring sites. In particular, dry deposition flux could not be estimated due to the lack of air concentration parameters from the network. In addition, parameters such as <math>\text{PO}_4^{3-}</math>, <math>\text{NO}_2^-</math>, <math>\text{HCO}_3^-</math> ions and organic acids in wet deposition, and COD, transparency, water colour in the case of samples from lakes and streams, etc. are not measured at some sites. Some of the unanalyzed parameters are important to achieve ion balance while others are necessary to characterize precipitation.</p> <p>The monitoring of ground level ozone is included as one of the mandatory parameters for dry deposition (air concentration) monitoring. However, as of 2007, only 4 countries are monitoring this parameter. Data on ozone and its precursors are required to assess the regional photochemical oxidant problem which can cause serious impacts on human health and vegetation including agricultural crops.</p> <p>Results of inland aquatic environment monitoring and soil/vegetation monitoring are indispensable to assess the adverse impacts of acid deposition on terrestrial and aquatic ecosystems. The number of wet deposition sites in EANET has reached 50 in 2007, but the number of air concentration monitoring sites is only 38 and the number of soil and vegetation monitoring sites and inland aquatic environment monitoring sites are still limited. As of 2006, only 8 countries carry out both soil and vegetation monitoring, and 8 countries carried out inland aquatic environment monitoring.</p> <p>Considering the vast area of the EANET region, current data and</p>

	<p>information from limited monitoring sites are not enough to assess the state of acid deposition in East Asia. It is necessary to increase the number of monitoring sites in order to achieve a better understanding of acid deposition in East Asia. There are still areas in some country where monitoring data is lacking for regional assessment of atmospheric acidification and its impacts on the ecosystem. The additional data acquired will also be useful for national studies that can help to improve overall environmental management by the national authorities.</p> <p>Some EANET countries, particularly the developing countries, do not have sufficient human and financial resources to establish new monitoring sites or to add new parameters to the current monitoring activities carried out in the existing EANET sites. Funding is required to acquire the monitoring equipment as well as laboratory equipment and supplies to carry out chemical analysis. For some monitoring parameters, the use of less expensive equipment such as passive samplers instead of automatic instruments can be considered. EANET can provide training for the personnel and will assist in the installation of the equipment provided by donor countries.</p>
Scope of Activities	<ol style="list-style-type: none"> <li>i. To identify the important sites in the EANET network which lack the mandatory parameters to complete the measurement program recommended by EANET due to lack of national resources</li> <li>ii. To give necessary support, such as equipments, technical guidance or training to complete monitoring parameters required by EANET in those monitoring sites</li> <li>iii. To give technical training to the national staff on the monitoring procedures where necessary, such as inland aquatic environment monitoring and soil and vegetation monitoring</li> <li>iv. To draft the plan of establishing new monitoring sites in EANET region</li> <li>v. To establish new sites in several countries by providing some basic equipment. The use of less expensive methods such as filter pack method and passive samplers will be considered.</li> <li>vi. To train the local staff of new sites and provide the necessary technical support to operate the sites.</li> </ol>
Cost Estimate	<ol style="list-style-type: none"> <li>i. To complete the monitoring program at existing sites: USD 20,000 per site x 12 sites = USD 240,000</li> <li>ii. Establishment of new sites:</li> </ol>

	<p>USD 50,000 per site x 10 sites = USD 500,000</p> <p>(Training of staff and other technical assistance are included in the estimates)</p>
Timeframe/Schedule	<p>The project will be implemented over a three year period from 2008 to 2010.</p>
Output	<p>All necessary monitoring parameters required by EANET are monitored.</p> <p>More inland aquatic environment monitoring sites and soil and vegetation monitoring sites are involved in EANET</p> <p>More monitoring sites are included in EANET</p>
Proposed Funding Source	<p>UNEP, ADB, JICA, SIDA and other donor agencies</p>
Date of endorsement by NFP	

**Capacity building workshops for policy makers of the participating countries of EANET –  
Concept Paper**

Title of Project	Capacity building workshops for Policy Makers of the participating countries of EANET
Objectives	<ul style="list-style-type: none"> <li>i. To enhance the capacity of officials, those involved in the policy making process and experts in order to contribute to the process of discussion necessary for future development of the Acid Deposition Monitoring Network of East Asia (EANET) by providing them with the relevant and necessary knowledge on acid deposition and related regional air pollution issues</li> <li>ii. To improve the awareness of policy makers of participating countries on the adverse impacts on the environment caused by acid deposition and related regional air pollution</li> <li>iii. To strengthen the regional cooperation by providing the policy makers with the good practices and knowledge on other international policies and regulations related to acid deposition and related regional air pollution</li> </ul>
Background Information	<p>With the common efforts of the Secretariat, the Network Centre and the participating countries, EANET has made considerable progress in enhancing the capacity of the participating countries.</p> <p>However, it was recognized that most of the EANET members are developing countries, and their personnel have insufficient experiences and capabilities to take part in relevant activities of EANET. Such lack of capacity may also cause difficulties for the further development of EANET</p> <p>Up to now, EANET has implemented a set of training activities for the capacity building among the participating countries on acid deposition monitoring including sampling procedures and laboratory analysis. However, the training activities for the other staff members who are not involved in the laboratory work but take part in the EANET meetings and policy making are still insufficient. This is one of the main challenges that need to be resolved so as to further develop EANET. Capacity building in this field is an urgent matter for this purpose.</p>
Scope of Activities	<p>The activities of the capacity building workshops are as follows:</p> <ul style="list-style-type: none"> <li>i. To develop various course modules for the workshops based on the needs of the participating countries.</li> </ul> <p>According to the experiences of training courses that EANET has implemented, it is important to establish one main subject area for enhancing capacity in each workshop, which will facilitate</p>

	<p>participating countries to choose different officers or experts to take part in the capacity building workshop. This training mode will improve the training efficiency. Due to the current EANET situation, the following workshops are the priority areas:</p> <ul style="list-style-type: none"> <li>• Workshop for improving the negotiation skill for participating countries</li> <li>• Workshop for introducing the damage on materials, agriculture and others caused by acid deposition and related regional air pollution</li> <li>• Workshop for introducing and communicating the related laws and regulations on acid deposition including the viewpoints of environmental economics, and related regional air pollution management to participating countries and international practices</li> <li>• Workshop for introducing the Best Available Technology (BAT) of acid deposition control which may include the related monitoring technology and data management and data analysis technology.</li> </ul> <p>ii. To implement the workshop.</p> <ul style="list-style-type: none"> <li>• The selected experienced trainers will prepare training materials (documents and presentation materials). Considering the importance of this course, the assistance of the Secretariat and NC as well as relevant experts in this field is expected for the preparation of the training materials</li> <li>• The Secretariat, NC and relevant experts will jointly carry out the workshop</li> <li>• Potential lecturers from within or outside the EANET region will be identified and invited to provide lectures to enhance the capacity of the participating countries on selected subjects/topics</li> </ul> <p>iii. To evaluate the training workshop. A questionnaire will be designed to evaluate each training workshop after the completion of the training, which will enable the workshop organizers to improve on the organization and quality of the lectures in the workshops and better plan for future projects.</p>										
Cost Estimate	<p>Assuming that 2 participants will be invited from each of the 13 participating countries of EANET and one workshop will be held in a year in a EANET country, the cost for implementing the project on capacity building workshops is estimated as follows:</p> <table data-bbox="598 1771 1340 1944"> <tr> <td>i. Air fare for participants</td> <td>USD 40,000</td> </tr> <tr> <td>ii. Accommodation</td> <td>USD 20,000</td> </tr> <tr> <td>iii. Per diem</td> <td>USD 10,000</td> </tr> <tr> <td>iv. Workshop facilities</td> <td>USD 5,000</td> </tr> <tr> <td>v. Honorarium for external lecturers</td> <td>USD 5,000</td> </tr> </table> <p>Total cost : USD 80,000 per year</p>	i. Air fare for participants	USD 40,000	ii. Accommodation	USD 20,000	iii. Per diem	USD 10,000	iv. Workshop facilities	USD 5,000	v. Honorarium for external lecturers	USD 5,000
i. Air fare for participants	USD 40,000										
ii. Accommodation	USD 20,000										
iii. Per diem	USD 10,000										
iv. Workshop facilities	USD 5,000										
v. Honorarium for external lecturers	USD 5,000										

Timeframe	A total of four workshops will be held, one in each year from 2009 – 2012
Output	<p>The project is expected to produce:</p> <ul style="list-style-type: none"> <li>i) Improved skills in negotiations at international/regional environmental among EANET countries.</li> <li>ii) Improved understanding of the harmful effects of acid deposition and related air pollution on materials, agriculture, and ecosystems.</li> <li>iii) Better understanding of the laws and regulations related to acid deposition with the viewpoints of environmental economics, and other related regional air pollution for environmental management in participating countries and international practices</li> <li>iv) Improved understanding of BAT of acid deposition control among the EANET countries</li> </ul>
Proposed Funding Source	UNEP, ADB and other international funding agencies
Endorsement by NFPs	

**Investigation on potential effects of acid deposition and oxidants/ozone on ecosystem including agriculture – Concept Paper**

<b>Title of Project</b>	Investigation on potential effects of acid deposition and oxidants/ozone on ecosystems including agriculture
<b>Purpose/Objectives</b>	<ul style="list-style-type: none"> <li>i. To obtain scientific knowledge on potential effects of acid deposition and oxidants including ozone on ecosystems</li> <li>ii. To provide basic information on new techniques/approaches for the future EANET monitoring methodologies</li> <li>iii. To develop recommendations for risk assessment on ecosystems including agriculture based on modeling approaches</li> </ul>
<b>Background Information</b>	<p>Baseline data on the East Asian ecosystems are accumulated in the basic survey for soil, vegetation and inland aquatic environments according to the current EANET Technical Manual. The data and phenomena monitored may be informative for discussion on the current status of each component in ecosystems. However, it may be difficult to evaluate potential effects of acid deposition and oxidants quantitatively and precisely by this basic survey. More comprehensive surveys on ecosystems or detailed investigations on each mechanism/function may be necessary for the purposes.</p> <p>As for potential effects of acid deposition, current situations on acidification of soil and inland water have not been enough clarified. Especially for water quality of streams in high mountainous area, their current situations as well as seasonal changes should be investigated, while lakes/ponds have been focused on in the EANET monitoring so far. Moreover, quantitative evaluation of sensitivities of soil or inland water should be considered by using simulation modeling of ecosystems.</p> <p>As for potential effects of oxidants including ozone, the direct exposure should be focused on. Measurement of ozone concentrations in forest area or agricultural field as well as observation of ozone injury symptoms on plant leaves should be considered to clarify the current situation on the potential effects.</p> <p>The above two topics, namely, long-term acidification and direct exposure to oxidants, may be investigated independently for a while, although total evaluation of multi-pollutant effects on ecosystems should also be evaluated in the future.</p>
<b>Scope/Activities</b>	This project will include the following three activities: two activities on acidification and one activity on ozone.

	<p>i) Intensive survey on stream water in high mountainous area</p> <p>Measurement of stream waters in high mountainous area will be promoted in several countries by their voluntary contribution. At least ten to twenty unpolluted streams will be surveyed in the respective countries, and in total, preferably, hundreds data in the region will be collected. The water will be collected to clarify base-flow quality at least once or twice a year. The pH, alkalinity (as acid neutralizing capacity), and nitrate concentrations should be focused on. Especially, the nitrate concentration in stream waters may be informative to discuss the current situation of ecosystems in context of “nitrogen saturation” under high nitrogen (<math>\text{NO}_3^-</math> and <math>\text{NH}_4^+</math>) depositions.</p> <p>ii) Campaign of ozone passive sampling in forest area and agricultural field</p> <p>Measurement of ozone concentrations using passive samplers will be promoted in several countries by their voluntary contribution. The campaign will continue for several months in the plant-growing period or cultivating period of agricultural fields. Several representative points for forest area and agricultural field will be selected in the respective countries. Observation of ozone visible injury will also be applied in case high concentrations of ozone will be recorded.</p> <p>iii) Consideration on simulation modeling on acidification of soil and inland water</p> <p>Information on simulation modeling in the East Asian ecosystems will be compiled for consideration on future modeling approaches to be used in EANET. The workshop will be held with participation of experts on ecological modeling. Some recommendation on future direction of the modeling approach will be obtained.</p>
<p><b>Cost Estimate</b></p>	<p>i) Supporting consumables and part of the travel cost for collection and analysis of stream waters: USD 70,000</p> <p>ii) Supporting consumables including passive samplers/filters and part of the travel cost for measurement of ozone: USD 70,000 per year</p> <p>iii) Travel cost and logistic arrangements for the workshop: USD 60,000</p> <p>Total: USD 200,000 (for three years)</p>
<p><b>Timeframe/Schedule</b></p>	<p>1<sup>st</sup> year:</p> <ul style="list-style-type: none"> <li>- Intensive survey on stream water</li> </ul> <p>2<sup>nd</sup> year:</p> <ul style="list-style-type: none"> <li>- Campaign of ozone passive sampling</li> </ul> <p>3<sup>rd</sup> year:</p> <ul style="list-style-type: none"> <li>- Workshop on ecological models</li> </ul>
<p><b>Outputs</b></p>	<p>i) Identification of streams with low acid neutralizing capacity as</p>

	<p>well as high nitrate concentrations (as “nitrogen saturation” will be suspected)</p> <ul style="list-style-type: none"><li>ii) Identification of areas with high concentrations of ozone, and discussion of possible impacts on plants in such areas</li><li>iii) Recommendation for future direction on ecological modeling</li></ul>
<b>Proposed Funding Source</b>	Several international donor agencies including Asian Development Bank (ADB) and United Nations Environment Programme (UNEP) will be approached to fund this project
<b>Endorsement by NFPs</b>	

**Emissions inventory pilot project - Concept Paper**

<p><b>Title of Project</b></p>	<p>Guidance on the preparation of air pollutant emission inventories in EANET countries</p>
<p><b>Purpose/Objectives</b></p>	<ul style="list-style-type: none"> <li>i. To help generate a consensus within EANET countries on the need for reliable, harmonized emissions inventories for enabling effective air pollutant management within the region.</li> <li>ii. To provide expert guidance on the compilation of such inventories within EANET (up to 8 countries within Northeast and Southeast Asia).</li> </ul>
<p><b>Background Information</b></p>	<p>Many Asian countries have experienced rapid economic growth over recent years and this trend is expected to continue. The combination of expanding economies with high population growth has brought about a vast expansion in the need for energy, industrial and agricultural goods and services, and an expansion in the demand for the fuels and materials that help to supply these services. This is likely to lead to a dramatic increase in emissions of air pollutants such as sulphur and nitrogen oxides, particulate matter and the precursors of tropospheric ozone. The increasing levels of pollutants in the atmosphere are of growing concern due to their detrimental effects on human health, agriculture and natural ecosystems. Some air pollutants can be transported across national boundaries and addressing problems associated with these ‘transboundary’ air pollutants requires coordinated regional planning.</p> <p>Good quality emission inventories are essential for developing strategic plans for dealing with regional air pollution problems and for monitoring the effect of implementing them. In Europe and North America there is official national reporting of emission inventories for a number of air pollutants to the Convention on Long-Range Transboundary Air Pollution. However in East Asia, routine calculation of emission estimates of high quality is either absent or only available for a few countries. There is no official calculation or reporting by governments in most of the remaining countries and capacity to undertake the necessary calculations is generally lacking.</p> <p>The quantitative emissions estimates provided by an inventory can help to raise awareness of both policy makers and the general public about air pollution issues. They also enable the major emission sources to be identified and priorities for emission reduction to be defined. Emissions estimates can be used as input data for atmospheric transport and deposition models. The resulting air concentration and deposition estimates obtained by modelling, after verification with monitoring data on the ground and/or data from satellite observations, can provide important information for air quality management decision-making. Further useful information can be provided by estimates of the likely adverse impacts (to humans,</p>

animals, crops and natural ecosystems) which may be assessed from the modeled deposition and concentration of pollutants. A current emission inventory can be used as the basis for estimating future emissions according to different scenario assumptions and so provide important information for setting emission reduction targets. The likely effects of introducing various prevention and control measures can be assessed and compared thus enabling the most cost-effective emission reduction measures to be identified.

EANET (Acid Deposition Monitoring Network in East Asia) started as a network to cooperate in monitoring acid deposition. However, given the likely degradation of air quality in the future, it becomes increasingly necessary to make use of all the scientific tools available for the management of the atmospheric environment - including emission inventories. Regional analyses based on emission inventories and atmospheric transport modelling are made easier and more fruitful if the methodologies used are harmonized across all countries in a region. It is to be expected that increased capacity in compiling emissions inventories within EANET countries, using a common approach, will help to bring about more coordinated and effective management of the atmospheric environment leading to a reduction in transboundary air pollution within East Asia.

A manual and workbook have been produced under the auspices of the Global Atmospheric Pollution Forum (the Forum) which provides a simplified and user-friendly framework for emissions inventory preparation suitable for use in different developing and rapidly industrializing countries. The Forum Manual was based on, and grew out of, a manual initially prepared for UNDP/UN DESA entitled *'Manual for Preparation of Emissions Inventories for use in Modelling of Transboundary Air Pollution'* for use in Northeast Asia which has since been modified for use by the Malé Declaration countries of South Asia and the Air Pollution Information Network for Africa (APINA).

The Forum Manual approach is flexible (using top-down and, if available, bottom-up data) and its emission source structure is compatible with other major international emissions inventory initiatives such as EMEP/Corinair and IPCC. Inventory methods are provided for estimating emissions from the following sources: fuel combustion and transformation; fugitive emissions from fuels; industrial process emissions (non-combustion); emissions from solvent and other product use; emissions from agriculture (including crop residue burning); emissions from other vegetation fires and forestry; and emissions from the treatment and disposal of wastes. The air pollutants covered are sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), ammonia (NH<sub>3</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). An Excel workbook has been prepared as a companion to the Manual for use as an aid and tool in preparing emissions inventories. The Forum Manual will form the basis of the training element of this project.

<p><b>Scope/Activities</b></p>	<p>This project will include 3 training workshops spread over 1.5 years. An initial 5-day emissions inventory training workshop will be held in an East Asian country attended by participants (2 per country) from up to 8 EANET countries. This initial workshop will comprise a series of presentations interspersed with practical exercises and open discussion sessions. Topics to be covered will include:</p> <ul style="list-style-type: none"> <li>• The problem - causes and effects of transboundary air pollution</li> <li>• The need for emission inventories</li> <li>• What is an emission inventory</li> <li>• Existing emissions inventory work within or including the EANET region (e.g. REAS, RAINS-Asia)</li> <li>• The emissions inventory approach used in Europe and North America (e.g. EMEP/Corinair)</li> <li>• Other regional approaches (e.g. Malé Declaration Countries of South Asia, APINA countries of southern Africa, and the Global Atmospheric Pollution Forum)</li> </ul> <p>Practical experience will be gained by the participants in using the <i>'Global Atmospheric Pollution Forum air pollutant emissions inventory manual'</i> and its associated Excel spreadsheet software. Participants will be encouraged to find as much relevant activity data for their country when they return home and to continue filling in the workbook.</p> <p>A second (3-day) workshop will be held 6 months after the first, at which the same participants will report back on progress made and problems encountered will be shared and addressed where possible. QA/QC procedures will be addressed in more detail and methods for inventorying large point source (LPS) emissions described.</p> <p>A final (3-day) workshop will be held 1 year after the first at which the draft national inventories will be presented, remaining problems addressed and further QA/QC procedures carried out.</p>
<p><b>Cost Estimate</b></p>	<p>USD 500,000 per year</p>
<p><b>Timeframe/Schedule</b></p>	<p>First workshop - April/May 2008          Second workshop - October/November 2008          Third workshop - October/November 2009</p>
<p><b>Outputs</b></p>	<p>The project is expected to produce:</p> <ol style="list-style-type: none"> <li>i) Raised awareness of the need for a harmonized approach to compiling emission inventories within EANET countries.</li> <li>ii) Capacity building in emission inventory compilation for participants from up to 8 EANET countries.</li> </ol>

	iii) Draft national emission inventories for participating countries prepared using the Forum Manual/Workbook.
<b>Proposed Funding Source</b>	Several international donor agencies including Asian Development Bank (ADB), United Nations Environment Programme (UNEP), Japan International Cooperation Agency (JICA) will be approached to fund this project
<b>Endorsement by NFPs</b>	

**New Proposals from Participating Countries**

**PROJECT PROPOSAL  
EFFECT OF ACID DEPOSITION ON WELL WATER QUALITY IN DEVELOPING COUNTRIES  
SUBMITTED BY INDONESIA**

Title of Project	Effect of Acid Deposition on Well Water Quality in developing country.
Purpose/Objectives	To carry out the impact of acid deposition on the quality of well water around industrial areas and possible impact on human health
Background Information	<p>In aquatic systems, acid deposition can affect these ecosystems by lowering their pH. However, not all aquatic systems are affected equally. Streams, ponds, or lakes that exist on bedrock or sediments rich in calcium and/or magnesium are naturally buffered from the effects of acid deposition. One of the most obvious effects of aquatic acidification is the decline in fish numbers. Originally, it was believed that the fish died because of the increasing acidity of the water. However, in the 1970s scientists discovered that acidified lakes also contained high concentrations of toxic heavy metals like mercury, aluminum, and cadmium. The source of these heavy metals was the soil and bedrock surrounding the water body. Normally, these chemicals are found locked in clay particles, minerals, and rocks. However, the acidification of terrestrial soils and bedrock can cause these metals to become soluble. Once soluble, these toxic metals are easily leached by infiltrating water into aquatic systems where they accumulate to toxic levels. The toxic metals can then end up in the drinking water, crops, and fish and then ingested by humans through consumption. If ingested in great quantities, these metals can have toxic effects on human health.</p> <p>Based on the national economic and social survey, around 70 % of Indonesian people get drinking water coming from water wells directly. The 30 % of the people has opportunity by receiving from drinking water company or from spring water. For this fact, the health of major population in Indonesia is quite related to the quality of well water used for domestic needs. It is therefore important to know how acid deposition, in certain period of times will influence the quality of well water especially around the industrial areas.</p>
Scope/Activities	<p>This project proposes a study to carry out the influence of acid deposition to the quality of well water used as drinking around industrial areas.</p> <p>The main activities are :</p> <ol style="list-style-type: none"> <li>1. To gather information on people health around industrial areas using well water susceptible to receive acid deposition</li> <li>2. To monitor the quality of such well water related to the amount of acid deposition.</li> <li>3. To produce a risk map of well water acidification taking into</li> </ol>

	account acid deposition amount.
Cost Estimate	USD 40,000 per year
Timeframe/Schedule	2008 - 2011
Output	The project is expected to produce : <ol style="list-style-type: none"><li>1. Clear information on the effect of acid deposition on the quality of well water and possible impact on human health.</li><li>2. A model predicting the quality of well water influenced by acid deposition</li></ol>
Proposed Funding Source	
Endorsement by NFPs	

**PROJECT PROPOSAL**  
**EFFECT OF ACID DEPOSITION ON INLAND AQUATIC ECOSYSTEM**  
**SUBMITTED BY INDONESIA**

Title of Project	Effect of Acid Deposition on Inland Aquatic Ecosystem, especially on macro invertebrate community structure as bioindicator of food chain.
Purpose/Objectives	To carry out the impact of water quality change caused by acid deposition on macro invertebrate community structure and its food chain (included fish) in several rivers and lakes.
Background Information	<p>Acid deposition problem in Europe and North America was indicated by a decrease in the pH levels of lake/river water in the 1970s. Resulting damage included declines in fish population. The cause of this pH decline is believed to be the deposition of acidic substances into water body in amounts that exceeded the neutralizing or buffering capacity of the lakes and their watersheds. In general, inland bodies of water with low alkalinity and low electrical conductivities are prone to sensitivity to acidification caused by acid deposition.</p> <p>By experience of monitoring conducted from 2000 to 2004 in several participating countries of EANET, it may be concluded that some water bodies in EANET countries have experienced acid deposition. However, the real effect of such deposition to water ecosystem is to be more clarify.</p> <p>Aquatic life is affected not only by the acidity, but also by the other chemical changes that precede or accompany acidification: increased sulfate concentrations; reduced calcium levels; and increased concentrations of toxic metals, such as aluminum, which are leached from soil and sediments. Many aquatic organisms are unable to reproduce or are poisoned by high metal concentrations in acidified waters. When freshwater systems begin to be acidified, small organisms are commonly the first to be affected. Population declines occur among tiny plankton (floating plants), shrimp, snails, crayfish, mussels, <i>macro invertebrates and insects</i>, which serve as food for fish. As the aquatic environment becomes more acidic, fish populations decline because of reduced food supplies, decreased resistance to environmental stress, and declines in reproductive success. Fish in the early stages of life are far more sensitive to acidity; hence, a fish species may disappear totally from a freshwater system <i>before</i> acidity reaches a level that is lethal to adult fish.</p> <p>In general, the change of physical and chemical quality of water body caused by pollution material (included acid deposition) will influence the ecological equilibrium of the lake/river. In consequence, biotic community structure and function will be altered. This pollution will change not only the physical and chemical balances but also the aquatic community equilibrium of the water bodies (lake/river). The biological responses to pollution occur at a wide range of level of organization from sub-cellular to global. The ecological consequences include:</p> <ol style="list-style-type: none"> <li>1) Impacts on population (size, density, range),</li> </ol>

	<p>2) Community (species richness, relative abundance, trophic structure), 3) Ecosystem processes (productivity, nutrient transformation).</p> <p>Polluted/acidified streams give very clear effects on populations and communities of macro invertebrate because of its sensitivities. It is difficult to Zoo benthic to avoid the environmental change since this type of organisms move relatively slowly, or even stick on the bottom of lake/river such as sludge, sand or gravel. If the water body is polluted, macro invertebrate will be affected firstly. The level of change depends on the pollution degree. In the extreme condition most of all biota will die, but in the gradual level of pollution only species with a certain level of tolerance to certain waste can survive and tend to dominate. Other species will die or turn aside. This phenomenon can be used as a good tool for assessment of water quality change influenced by acid deposition.</p>
Scope/Activities	<p>This project propose a study to carry out the effect of acid deposition to inland aquatic environment by using macro invertebrate and its food chain as bioindicator of water quality change.</p> <p>Three major activities will be conducted limnological survey and sampling at several sites chosen, data analysis and interpretation :</p> <ol style="list-style-type: none"> <li>a. To collect data and information on limnological condition of the sampling sites.</li> <li>b. To analyze all samples collected from the sampling sites: physical, chemical and biological parameters (sort and identification of macro invertebrate).</li> <li>c. To build a model relating water quality to macro invertebrate community structure in order to characterize the impact of acid deposition on inland aquatic ecosystem.</li> </ol>
Cost Estimate	USD 60,000 per year
Timeframe/Schedule	2008 - 2011
Output	<p>The project is expected to produce :</p> <ol style="list-style-type: none"> <li>3. Clear information on the effect of acid deposition on inland aquatic ecosystem.</li> <li>4. A model relating the water quality change caused by acid deposition and community structure of macro invertebrate and its food chain.</li> </ol>
Proposed Funding Source	
Endorsement by NFPs	