Integrated approaches using local air quality assessment in GHG abatement strategies

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The development of an integrated implementation plan for improving local air quality and, at the same time, reduce green house gas (GHG) emissions are being based on a combination of top-down and bottom-up emission inventories.

NILU has developed and applied tools for air quality management planning on a local and regional scale in a number of cities worldwide. The work on co-control and co-benefits including local, regional and global impacts started in 2008. The methods developed for these approaches have been presented for Oslo, Norway and is now being applied in cities in Asia.

Top-down to bottom-up emission inventories

Integrated assessments are including both GHG emissions and emissions of local air pollutants. The co-benefit results from evaluation of the reduced impacts on all scales from local health impacts to climate change issues.

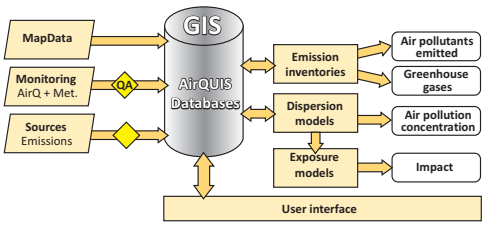
The most important input to any co-control study is an appropriate emission inventory. The approach that NILU is now applying is a combination of a simplified top-down emission inventory and a more detailed bottom-up inventory. The latter one is GIS based and represents the input for modelling exposure and local health impacts.

A first estimate using a top-down approach has been undertaken for GHG emissions based on the GAINS model (*Greenhouse Gas – Air Pollution Interactions and Synergies*). This model was developed by International Institute for Applied Systems Analysis (*IIASA*).

In order to estimate local impacts, concentration distributions and population exposures a more detailed GIS based emission inventory is needed. This is based on source data and consumption/production data collected in Excel based templates. (*AirQUIS 2007*).

The NILU planning tool used in Oslo, Norway

The AirQUIS planning tool has been developed by NILU to handle a number of air pollution tasks and challenges. It is based on a GIS platform and includes monitoring data, emission inventory tools and models.



The NILU developed air quality planning tool; AirQUIS used in co-control studies

Studies have been performed in Oslo in order to evaluate the exposure to people for alternative scenarios identified in order to reduce the air pollution impacts. The most important source to air pollutants in Oslo is road traffic.

Based on a complete emission inventory for Oslo, models were applied to estimate emissions of pollutants as well as emissions of CO_2. The model shows that private households (including heating with wood and fossil fuels) accounts for around 50% of emissions of particulate matter PM_{10}. Road traffic is responsible for 20% of the total PM_{10} emissions and about 55% of the NO_x emissions in Oslo. Integrated assessment for Dhaka Bangladesh A new project, the Bangladesh Air Pollution Management Project (*BAPMAN*) was initiated in August 2010. The project will be undertaken in co-operation between NILU and Department of Environment in Dhaka.

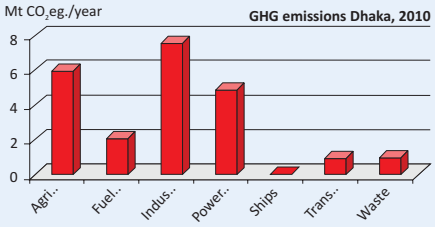
	Actions	NO_2	PM_{10}	CO_2	Comments
Traffic actions	Prices, parking, public transport, mobility	++	++	++	Reduce car-km driven in Oslo
	Mobility planning	+	+	+	Long term policies
Vehicles	Non studded tires	0	++	0	Dust reductions, no CO_2 effects
	Low emission zones	++	++	++	Immediate effects
	Eco driving	+	+	+	Long term effects
	Ban idling	+	+	+	Effect on CO emissions
	Electric cars public transport	+	+	+	Long term
Roads	Speed limit reductions	0	++	0	Immediate effects
	Road cleaning	0	++	0	Immediate effects
	Reduce tunnel emissions	+	++	0	Clean road tunnel emisisons
Wood burning	Cleaner stoves	0	++	+	Long term effects
Harbour emissions	Reduce ship emissions, change fuels	++	+	++	Immediate effects, also SO_2 reduced

Several actions were included in the evaluation of an optimal abatement strategy for Oslo. Considerations were discussed concerning local impacts of NO_2, PM as well as CO_2 emissions reductions from the same mitigation actions.

Top-down estimates

'Top-down' estimate of total emissions using gross statistical data and available emission factors to identify most of the local air emissions. A first estimate using a top-down approach has been undertaken in Dhaka.

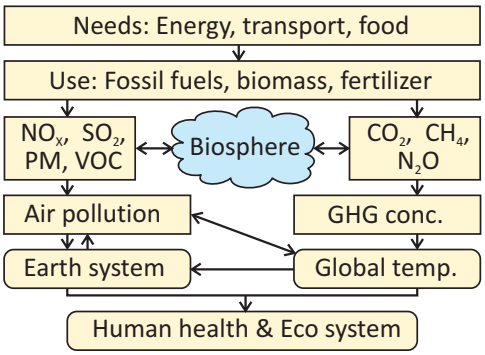
The first top-down estimates indicated that the transport sector may be underestimated. NILU is presently collecting input data in order to perform a more detailed GIS based bottom-up emission inventory for Dhaka.



Summary results for year 2010 in Dhaka indicates that most of the greenhouse gases (in CO_2 equivalents per year) are originating from industrial sources and from agriculture and power plants. It is believed that the transport sector might have been strongly under estimated.

The interactive co-control approach

An integrated approach aimed at identifying measures leading to fulfilment of climate change and air pollution policies will provide benefits both on local and global scale, and in short as well as in long term horizon. A number of reduction options for GHG emissions have co-benefits for air pollution, and a number of air pollution combating measures also provide significant climate change related benefits.



The interactive impact of emissions of pollutants and greenhouse gases into the atmosphere, acting on the biosphere, changing the global temperature again acting on the earth system and influencing at the end on the human health and on the ecosystem.

References

AirQUIS (2007). www.airquis.no.

GAINS (Greenhouse Gas -Air Pollution Interactions and Synergies) South Asia database. International Institute for Applied Systems Analysis (IIASA), Atmospheric Pollution and Economic Development, Austria. Available at http://gains.iiasa.ac.at/gains/IND/index.login?logout=1

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