

INTEGRATING CLIMATE CHANGE SCENARIOS INTO LOCAL AIR QUALITY HEALTH RISK ASSESSMENT

A 2FUN Project Case Study

Elsa Casimiro ^{1&2}, Pedro Lopes ¹, Ricardo Aguiar ¹, Filipe Duarte Santos ¹, Pedro Serpa ¹

¹ Climate Change Impacts, Adaptation & Mitigation Research Group, Faculty of Sciences, University of Lisbon, Portugal

² INFOTOX Environmental Risk Consultants, Lisbon, Portugal
 ecasimiro@infotox.pt



INTRODUCTION

Previous studies and programs have identified that further research is needed in the methods and tools used to assess the health effects of air pollution under climate change scenarios as well as health effects due to multi-pollutant exposures.

Indeed there are many challenges in assessing future health impacts of local air quality, for example:

- Future climate datasets are for periods too far into the future (i.e. 2080-2100),
- The resolution of the future climate data is too coarse/low,
- Daily climate data sets are difficult to obtain,
- Future local emissions of air pollutants have many uncertainties, and
- Future local demographic changes are difficult to estimate.

The present study is one of the case studies of the project 2-FUN (Full-chain Uncertainty Approaches for Assessing Health Risks in Future and Environmental Scenarios). In this case study the potential health risks associated with future changes in air pollution in Lisbon are being assessed taking into consideration future climate and socio-economic changes.

2-FUN is an integrated EU 6th FP research project that aims to provide decision-makers with the state of the art tools to analyze the current and future trends in environmental conditions and pressures that may lead to health problems. It focuses on the following topics:

- Construction of future environmental and socio-economic scenarios relevant for health risk assessment,
- Toxicity assessment of chemical mixtures,
- Integration of children's issues in health risk assessments, and
- Development of uncertainty models for improved health management.

The tools developed in 2-FUN will be tested on three contrasting case studies.

RESULTS AND DISCUSSION

The 2-FUN project duration is from 2007-2011. During the first half of the project the future climate and demographic data have been produced (1) and the 2-FUN risk assessment tool box is being developed. The case studies will be conducted during the second half of the project.

The assessment methodology followed in the case study presented here is likely to be of value for EIA studies and other studies assessing environmental health risks from chemical exposures at the local level. In addition, since climate change adaptation actions need to be conducted predominately at a local level, the climate downscaling method presented will be of interest to local municipalities and industries.

REFERENCES AND ACKNOWLEDGEMENTS

1 – Aguiar R. et al. (2008) Methodologies for downscaling socio-economic, technological and emission scenarios, as well as meteorological scenario data to country and local level. 2-FUN Project Report.

This project is co-funded by the European Commission within the 6th Framework Program under contract FP6-2005-GLOBAL-4-036976.

METHODS

Potential health risks associated with future changes in air pollution in Lisbon are being assessed with the aid of the 2-FUN downscaling methods (1) which facilitate the production of:

- Future climate data at local (i.e. city) level from global climate change models, and
- Future demographic changes for Lisbon district from national IPCC socio-economic scenarios.

Downscaled data for all four Intergovernmental Panel of Climate Change (IPCC-SRES) scenarios in Figure 1 will be used.

Figure 2 shows the steps involved in the case study. Local air pollutant concentrations will be estimated using the downscaled future climate data together with local pollution emission. Pollutant concentrations will be assessed for future scenarios for the 2020s and 2050s.

Health risks for children and adults associated with chronic exposure to these pollutants will be estimated using the 2-FUN health risk assessment tool box that incorporates multi-media exposure models with physiological models to allow for the assessment of chemical mixtures. Health impacts from acute exposures will be assessed using (traditional) concentration response functions from epidemiological studies in Lisbon.

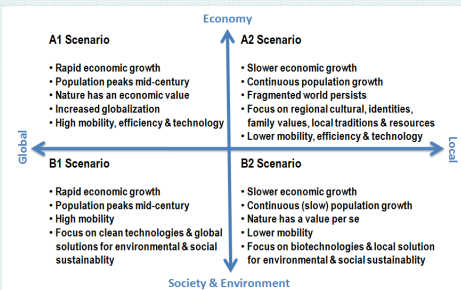


Figure 1 – IPCC scenario story lines used in case study

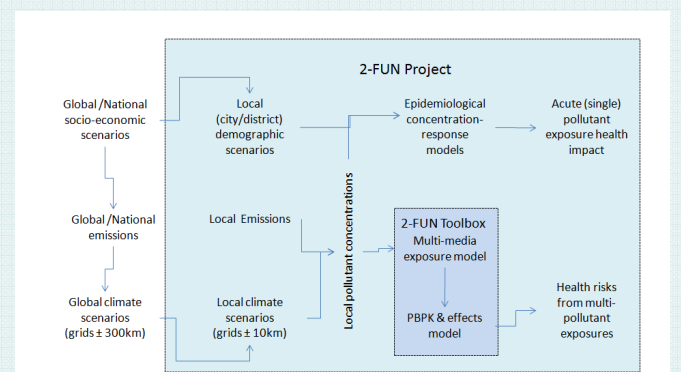


Figure 2 – Case study flow diagram