



Implementing Projects in Phase III of the Malé Declaration

Further details of activities and Terms of Reference for their implementation

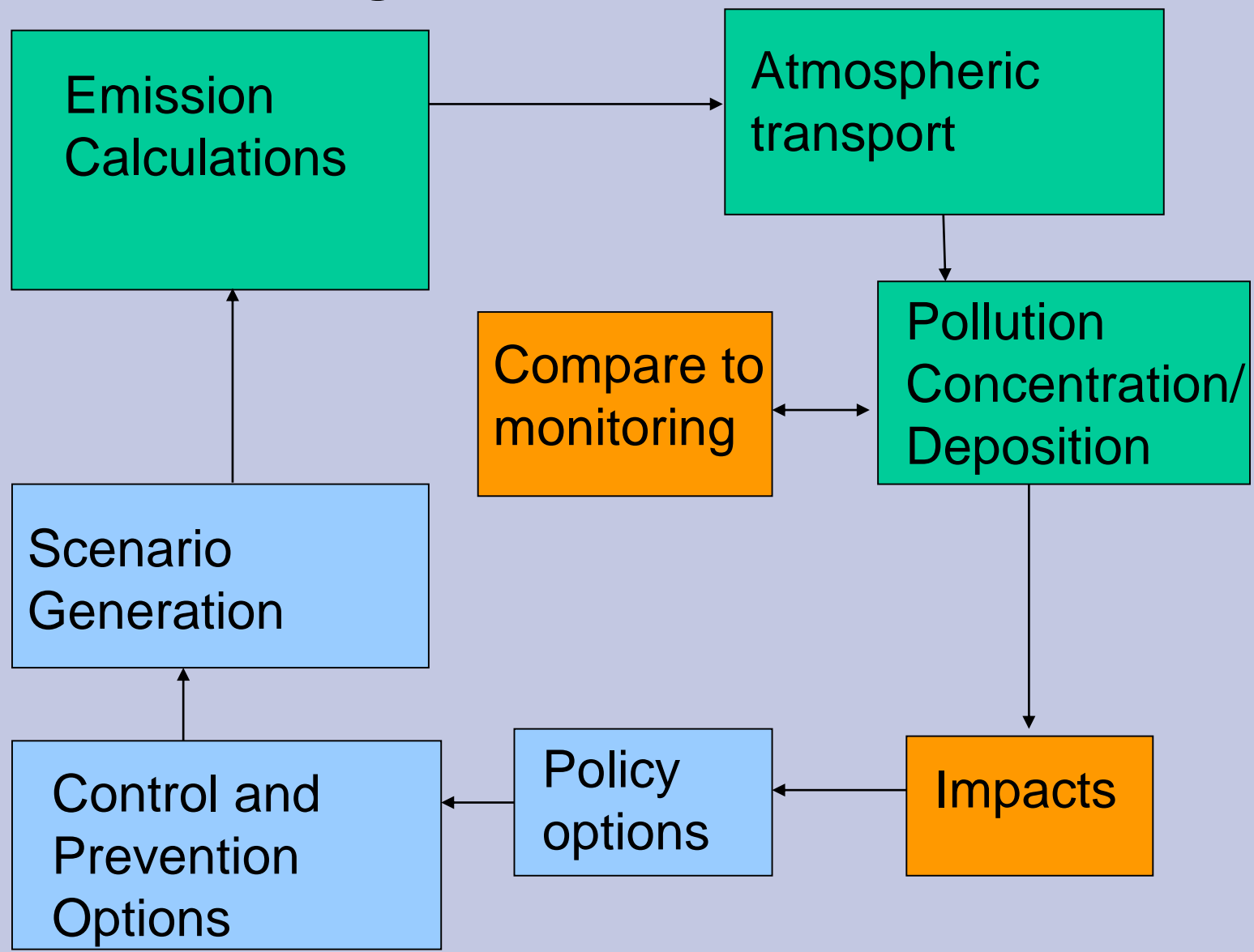


Capacity Building Projects

During the Consultation NIAs requested help with the following aspects:

- 1. Enhancing the Malé Declaration Network**
- 2. Enhancing the Malé Declaration Monitoring Capacity**
- 3. Developing emission inventories, scenarios and integrated assessment**
- 4. Supporting and strengthening impact assessment capacity**
- 5. Support decision making for prevention and control of air pollution**
- 6. Raise awareness about air pollution in South Asia**

Malé Integrated Assessment of Air Pollution



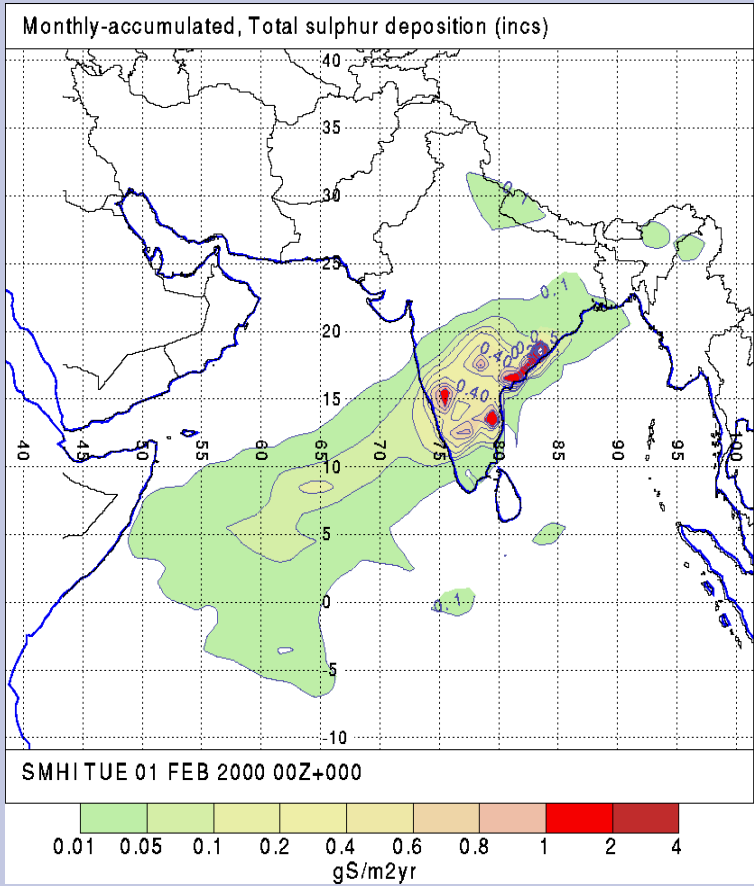
Atmospheric Transport of pollutants

Planned activities and goals

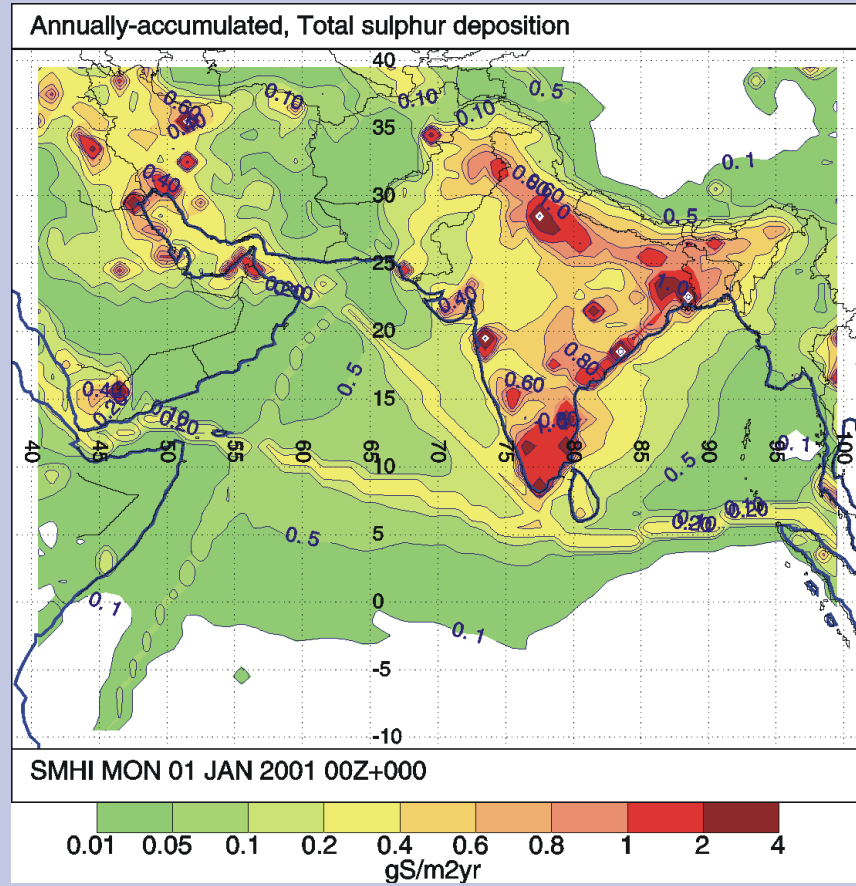
1. Trajectory Analysis
2. Training in atmospheric modelling
3. Developing a group of meteorologists



MATCH Model



Monthly Sulphur Deposition due to emission from one region



Annual Sulphur Deposition

Terms of Reference for Atmospheric Transport

<p>Institution</p>	<p>NIAs need to nominate a meteorological institution to:</p> <ul style="list-style-type: none"> • Attend up to 3 training workshops for trajectory analysis, atmospheric modelling and IAM • carry out trajectory analysis for monitoring sites for 365 days • help plan use of the MATCH model at UNEP
<p>Personnel</p>	<p>Meteorologist or other atmospheric scientist with good computer skills</p>
<p>Equipment</p>	<p>Access to computer and good internet connection</p>
<p>Other</p>	

Emission inventories

Activities envisaged:

1. Training in use of Male Manual and Workbook
2. Compilation of emission inventories by countries for emission regions
3. Continuous improvement of the manual



Terms of Reference for Emission Inventory

<p>Institutions</p>	<p>NIAs nominate individuals in their institution or other institution who will:</p> <ul style="list-style-type: none"> • Be available for up to 4 training workshops • Have enough time to compile inventories • Help improve the manual iteratively
<p>Personnel</p>	<p>Person(s) with a technical background and good computer skills (esp. Excel) to undertake the data gathering and emission inventory.</p>
<p>Equipment</p>	<p>Access to computer</p>
<p>Other</p>	<p>Access to national or international sources of activity, fuel quality and pollution control data</p>

Enhance Capacity in developing Emission Scenarios

Activities envisaged:

1. Hold training workshops in scenario development
2. Produce a manual for the development of pollution scenarios
 - A “why”, “what”, “how” manual
 - To link to emissions inventory
 - Up to 4 Workshops back to back with emission inventories
 - Application of methods by countries

Terms of Reference for Scenario Development

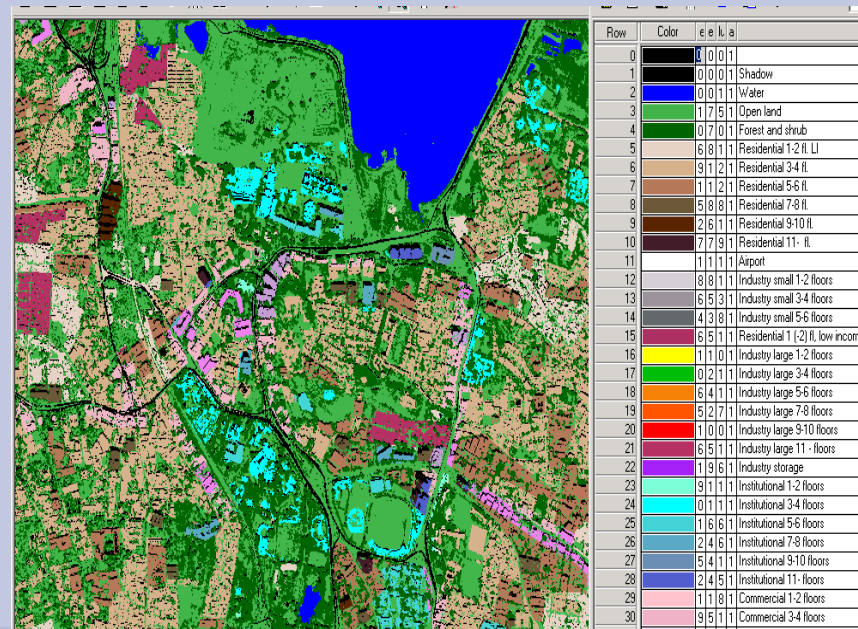
Institutions	<p>NIAs nominate individuals in their institution or other institution who will:</p> <ul style="list-style-type: none"> • Be available for up to 4 training workshops • Comment on draft approaches • Provide feedback between workshops • Be able to undertake scenario work
Personnel	<p>Person(s) with a technical background to undertake the data gathering and scenarios</p>
Equipment	<p>Access to computer</p>
Other	<p>Access to national or international sources of data and sector-specific information required for scenarios</p>



Rapid Urban Assessment

Planned activities

- Training in methods for all nominated institutions
- Application of methods in one city comprising:
 - top-down emission inventory for city using Male manual
 - disaggregation of emissions using satellite data
 - dispersion modelling in urban area
 - monitoring campaign



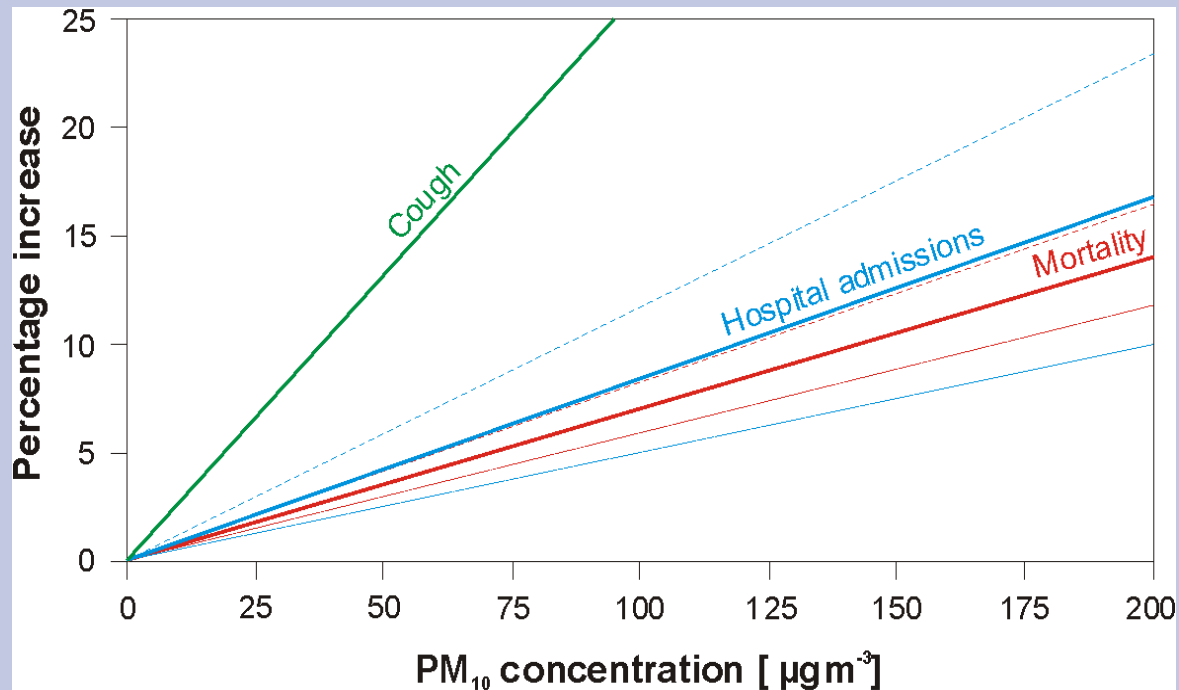
Terms of Reference for Rapid Urban Assessment

<p>City/ Institution Personnel</p>	<p>NIAs need to nominate candidate cities that have:</p> <p>Max. 2 million people</p> <p>Access to city-wide activity, traffic, point source data</p> <p>Access to trained and enthusiastic personnel:</p> <p>GIS Technician – Arc Info user to classify satellite image</p> <p>Technician to apply top-down emission inventory, do traffic counts and run TAPM model</p> <p>Technician for monitoring campaign</p>
<p>Equipment</p>	<p>Computer with Arc Info installed</p> <p>Monitoring data and/or equipment</p>
<p>Other</p>	<p>Satellite image for chosen city (1m data for city centre, 5m for suburbs)</p>

Human health impacts

Activities include:

1. Setting up a group of health experts to assess the status of health impact studies in South Asia
2. Hold training workshops in assessment methods – learning by doing
3. Undertake a health study



Schools study to determine air pollution impacts on children's health

Personnel: Epidemiologist, Nurse, Technicians recruited to run study

Method: 2 schools, 3-9 grade (1500-2000 pupils) in area with high PM

- 100 randomly selected asthmatic children chosen and 50 control
- 10 teachers chosen and trained
- Monitoring site near or at school
- Spirometry for all 150 children twice daily
- Personal samplers used 1 day per week
- All symptoms recorded, all data logged and analysed by epidemiologist/ statistician



Requirements for implementation of schools study

<p>Personnel</p>	<p>Epidemiologist to coordinate studies (part-time for 2 years)</p> <p>Nurse to oversee and take part in activities (12 months)</p> <p>Monitoring technician (6 weeks)</p> <p>Data logger/ statistician (6 months)</p> <p>10 teachers from schools</p>
<p>Equipment</p>	<p>Monitoring station (PM₁₀, SO₂, NO₂) up to 2km away</p> <p>Personal PM monitors</p> <p>Passive samplers for exposure assessment (?)</p> <p>Met station (within 2km)</p>
<p>Other</p>	<p>-</p>

Terms of Reference for Health studies

<p>Institution</p>	<p>NIAs need to nominate a health-related institution to:</p> <ul style="list-style-type: none"> •Participate in training workshops on health assessment methods •Nominate schools where the health study may be undertaken explaining capability of team
<p>Personnel</p>	<p>Epidemiologist or other health expert to assess impacts in South Asia and modify and apply methods and estimate health impacts</p>
<p>Equipment</p>	<p>Only for schools study</p>
<p>Other</p>	<p>Data on pollution in cities and health data for impact estimation at workshop</p>



Impacts on crops

Project activities:

- Using Indicator Plants to assess risk of ozone pollution
- Chemical protectant studies





Risk assessment using Indicator Plants

1. Undertake biomonitoring study using plants sensitive to ozone
 - i. Grow cuttings in pots with standard soil and wicks to keep moist
 - ii. Tend plants
 - iii. Assess damage to plants
 - iv. Analyse data at training workshop

The experimental site should be large enough to house 50 to 100 plant pots, be secure from animal invasion, and have access to a water supply.



Ozone induced injury on clover

Assessing Yield Reductions

- i. Establish sites with crop plants grown in pots with standard soils and wicks to keep plants at standard moisture
- ii. Spray soil of some pots with EDU (ethylene di-urea) and control pots not sprayed. EDU protects plants from ozone.
- iii. Harvest plants and compare yields of protected and un-protected crops



Terms of Reference for crops studies

<p>Institution</p>	<p>NIAs need to nominate an agricultural institution:</p> <ul style="list-style-type: none"> • With a suitable field site • Allow persons to participate in training (2) in methods • Grow, harvest and assess indicator plants • Undertake chemical protectant studies
<p>Equipment</p>	<p>Cuttings of plants sent to each site Plants in standard soils Watering system (wicks)</p>
<p>Personnel</p>	<p>university degree in biological sciences, be comfortable establishing a small experimental field site, and be computer literate</p>



Corrosion Impact Activities

- i. Exposing standard samples on racks**
- ii. Exposure of kits**
- iii. Stock at risk study**





Corrosion Impact Activities

i. Exposing standard samples on racks

- to determine an absolute measure of corrosion and develop dose-response relationships
- assemble rack and expose samples pre-prepared by SCI
- Need to monitor SO_2 , NO_2 , O_3 , HNO_3 and PM (total deposited) bi-monthly
- rain pH and amount (weekly)
- Need a met station measuring $^{\circ}\text{C}$ and RH



4.3 Potential Corrosion Impact Activities

ii. Exposure of kits

- to determine a relative measure of corrosion in sites with different levels of pollution absolute measure of corrosion
- Expose for 1 year
- up to 10 sites per city E.g. 2 metals and one stone sample per site
- Passive monitoring of gases only

iii. Stock at risk study

- identify materials in typical buildings (random inventory of 100s of buildings)
- Generalise occurrence of buildings across city
- Include street infrastructure and vehicle fleet
- Estimate economic losses for materials where have D-R relationships

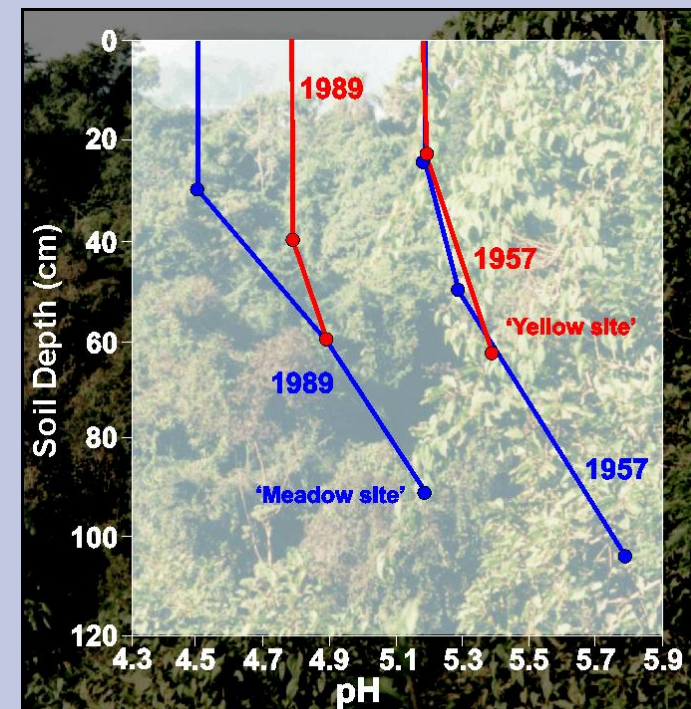
Terms of Reference for corrosion study

<p>Institution</p> <p>Personnel</p>	<p>NIAs will need to:</p> <p>Nominate an institution and site for rack, application of rapid kit and stock-at-risk (if these are prioritised)</p> <p>Provide technical person with interest in corrosion, preferably materials institution, for training</p> <p>Technician to tend monitoring site</p>
<p>Equipment</p>	<p>Rack (supplied by SCI)</p> <p>Samples (supplied by SCI)</p> <p>Weighing and lab. Facilities</p> <p>Site for rack</p> <p>Monitoring equipment</p> <p>Met station in city</p>
<p>Other</p>	<p>-</p>

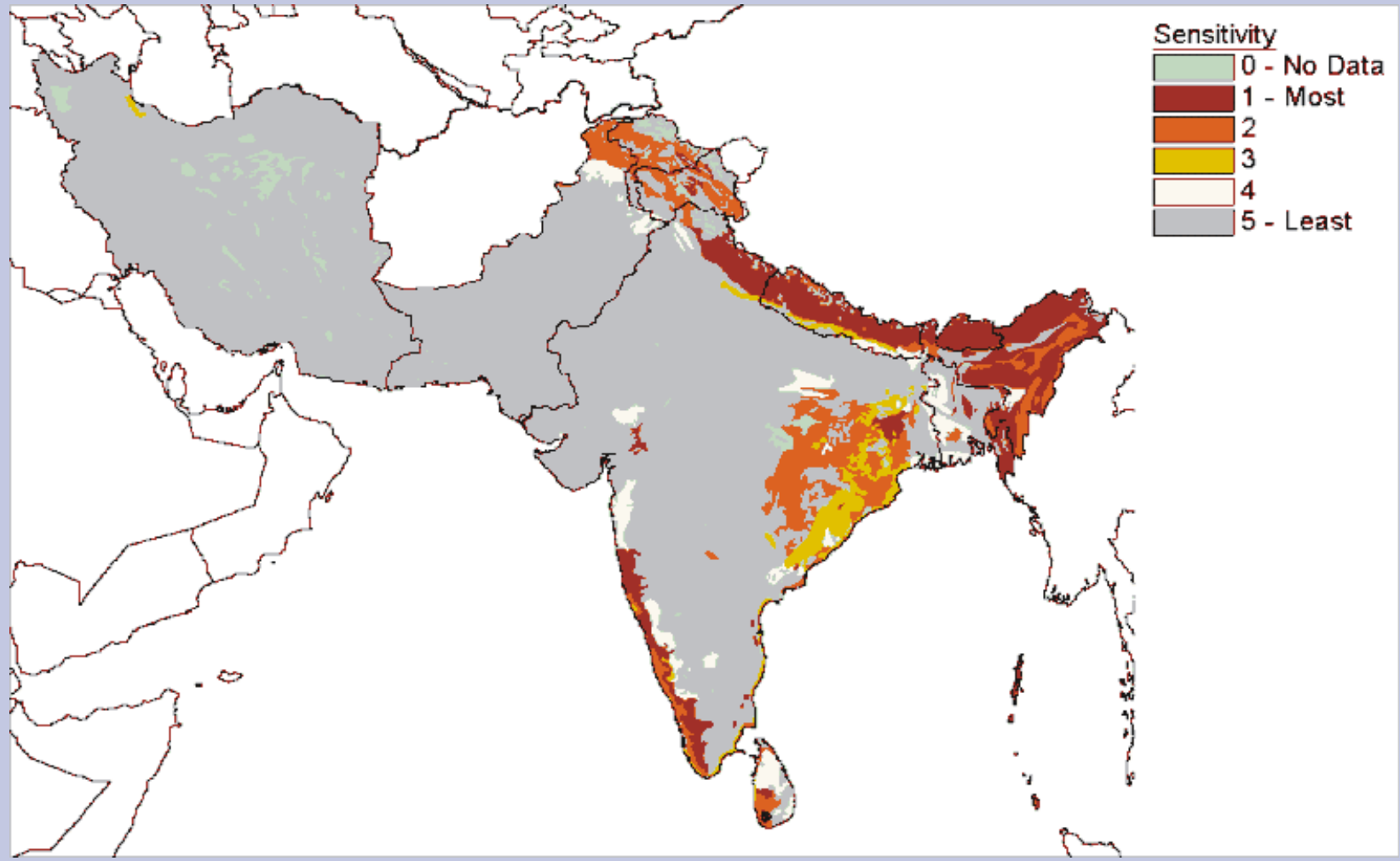
Acidification studies

- i. **Mapping sensitivity of soils/ ecosystems to acidification**
 - Using soil map – reclassify into relative sensitivity classes according to manual
 - Compare to deposition
- ii. **Time development of acidification**
 - Apply methods in manual to soil data from monitored sites

Soil acidification at Mt. Lu in southern China (Zhao, 1996)



Terrestrial Ecosystem Sensitivity to Acidic Deposition in South Asia (preliminary assessment)



Source: Kuylenstierna *et al.* 2001

Terms of Reference for acidification assessment and training

Institution	NIAs will need to nominate an institution who can receive training
Personnel	Soil scientist, Ecologist, GIS technician would be needed for application of methods and assessment of results
Equipment	Computer with GIS software
Other	Soil maps (preferably digitised) Soil physical and chemical data for soil types and soil profiles

Conclusion:

Training will be given and people need to be nominated for this

Limited funds for studies are available and need to be matched with resources and infrastructure available in each country, NIA priorities and enthusiasm for different projects

Need to know resources, personnel and institutions in each country who would carry out prioritised tasks

Realistic budgeting will then be carried out to assess how many projects may be undertaken

REQUIREMENTS FOR IMPLEMENTATION – IAM operation and atmospheric process training

Personnel	IAM training – NIA personnel Atmospheric processes: Meteorologist preferably – same person as for trajectory analysis. Can develop questions to modellers as group of atmospheric scientists
Equipment	Computer on which IAM can be installed
Other	Training on IAM, atmospheric processes and trajectory analysis may be combined IAM should be considered preliminary

Enhance Capacity in developing Emission Scenarios

- Identification/proposal of person to be responsible for Emission Scenario work (Emission Inventory Work) – **ASAP**
- Feedback on draft workplan (Scenario Manual) presented this week
- Intermittent feedback between workshops to facilitation
- Involvement in training
- (Eventually) creation of country specific scenarios