

Malé Declaration emissions inventory workshop Delhi, India, 2010

Session 6 – Quality assurance and Quality control (QA/QC)

Dr Harry Vallack,
Stockholm Environment Institute (SEI)
University of York, UK



Malé Declaration on Control and Prevention of Air Pollution
and Its Likely Transboundary Effects for South Asia

Emission inventory objectives

The objectives of emissions inventories are that they should be:

- ❖ **transparent**
- ❖ **accurate**
- ❖ **complete**
- ❖ **consistent**
- ❖ **comparable**

Emission inventory objectives

Transparency:

There is sufficient and clear documentation such that individuals or groups other than the inventory compilers can understand how the inventory was compiled and can assure themselves that it meets the requirements set for the inventory.

Emission inventory objectives

Accuracy:

That the inventory contain neither over- nor underestimates so far as can be judged. This means making all endeavours to remove bias from the inventory estimates.

Emission inventory objectives

Completeness:

Estimates are reported for all relevant emission sources and air pollutants within the scope of the inventory. Where data are missing their absence should be clearly recorded and documented.

Emission inventory objectives

Consistency:

Estimates for different inventory years, pollutants and sources are made in such a way that differences in the results between years and sources reflect *real* differences in emissions.

Emission inventory objectives

Comparability:

The inventory is reported in a way that allows it to be compared with inventories for other Malé Declaration countries. This should be reflected in appropriate use of tables and use of a common classification and definition of sources of emissions (as set out in the Malé inventory Manual/Workbook).

Quality assurance/quality control (QA/QC)

To ensure that these objectives are met, QA/QC checks are required

- ❖ **Quality Control or QC** is a system of routine technical activities implemented by **the inventory development team** to measure and control the quality of the inventory as it is being compiled.
- ❖ **Quality Assurance or QA** is a system of external review and audit procedures conducted by **personnel not involved** in the inventory development process.

Quality assurance/quality control (QA/QC)

Examples of Quality Control QC checks:

- ✓ Cross-check a sample of input data from each source category for transcription errors.
- ✓ Confirm that references to data sources and non-default EFs are all properly recorded.
- ✓ Reproduce a representative sample of emissions calculations.
- ✓ Check that units are correctly carried through from beginning to end of calculations.
- ✓ Check that conversion factors are correct.
- ✓ Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review.
- ✓ Check that known data gaps that result in incomplete source category emissions estimates are documented (i.e. keep a log).

Quality assurance/quality control (QA/QC)

Quality Assurance (QA):

An objective, unbiased review to assess the quality of the inventory, and also to identify areas where improvements could be made.

It is *good practice* to use QA reviewers that have not been involved in preparing the national inventory (e.g. experts from other Malé Declaration countries or from other agencies or institutes within the same country).

QA/QC priorities

Key sources:

- ❖ *sources that have a significant influence on a country's inventory in terms of the absolute level of emissions, the trend in emissions, or uncertainty.*
(Identified in your first inventory report)
- ❖ should be the priority for countries during inventory resource allocation for data collection, compilation, QA/QC and reporting.

Quality control in practice

Data checks for:

- ❖ **Transcription errors** – has the number been copied over accurately and in the correct format (i.e. do not use gaps for the thousands delineator [10000 not 10 000] and you must use a dot ‘.’ for decimal places not a comma ‘,’)
- ❖ **‘Units’ errors** – have you identified the source data units correctly (e.g. 1000s tonnes or just tonnes; *1000s* animals or *head* animals) and are they the same as required in workbook (or must they be converted first).

Quality control in practice

- ❖ Have the correct **conversion factors** been used – double check your maths (e.g. for NCV: MJ/kg converted to toe/t).
- ❖ **Are pollutant emissions shown** where expected? (If zero, perhaps an emission factor was left out or a letter ‘O’ rather than a zero ‘0’ entered as part of the data entry? If very high, perhaps there is a ‘transcription’ or ‘units’ error.)
- ❖ Did you **record all references** to activity data sources and non-default emission factors, S content of fuels or S retention-in-ash values in the tables provided at the bottom of each relevant worksheet (**if not, make a note to do this when you get home**).

QA/QC when you get home

Keep a separate *'Inventory preparation log book'*:

- ❖ **Note all activities with dates** – (e.g. which worksheets have been completed, by whom and when; letters sent to Ministries, companies etc. requesting data)
- ❖ **Make a note of data gaps** – in which worksheets and for which source categories are data currently unavailable
- ❖ Will be invaluable resource both to inventory compilation team (for QC) and for external review (for QA).

QA/QC when you get home

Prepare an archive to aid future internal (QC) or external (QA) review and writing of inventory reports.

- ❖ Check that hard copies of activity data, supporting information (reference papers, reports, questionnaire/survey returns etc.) and inventory records (e.g. log book,) are safely archived.**
- ❖ Make sure that when working on the workbook it is backed up regularly (preferably on CD) in case of computer crash/hard disc corruption etc.**