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An intersectoral training package for environment and health experts.

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**World Health
Organization**

REGIONAL OFFICE FOR

Europe

Capacity Building in Environment and Health (CBEH) project

**An intersectoral
training package for
environment and
health experts**



An intersectoral training package for environment and health experts



Abstract

This training manual is designed to support and facilitate countries dealing with environment and health issues, by using different examples of training courses. Materials are based on the best available knowledge and evidence, are as comprehensive as possible and compiled under the coordination of the WHO Regional Office for Europe. It can be adapted to local environment and health problems and used with a broad variety of training audiences.

The primary objective of this manual was to allow prospective trainers to use the materials effectively in further capacity building activities. The contents of this manual are also supplemented by slides, exercises and case studies currently available upon request. They will provide useful further information and resources relevant to capacity building.

Keywords

Capacity building – Environment and Public Health – Environmental health –
Intersectoral cooperation – Risk assessment – Training support

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List of abbreviations

CBEH	capacity building in environment and health
CS	contaminated site
DALYs	disability-adjusted life years
DG Sanco	EC Directorate General for Health and Consumers
EH	environment and health
EU	European Union
EA	environmental assessment
EBD	environmental burden of disease
EIA	environmental impact assessment
HIA	health impact assessment
RR	relative risk
SEA	strategic environmental assessment
SMR	standardized mortality ratio
TOT	training of trainers

Foreword

Capacity building in environment and health has been recognized as a critical need among Member States of the WHO European Region. More and more, countries are faced with the challenge of addressing the growing burden of disease arising from environmental exposures, oftentimes unprepared. The training package on Capacity Building in Environment and Health (CBEH) aims to build significant capacity in addressing environment and health matters among key stakeholders such as individuals working in public health, policy-makers and civil servants as well as others. It will provide them with tools to take a championing role in strengthening the knowledge base of public health and other relevant professionals. It brings together knowledge and practical experience from a number of disciplines and experts relevant to environment and health.

Training is only one element of capacity building. WHO will continue to strengthen the CBEH training material and how it is implemented, while also contributing to addressing other capacity building needs that fall within WHO's mandate.

Contributors and editors

This training package was produced as a result of an international training workshop on environment and health (19–23 March 2012 Riga, Latvia) and presents the main training packages developed by leading experts in the field of environment and health: Lea den Broeder, Ben Cave, Gillian Gibson, Otto Hanninen, Ivano Iavarone, Franziska Matthies, Maria Partidario Rosario, Roberto Pasetto, Roberta Pirastu, and Paul Wilkinson.

The report was edited by Leda Nemer, Consultant to WHO, and Julia Nowacki, Technical Officer, European Centre for Environment and Health (Bonn, Germany), WHO Regional Office for Europe.

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1 Introduction

1.1 Scale of the problem

Many European countries face great challenges in environment and health (EH). It is estimated that in the WHO European Region well-tested EH interventions could reduce total death in these countries by almost 20% (Prüss-Üstün & Corvalán, 2006). The range of disability-adjusted years of life (DALYs) lost varies up to fourfold across the WHO European Region. The lowest levels of risk are found in northern and western European countries, while high risk levels are reported for some countries of eastern Europe. While rapid social and economic evolution, coupled with a legacy of environmental degradation (and its interplay with other significant health determinants) result in potentially large health impacts currently underway and/or projected, there is also great potential for health gains, if environmental determinants are addressed. As several countries are engaged in strengthening their health systems to better respond to these challenges, it is desirable to sustain such efforts by building appropriate in-country professional capacity in EH, focusing on public health officers, professionals from other relevant sectors, professionals with responsibilities in the use of health data and statistics, as well as their counterparts charged with political decision-making responsibilities.

1.2 Why was this package developed?

The Project entitled “Capacity Building in Environment and Health” (CBEH), started in January 2009 and ended in June 2012. It was co-funded by the European Commission Directorate General for Health and Consumers (DG SANCO) and coordinated by the WHO Regional Office for Europe. The overall objective of the project was to strengthen in-country capacity to deal with EH issues in central and eastern European Union (EU) Member States by main-streaming training in EH, supporting the inclusion of key reference policies, such as the WHO Ministerial Declarations, and supporting public health systems and current public health reform to better respond to current and emerging challenges in this area. In doing this, the package also aims to contribute to commitments taken at the Fifth Ministerial Conference on Environment and Health (WHO Regional Office for Europe, 2010). Eight EU Member States participated in the project: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.

This training package is the main product of the project’s Work Package 3 and contributes directly to supporting in-country capacity on EH by not only providing training methods and materials but also guidance necessary for setting up a continuous training programme for environment and health experts. The training package aims to build significant capacity in addressing EH matters among key stakeholders (public health and other relevant professionals, policy-makers and civil servants on relevant jobs of the administration) and give them tools to take a championing role in strengthening the knowledge base of public health and other relevant professionals. The knowledge compiled in the package should also allow them to develop a regular professional programme for EH professionals in their countries.

1.3 Contents of training package

The training package consists of three parts:

1. a narrative part which guides the user on implementation of a training initiative and use of materials;

2. the training materials of six training modules from the topical areas of health in environmental assessments (EAs) and quantitative methods in EH, consisting of a narrative description of the materials;
3. the lessons in powerpoint presentation format with instructor notes embedded as relevant and, in some cases, a detailed guide for delivering the lesson, handouts and practical exercises for participants to use during the training sessions.

1.3.1 Methodology for development of training materials

EH topics featured in this training package were developed by means of two preparatory workshops, which were held to identify and assess current capacity needs, review country specific priorities, EH policies, as well as institutional and training frameworks together with representatives of the participating countries. EH challenges and hotspots of participating countries were identified and compiled by using existing resources like the European Health for All Database (WHO Regional Office for Europe, 2012), Environment and Health Information System (ENHIS) (WHO Regional Office for Europe, 2013a), Environmental Burden of Disease country profiles (WHO, 2013), Environment and Health Performance Reviews (EHPR) (WHO Regional Office for Europe, 2013b) and other country specific online information if available. The data obtained were then presented at the preparatory workshops and discussed with country representatives. Additionally, participants prepared presentations on EH challenges and hotspots in their countries based on a previously distributed questionnaire.

Furthermore a review of training materials from the WHO European Centres on Environment and Health, Bonn and Rome, was compiled to give the workshop participants an overview of thematic issues that could be possible subjects at the main training event as well as to make further use of materials already developed by WHO for the main training event.

Two preparatory workshops were then conducted in the two subregions of the project to assess needs and validate information collected: 11–13 October 2011 in Tallinn, Estonia, and 28–29 October 2011 in Budapest, Hungary.

Topic areas included the following:

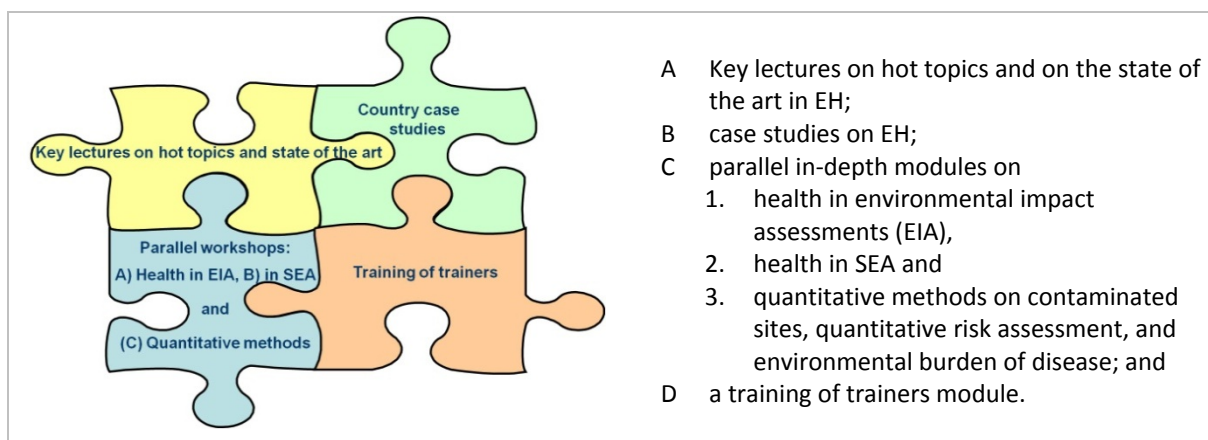
- overview of relevant EH policies and institutional frameworks, e.g., the 5th Ministerial Conference on Environment and Health (WHO Regional Office for Europe, 2010);
- overview of national instruments for EH;
- EH priorities already identified or flagged for specific response or action, e.g. assessment of health impacts in small areas, contaminated sites,
- health impact assessment (HIA) and health in strategic environmental assessment (SEA);
- specific training needs in the participating countries; and
- designing the main training event.

The above-mentioned information was then used to tailor development of the training materials themselves. Preparatory workshop participants strongly expressed that one single main training event for all participating countries would be preferable to holding two of them as this would support networking between the countries outside their usual subregion and generate new insights for participants on dealing with EH issues when participants from countries with different backgrounds and in different development stages meet and discuss together.

The main training event, a five-day international training workshop on EH, was developed informed by the preparatory workshop. Aims of this international training event were to provide new insights on EH hot topics, offer in-depth training options on EH specific areas and to provide opportunities

for networking among participants of different sectors and countries. Hence the workshop was structured by four main components (see Fig. 1):

Fig. 1 Main elements of the CBEH international training workshop



Following the preparatory workshop a full week international training workshop was designed with the aim of incorporating the main areas of concern and interest into the training.

The in-depth modules were developed by technical experts acting as temporary advisors to WHO:

- Module A – Health in EIA, Ben Cave and Gillian Gibson
- Module B – Health in SEA, Lea den Broeder and Maria Partidario Rosario
- Module C.1 – Contaminated Sites, Ivano Ivarone, Roberto Pasetto and Roberta Pirastu
- Module C.2 – Quantitative risk assessment, Paul Wilkinson
- Module C.3 – Environmental burden of disease, Otto Hanninen
- Module D – Training of trainers, Franziska Matthies and Francesco Mitis

1.3.2 Implementation and first review of the in-depth modules

The international CBEH workshop was held in Riga, Latvia, from 19 to 23 March 2012. A total of 70 representatives working in the EH sectors from eight Member States (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) participated. The training also served as forum to review the newly developed in-depth modules. Post training, modules were revised by experts with suggested changes incorporated.

The overall evaluation of the three parallel modules showed agreement among the majority of participants that the modules were relevant to their vocational/professional needs. Daily evaluations presented a more detailed picture. For example, out of the most useful things that participants of the health in EIA and SEA modules learned during the workshop were the differences and linkages between the various forms of impact assessment, especially between EIA and SEA, how they can contribute to each other and how health can be incorporated into EIA/SEA. Furthermore the different steps in and tools for HIA, EIA and/or SEA were mentioned as the most useful elements of these training modules. Strategic thinking was also mentioned by a number of the SEA module participants as being most useful.

Participants of the module on quantitative methods in EH especially considered the different quantitative risk assessment methods and general methods for risk assessments of air pollution or contaminated sites to be the most useful things learned during the workshop. Calculation of standardized mortality ratio (SMR), relative risk (RR) and attributable risks, as well as environmental

burden of disease (EBD) were also specifically mentioned as beneficial skills acquired. Most useful contents of the “Training of trainers” module ranged from “learning styles and the brain”, tips for presentations, differences in the role of trainers and facilitators, methods that can be used in trainings and how to plan trainings. For further information on the workshop please refer to the Riga international workshop report (WHO Regional Office for Europe, 2013c).

1.3.3 Target audience of this training package

The target audience for this manual are officials and practitioners from government agencies and research institutes in health, environment and other sectors related to environment and health such as energy, transport and education.

1.4 Learning objectives

Overall, the training package aims to:

- provide the potential trainer examples on how a training in EH could be structured and how specific topics of the in-depth modules could be addressed in a given country;
- present an example of how joint trainings with EH experts can improve understanding between sectors and enhance intersectoral work; and
- generate ideas on how EH issues can be addressed within one’s current area of work.

2 Training curriculum: structure and contents

This training package consists of a narrative description of the module, the training modules mainly consisting of PowerPoint presentations with trainer notes embedded as necessary, and in some cases exercises and case studies. Some training modules are accompanied by a detailed guide for delivery.

It is important to note that the modules do not consist of all the background information needed to conduct a full course. It is expected that the potential trainer is already familiar with the specific topic and uses the materials provided as examples of the topics and the methods that could be used in a similar training course. Hence, all modules presented in this manual should be considered as examples and will need adaptation to the specific training context taking into consideration trainee needs and experiences.

3 Training modules – a snapshot

3.1 Module A – Health in environmental impact assessment (EIA)

Developed by Ben Cave¹ and Gillian Gibson²

3.1.1 Module summary

This three-day module looks at health in EIA. It focuses on projects within the energy sector. This course should be delivered at the same time as a course on health in SEA. The two courses share an introduction and on the evening of the second day participants have the opportunity to work with their SEA counterparts.

Within this module trainees are taken through the process of a HIA from screening and scoping through to completion and reporting, addressing some of the more contentious areas which those commissioning or actively involved in HIA may encounter.

This training module draws on an understanding of HIA and of EIA. It looks at examples whereby HIA was conducted alongside, or in concert with an EIA. The training is based around two main case studies. The learning is drawn from a consideration of these HIAs, in addition to numerous other examples as appropriate. The training is intended to be participatory and includes discussion and small group work.

3.1.2 Module aims

The aims of this module are to:

- set HIA in the context of SEA and other policy drivers;
- consider HIA links with other assessments such as EIA;
- determine the skill sets required for appropriate interpretation of data provided; and
- understand the challenges facing the HIA practitioner in making the most appropriate use of an HIA.

3.1.3 Target Audience

Due to the nature of EIA work, a cross-sectoral target audience is very important for the success of this module. Hence, participants should come from the environment as well as the health sector, preferably with some experience in either health or environmental impact assessments.

¹ Ben Cave Associates Ltd., United Kingdom

² Gibson Consulting and Training, United Kingdom

3.1.4 Learning objectives

By completion of this course on health in EIA, participants should be able to:

- use HIA and health in EIA to influence decisions regarding planning applications;
- commission health within EIA, or HIA, to inform sound decision-making and enhance the health of the wider population;
- confront the conflicts inherent within health in EIA or in HIA;
- liaise with other disciplines to improve the content of the health input to EIA;
- challenge unreasonable assumptions regarding health within EIA;
- utilize the datasets provided from other disciplines; and
- align social data with corresponding environmental data.

3.1.5 Expected output

Individuals will be able to chair a steering group and have a clear understanding of what information is required and why, where to acquire it and how to present it for maximum impact.

3.1.6 Proposed module format

This training module should be taught over the course of a three day period and in concert with a health in SEA module. The summary format that follows is for illustrative purposes to show how the module could be implemented. Full suggested timetables and times in the schedule can be found in the participant guidance document (see Annex Module B).

Day 1 – Morning slot

- Outline of three day programme: aims objectives and crossovers
- Headlines: HIA in the wider context of SEA; drivers and synergies

Day 1 – Afternoon slot

- Stages in an HIA
- Cultural influences on HIA practice
- Commonality of technical language within an HIA
- Introduction to case study

Day 2 – Morning slot

- Case Study: Health and socioeconomic assessment (group A)
- Case Study: Health and environmental protection (group B)

Day 2 – Afternoon slot

- Case Study: Health and socioeconomic assessment (group B)
- Case Study: Health and environmental protection (group A)

Day 3 – Morning slot

- Coordination of outcomes from day 2
- Filtering pertinent information
- Assessing shortfalls in information
- Presenting findings into cohesive structure

Day 3 – Afternoon slot

- How does HIA fit into the wider process? How are HIAs used? What can they achieve?
- How can you assure the quality of a completed HIA?
- What information sources are there for HIA?
- Where next?

3.1.7 Methods used

- presentations
- group discussions
- small group work
- role play
- individual learning
- brainstorming

3.1.8 Recommended readings for participants

See reference list below. List is recommended as additional post-training support.

3.1.9 Recommended case studies for participants

Case studies meant to be given out at the appropriate time during training. In this manual, we provide abbreviated information on two case studies used during the health in EIA training. Contact module authors for full case studies.

3.1.10 Required material for training delivery

- pencil/paper – attendees
- post-it notes
- flip charts, pens, reusable adhesives
- computers/projector screens/video enabled (need speakers)

3.1.11 Module references

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3.2 Module B – Health in strategic environmental assessment (SEA)

Developed by Lea den Broeder³ and Maria do Rosário Partidário⁴

3.2.1 Module summary

This three day module focuses on the role of strategic environmental assessment in relation to integrating health issues. During the module participants will be introduced to SEA concepts and process dynamics, as well as to health issues when considered from a strategic perspective. Participants will obtain a full understanding of SEA as a process and instrument by means of a policy case study which illustrates the need to look at health concerns in a strategic context.

Mini-lectures will be supported by hands-on practical exercises and feed-back on exercises conducted. The cases used in these exercises focus on strategic energy policies. Participants are expected to actively participate in the module work and a final presentation of the groups' work can be held during the last hour of the module.

3.2.2 Module aims

The aims of this module are to:

- introduce participants to SEA and health issues when considered from a strategic perspective;
- clarify the meaning of SEA as a strategic instrument, illustrate SEA thinking, how it works and how it can be used to focus on health concerns in policy decision-making;
- explain the coherence of broad environmental and health issues; and
- demonstrate skills and methods of including health in broad strategic policy development.

3.2.3 Target audience

Due to the nature of SEA work, a cross sectoral target audience is very important for the success of this module. Hence, participants should come from the environment as well as the health sector, preferably with some experience in either health or environmental impact assessments.

Ideal background for an SEA trainer in health

The trainer should:

- have a strategic thinking mind set;
- broad environment/sustainability/health background;
- ideally trainer for SEA and health should combine a broad and strategic mind health expert and an broad and strategic mind SEA expert;
- be able to stimulate strategic thinking in trainees;
- have capacity to create discussion space and encourage exchange of perspectives;

³ National Institute for Public Health and the Environment (RIVM), Netherlands

⁴ Instituto Superior Tecnico, Departamento de Engenharia Civil e Arquitectura, Lisboa, Portugal

- use stimulating examples through which people can imagine situations; and
- provide a minimum of essential information and references for further exploration.

3.2.4 Learning objectives

By completion of the training course, participants should be able to:

- explain the specificities of SEA and why health should be addressed in such assessments;
- explain the difference between strategic health considerations and health outcome calculations;
- explain the importance of health sensitivity in SEA for practical implementation of broad policies;
- demonstrate skills in negotiating the inclusion of health issues in SEA processes; and
- demonstrate skills in presenting health aspects of broad environmental policies.

3.2.5 Expected outputs

Individuals will be able to participate and consider health in a SEA with assurance that they understand why certain kinds of information is required, where to acquire it and how to present it for maximum impact.

3.2.6 Proposed module format

This module is meant to be carried out in concert with the module on health in EIA over the course of a three day period. The summary format that follows is for illustrative purposes to show how the module could be implemented. Full suggested timetables and times in the schedule can be found in the participant roadmap.

Day 1 – Morning slot

- Introduction to SEA and Health in SEA;
- Energy policies- strategic health issues- technical lectures and group work
- Questions and answers

Day 1 – Afternoon slot

- Case study exercise: understanding the energy policy strategy and health implications – group discussion
- Group feedback

Day 2 – Morning slot

- Getting focused in SEA: mini-lecture
- Case exercise: relevant strategic issues to consider – group discussion

Day 2 – Afternoon slot

- Assessment in SEA – looking for strategic options – mini-lecture
- Case exercise: alternative policy options that enhance health issues – group discussion

- Group feed-back

Day 3 – Morning slot

- Assessment in SEA – option assessment and guidelines for follow-up – mini-lecture
- Case exercise: options assessment using health-inclusive criteria, and follow-up – group discussion

Day 3 – Afternoon slot

- Group feed-back
- Discussion over SEA role for health enhancement

3.2.7 Methods to be used

- mini-lectures and short presentations
- role play
- group discussion and joint presentations
- small group work
- final presentation

3.2.8 Recommended readings for participants

Ahmed K, Sanchez-Triana E (2008). *Strategic Environmental Assessment for Policies*. Washington, DC, World Bank.

Dalal-Clayton B, Sadler B (2005). *Strategic Environmental Assessment, a sourcebook and reference guide to international experience*. London, Earthscan.

Jones C et al. (2005). *Strategic Environmental Assessment and Land Use Planning – an international evaluation*. London, Earthscan.

OECD (2006). *Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation*. Paris, Organisation for Economic Co-operation and Development. .

Partidário MR (1999). Strategic Environmental Assessment – principles and potential. In: Petts J, ed. *Handbook of Environmental Impact Assessment*, London, Blackwell Science:60–73.

Partidário MR (2007). Scales and associated data – what is enough for SEA needs? *Environmental Impact Assessment Review*, 27:460–478

Partidário MR (2007a). *Strategic Environmental Assessment: Good Practices Guide – methodological guidance*. Lisbon, Portuguese Environment Agency (www.seataskteam.net/library.php, accessed 1 March 2013).

Partidário MR (2012). *Strategic Environmental Assessment: Better Practice Guide – Methodological guidance for strategic thinking in SEA*. Lisbon, Portuguese Environment Agency (www.seataskteam.net/library.php, accessed 1 March 2013).

Sadler B et al. (2011). *Handbook on SEA*. London, Earthscan.

Schmidt M, João E, Albrecht E, eds. (2005). *Implementing Strategic Environmental Assessment*. Berlin, Springer-Verlag.

Therivel R (2004). *Strategic Environmental Assessment in Action*. London, Earthscan.

UNEP (2009). *Integrated Assessment: Mainstreaming sustainability into policy-making. A guidance manual*. Geneva, United Nations Environment Programme.

Journals

- Environmental Impact Assessment Review
- Impact Assessment and Project Appraisal
- Journal of Environmental Assessment Policy and Management
- Sustainability
- Sustainable Development

Key legislation

European Union (2001). Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. *Official Journal of the European Communities*, L 197, 21.7.01:30–37 (<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:197:0030:0037:EN:PDF>, accessed 2 May 2013).

UNECE (1998). *Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters done at Aarhus, Denmark, on 25 June 1998*. Geneva, United Nations Economic Commission for Europe (<http://www.unece.org/env/pp/treatytext.html>, accessed 1 March 2013).

UNECE (2010). *Kiev Protocol on Pollutant Release and Transfer Registers*. Geneva, United Nations Economic Commission for Europe (<http://www.unece.org/env/pp/prtr.html>, accessed 1 March 2013).

3.2.9 Recommended links for participants

- IAIA – International Association for Impact Assessment (<http://www.iaia.org>)
- UNECE – United Nations Economic Commission for Europe (Espoo and Aarhus Conventions) (<http://www.unece.org/env/welcome.html>)
- EEA – European Environment Agency (<http://www.eea.europa.eu/>)
- European Commission Directives (<http://eur-lex.europa.eu/pt/index.htm>)
- European Commission – environment (http://ec.europa.eu/environment/index_en.htm)
- European Commission – sustainable development (<http://ec.europa.eu/environment/eussd/>)
- European Commission – environmental impact assessment and strategic environmental assessment (<http://ec.europa.eu/environment/eia/home.htm>)

3.2.10 Required material for training delivery

- hand-outs
- background reading
- case-study description and related case-study material when relevant
- data-show, flipchart, pens, round tables

3.2.11 Module references

- Morin E, Viveret P (2010). *Comment vivre en temps de crise*. Montrouge cedex, Bayard Éditions.
- Lloyaza F, Verheem R, Partidário MR (2008). *Preparation of the SEA Theme Forum – 28th Annual Conference of the International Association for Impact Assessment 4–10 May 2008, Perth, Australia*. Fargo, ND, IAIA.
- Mintzberg H (1994). *The rise and fall of strategic planning*. Cornwall, Prentice Hall International.
- Noble B, Harriman J (2008). *Strengthening the foundation for regional scale strategic environmental assessment in Canada. Research report prepared for the Canadian Council of Ministers of Environment Environmental Assessment Task Group under contract agreement*. Ontario, Canada, Canadian Council of Ministers of Environment.
- OECD-DAC (2006). *Good Practice Guide on applying Strategic Environmental Assessment (SEA) in Development Cooperation*. Paris, Organisation for Economic Co-operation and Development.
- Partidário MR (1999). Strategic Environmental Assessment – principles and potential. In: Petts J, ed. *Handbook of Environmental Impact Assessment*, London, Blackwell Science: 60–73.
- Partidário MR (2002). *Pre-Conference Training on Strategic Environmental Assessment (SEA) – key elements and practices in European approaches. 22nd Annual Conference Event of the International Association for Impact Assessment, 15–21 June 2002, The Hague, Netherlands*. Fargo, ND, IAIA.
- Partidário MR (2007). *Strategic Environmental Assessment: Good Practices Guide - methodological guidance*. Lisbon, Portuguese Environment Agency (www.seataskteam.net/library.php, accessed 1 March 2013).
- Steinemann A (2001). Improving alternatives for environmental impact assessment. *Environmental Impact Assessment Review*, 21:3–21.

3.3 Module C.1 – Methods for risk assessment related to contaminated sites

Developed by Ivano Iavarone⁵, Roberto Pasetto⁵ and Roberta Pirastu⁶

3.3.1 Module summary

This one day module introduces concepts and guidance on how to deal with EH in contaminated sites (CS) using simple and most frequently available vital statistics. Participants learn to assess appropriate responses to emerging problems associated with contaminated sites. Going through a case-study, participants are provided with methodological tools to examine environmental health aspects of living in CS.

This module is divided into three slots, each one including an introductory lesson, a practical guided work group session and a plenary discussion. The first slot introduces important issues related to CS and presents an *a priori* evaluation of the epidemiological evidence of the causal association between specific diseases and environmental exposures in CS. The second slot addresses methodological aspects related to describing population health status in CS with an opportunity for participants to work through an example of calculation of crude rates, standardized rates, and standardized mortality/morbidity ratios, by age and socioeconomic status, using an Excel spreadsheet. Based on the case-study results and information available from other studies provided, the third slot proposes a guided approach on how to:

- decide on the need for further studies;
- identify aspects that allow for attribution of environmental causes to a given health profile; and
- recognize public health implications in terms of preventive interventions to be implemented.

A final presentation sums up the key principles in evaluating EH aspects of CS and strengthens the information acquired by participants.

3.3.2 Module aims

The aims of the module are

- to show participants a novel approach for a first step evaluation of the association between contamination sources and health status of populations living in CS; and
- to provide participants with a framework for evaluating research evidence and making decisions on further studies and public health interventions.

3.3.3 Target audience

Professionals from national, regional or local public health or environmental health agencies/institutions, from Ministries of Environment and of Health; environmental health policy-makers and managers.

⁵ Istituto Superiore di Sanità, Italy

⁶ Università La Sapienza, Italy

3.3.4 Learning Objectives

Upon completion of this module, participants should be able to:

- relate the key importance of evaluating the epidemiological evidence of the association between exposure/s in CS and health status;
- describe different bibliographic sources and their relevance in the evaluation of the epidemiological evidence;
- make calculations to examine health status of residents in CS using vital statistics in a case-study; and
- evaluate research evidence and identify main criteria for further research and public health interventions.

3.3.5 Expected outputs

Participants will be able to assess aspects attributable to environmental causes associated with CS and recognize public health implications in terms of preventive interventions to be implemented.

3.3.6 Proposed module format

This module consists of three different slots that can be taught over the course of one day. What follows is a suggested format for module delivery.

Morning – slot 1

- Presentation of the mortality study of residents in CS from the Italian SENTIERI Project;
- Evaluation of the epidemiological evidence of the association between environmental exposure and disease: case-study from the SENTIERI Project; and

Afternoon – slot 2

- Introduction to ecological studies
- Risk indicators: crude rates, direct standardized rates, standardized mortality/morbidity ratios
- How to calculate risk indicators in the case-study

Afternoon – slot 3

- How to go through a priori evidence and health statistics
- Key principles for evaluating EH aspects of CS
- How to recognize the public health implications in terms of preventive interventions to be implemented

3.3.7 Methods to be used

- short lectures
- group work on case studies
- presentations and discussion

3.3.8 Recommended readings for participants

- Elliott P, Wartenberg D (2004). Spatial Epidemiology: Current Approaches and Future Challenges. *Environment and Health Perspectives*, 112(9):998–1006 (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1247193/pdf/ehp0112-000998.pdf>, accessed 2 May 2013).
- Pasetto R, Sampaolo L, Pirastu R (2010). Measures of material and social circumstances to adjust for deprivation in small-area studies of environment and health: review and perspectives. *Annali dell'Istituto Superiore di Sanità [Annals of the National Institute of Health]*, 46(2):185–197 (http://www.iss.it/binary/publ/cont/Ann_10_02_13.pdf, accessed 1 March 2013).
- Pirastu R et al., eds. (2010). SENTIERI Project – Mortality study of residents in Italian polluted sites: evaluation of the epidemiological evidence. *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 34(5–6 Suppl. 3):1–96 (http://www.epiprev.it/materiali/2010/EP5-6_2010_suppl3.pdf, accessed 1 March 2013; in Italian and English).
- Pirastu R et al. (2011). SENTIERI Project – Mortality study of residents in Italian polluted sites: Results. *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 35(5–6 Suppl. 4):1–204 (<http://www.epiprev.it/pubblicazione/epidemiol-prev-2011-35-5-6-suppl-4>, accessed 1 March 2013; in Italian and English).
- Schoenbach VJ, Rosamond WD (1999). Standardization of rates and ratios. In: *Understanding the Fundamentals of Epidemiology – an evolving text*. Chapel Hill, NC, University of North Carolina:129–160 (<http://www.epidemiolog.net/evolving/FundamentalsOfEpidemiology.pdf>, accessed 1 March 2013).

3.3.9 Recommended links for participants

- EPA (2001). Contaminated Media, Human Health, and Environmental Effects [web site]. Washington, DC, United States Environmental Protection Agency (<http://www.epa.gov/superfund/health/index.htm>, accessed 1 March 2013).
- EEA (2007). Progress in management of contaminated sites (CSI 015) – Assessment published Aug 2007 [web site]. Copenhagen, European Environment agency (<http://www.eea.europa.eu/data-and-maps/indicators/progress-in-management-of-contaminated-sites/progress-in-management-of-contaminated-1>, accessed 1 March 2013).
- EPA (2013). Risk Assessment [web site]. Washington, DC, United States Environmental Protection Agency (<http://www.epa.gov/risk/>, accessed 1 March 2013).
- Kunzli et al. (2000). Public-health impact of outdoor and traffic-related air pollution: a European assessment. *The Lancet*, 356(9232):795–801 (<http://www.sciencedirect.com/science/article/pii/S0140673600026532>, accessed 2 May 2013)

3.3.10 Required materials for the training delivery

- copies of selected articles (abstract)
- table to fill in for evidence evaluation
- PC & beamer
- calculators
- access to the web

3.3.11 Module references

Slot 1: Evaluation of the epidemiological evidence

Pirastu R et al., eds. (2010). SENTIERI Project – Mortality study of residents in Italian polluted sites: evaluation of the epidemiological evidence. *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 34(5–6 Suppl. 3) (http://www.epiprev.it/materiali/2010/EP5-6_2010_suppl3.pdf, accessed 1 March 2013; in Italian and English).

Slot 2: Main reference to develop approach on how to evaluate contaminated sites

Pirastu R et al., eds. (2011). SENTIERI Project – Mortality study of residents in Italian polluted sites: Results *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 35(5–6 Suppl. 4) (<http://www.epiprev.it/pubblicazione/epidemiol-prev-2011-35-5-6-suppl-4>, accessed 1 March 2013; in Italian and English).

Slot 2: other essential references:

Schoenbach VJ, Rosamond WD (1999). Standardization of rates and ratios. In: *Understanding the Fundamentals of Epidemiology – an evolving text*. Chapel Hill, NC, University of North Carolina:129–160 (<http://www.epidemiolog.net/evolving/FundamentalsOfEpidemiology.pdf>, accessed 1 March 2013).

Elliott P, Wartenberg D (2004). Spatial Epidemiology: Current Approaches and Future Challenges. *Environment and Health Perspectives*, 112(9):998–1006 (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1247193/pdf/ehp0112-000998.pdf>, accessed 1 March 2013).

Pasetto R, Sampaolo L, Pirastu R (2010). Measures of material and social circumstances to adjust for deprivation in small-area studies of environment and health: review and perspectives. *Annali dell'Istituto Superiore di Sanità*, 46(2):185–197 (http://www.iss.it/binary/publ/cont/Ann_10_02_13.pdf, accessed 1 March 2013).

Slot 3:

Pirastu R et al., eds. (2010). SENTIERI Project – Mortality study of residents in Italian polluted sites: evaluation of the epidemiological evidence. *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 34(5–6 Suppl. 3) (http://www.epiprev.it/materiali/2010/EP5-6_2010_suppl3.pdf, accessed 1 March 2013; in Italian and English).

Pirastu R et al., eds. (2011). SENTIERI Project – Mortality study of residents in Italian polluted sites: Results *Epidemiologia e Prevenzione [Epidemiology and Prevention]*, 35(5–6 Suppl. 4) (<http://www.epiprev.it/pubblicazione/epidemiol-prev-2011-35-5-6-suppl-4>, accessed 1 March 2013; in Italian and English).

3.4 Module C.2 – Quantitative risk assessment methods

Developed by Paul Wilkinson⁷

3.4.1 Module summary

This module is an introduction to the concepts and methods of quantitative risk assessment (QRA). It should be taught using a case study example. Participants initially work in groups, with minimal guidance from tutors, to formulate their own response to a hypothetical problem regarding alternative options for increasing electricity production of a small city. They are asked to come up with estimates of health impact relating to the alternative options and to prepare a presentation to explain their reasoning and findings. This will be used to discuss the process of QRA and the interpretation of evidence derived from it. Participants are then asked to work through an example QRA calculation using an Excel spreadsheet, and will discuss and see a demonstration of methods for characterizing uncertainties in such calculations. Finally, a formal presentation will be made to cover the key principles of QRA and to consolidate the messages learned from the practical exercises.

3.4.2 Module aims

To apply methods for quantifying the risks to health of environmental exposures in a way that equips trainees with the principles of how to undertake a QRA analysis and compare alternative policy options using QRA methods.

3.4.3 Target audience

The target audience for this module should have the following characteristics:

- a general understanding of environmental epidemiology and health concept
- consist of a maximum of 12–24 participants that can be divided into three to five small groups
- for small groups, at least one person familiar with Excel

3.4.4 Learning objectives

At the end of this session participants should be able to:

- outline the method of using QRA for assessing the likely health impact of environmental exposures;
- describe the four main steps of QRA as conventionally defined; and
- explain the uncertainties in the risk assessment process and outline how they could be addressed.

⁷ London School of Hygiene and Tropical Medicine, United Kingdom

3.4.5 Expected output

- insight into QRA methods;
- understanding of how to formulate a QRA to compare health impacts of alternative scenarios; and
- understanding of how to interpret the results of QRA.

3.4.6 Proposed module format

The QRA module can be taught over a one day period using the following format.

Morning slot:

- Case study: description of hypothetical scenario and task
- Group work to develop response to the set task
- Assembly of materials and carrying out of risk calculations
- Presentation of results to class
- Discussion

Afternoon slot:

- Computer practical: use of a simple Excel spreadsheet
- Discussion of sources of uncertainty and interpretation of QRA evidence
- Demonstration of methods for quantifying uncertainties
- Wrap-up lecture

Suggested timetable:

Morning slot

9.30–9.45	Explanation of QRA exercise
9.45–12.00	Group work: formulation of QRA, carrying out of calculations and preparation of group presentation of findings
12.00–12.30	Presentations

Afternoon slot

13.30–14.00	Discussion of lessons from morning activities
14.00–15.00	Carrying out a QRA calculation in a simple Excel spreadsheet
15.30–16.30	Handling uncertainties: demonstration of methods for quantification
16.45–17.30	Wrap-up lecture and discussion

3.4.7 Methods used

- small group work
- working through hypothetical problem
- presentations and discussion
- computer practicals
- demonstration
- lecture

3.4.8 Recommended reading for participants

Median S et al. (2004). Apehis: public health impact of PM 10 in 19 European cities. *Journal of Epidemiology & Community Health*, 58:831–836.

Kunzli et al. (2000). Public-health impact of outdoor and traffic-related air pollution: a European assessment. *The Lancet*, 356(9232):795–801.

3.4.9 Recommended links for participants

EPA (2013). Risk Assessment [web site]. Washington, DC, United States Environmental Protection Agency (<http://www.epa.gov/risk/>, accessed 1 March 2013).

3.4.10 Recommended case studies for participants

See Annex Module C.2 for training case study developed by Paul Wilkinson.

3.4.11 Required material for training delivery

- PCs
- calculators
- access to the web
- flipcharts and marker pens
- data projector

3.4.12 Module references

Median S et al. (2004). Apehis: public health impact of PM 10 in 19 European cities. *Journal of Epidemiology & Community Health*, 58:831–836

Kunzli et al. (2000). Public-health impact of outdoor and traffic-related air pollution: a European assessment. *The Lancet*, 356(9232):795–801.

3.5 Module C.3 – Environmental Burden of Disease

Developed by Otto Hänninen⁸

3.5.1 Module summary

This module is an introduction to the concepts and methods of EBD. It aims to give participants hands on experience using various methods for quantifying the burden of disease from selected environmental exposures so that they will understand how burden of disease estimates are produced and interpreted when setting policy priorities for protecting public health. The module uses a combination of lectures, group work discussions, calculations and case studies as teaching methods. It features case study examples with selected environmental stressors (like particulate matter PM_{2.5}), second hand smoke, radon). After an introduction to EBD concepts and methods, participants are asked to work in groups, with minimal guidance from tutors, to formulate their initial response to the scope of the listed environmental health problems. Participants then work through the example EBD calculation using an Excel spreadsheet, national input data on exposures, WHO data on background burden of disease, and exposure-response functions. Finally, a formal presentation of the small groups will be made to cover the key messages learned from the exercises.

3.5.2 Module aims

The aims of this module are to

- give participants hands on experience using various methods for quantifying the burden of disease from selected environmental exposures; and
- explain how burden of disease estimates are produced and how they can be interpreted when setting policy priorities for protecting public health.

3.5.3 Target audience

The target audience for this module should have the following characteristics:

- a general understanding of environmental epidemiology and health concept
- consist of a maximum of 12–24 participants that can be divided into three to six small groups
- for small groups, at least one person familiar with Excel

3.5.4 Learning objectives

Upon completion of this module, participants should be able to:

- distinguish between the basic concepts of burden of disease, DALYs, target health endpoints and illustrate the importance of the background burden of disease;
- describe the main steps in estimating EBD and recognize the most common types of exposure response models; and
- explain the health end points covered by the exemplary assessment and identify the potentially missing outcomes.

⁸ National Institute for Health and Welfare (THL), Finland

3.5.5 Expected outputs

Expected outputs from this module are:

- numerical estimates of national burden of disease for selected stressors and outcomes;
- a list of key principles and data sources for EBD assessments; and
- acquisition of practical experience applying commonly used EBD model types.

3.5.6 Proposed module format

This module can be taught over the course of a day with a duration of approximately four and a half hours. The following format can be used:

Morning slot

- Introduction to the concepts and methods
- Formation of the small groups and handling of input data
- National data extraction and model development

Afternoon slot

- Demonstration of the EBD calculations
- Finalization of the case study models
- Presentation of the results to the class
- Exercise summary

The PowerPoint slides accompanying this module indicate which slides correspond to each of the above lesson slots.

3.5.7 Methods used

- lecture with PowerPoint slides
- group work on case study
- group work feed back
- group discussions

3.5.8 Recommended readings for participants

- WHO Environmental Burden of Disease series (see links below)
- Hänninen O, Knol A, eds. (2011). *European Perspectives on Environmental Burden of Disease: Estimates for Nine Stressors in Six European Countries*. Helsinki, National Institute for Health and Welfare (THL Reports 1; <http://www.thl.fi/thl-client/pdfs/b75f6999-e7c4-4550-a939-3bccb19e41c1>, accessed 1 March 2013).

3.5.9 Recommended case studies and links for participants

- WHO (2013). Quantifying Environmental Health Impacts [web site]. Geneva, World Health Organization (http://www.who.int/quantifying_ehimpacts/en/, accessed 1 March 2013).
- WHO (2013). Quantifying Environmental Health Impacts, Publications [web site]. Geneva, World Health Organization (http://www.who.int/quantifying_ehimpacts/publications/en/, accessed 1 March 2013).
- OPASNET (2012). EboDE [web site]. Helsinki, National Institute for Health and Welfare (<http://en.opasnet.org/w/Ebode>, accessed 1 March 2013).

3.5.10 Required materials for the training delivery

- computers with Excel spreadsheet software
- access to the Internet
- data projector
- pens, notebook

3.5.11 Module references

General methodology

- Hänninen O, Knol A, eds. (2011). *European Perspectives on Environmental Burden of Disease: Estimates for Nine Stressors in Six European Countries*. Helsinki, National Institute for Health and Welfare (THL Reports 1; <http://www.thl.fi/thl-client/pdfs/b75f6999-e7c4-4550-a939-3bccb19e41c1>).
- OPASNET (2012). Ranking of environmental stressors by health impact in Europe (EBoDE pilot). Helsinki, National Institute for Health and Welfare (<http://en.opasnet.org/w/Ebode>, accessed 1 March 2013).
- WHO (2013). Quantifying Environmental Health Impacts [web site]. Geneva, World Health Organization (http://www.who.int/quantifying_ehimpacts/en/, accessed 1 March 2013).
- WHO (2013). Quantifying Environmental Health Impacts, Publications [web site]. Geneva, World Health Organization (http://www.who.int/quantifying_ehimpacts/publications/en/, accessed 1 March 2013).

Particulate matter (PM_{2.5})

EEA (2009). *Spatial assessment of PM10 and ozone concentrations in Europe (2005)*. Copenhagen, European Environment Agency (Technical Report 1/2009; <http://www.eea.europa.eu/publications/spatial-assessment-of-pm10-and-ozone-concentrations-in-europe-2005-1>, accessed 1 March 2013).

Hurley F et al. (2005). *Service Contract for Carrying out Cost-Benefit Analysis of Air Quality Related Issues, in particular in the Clean Air for Europe (CAFE) Programme: Methodology for the Cost-Benefit analysis for CAFE: Volume 2: Health Impact Assessment*. Oxon, AEA Technology Environment (http://ec.europa.eu/environment/archives/cafepdf/cba_methodology_vol2.pdf, accessed 1 March 2013).

Leeuw de F, Horalek J (2009). *Assessment of the health impacts of exposure to PM2.5 at a European level*. Bilthoven, European Topic Centre (ETC/ACC Technical Paper 2009/1; (http://acm.eionet.europa.eu/docs/ETCACC_TP_2009_1_European_PM2.5_HIA.pdf, accessed 1 March 2013).

Radon

Darby S et al. (2005). Radon in homes and lung cancer risk: collaborative analysis of individual data from 13 European case-control studies. *British Medical Journal*, 330:223–226 (<http://www.bmj.com/cgi/reprint/330/7485/223>, accessed 2 July 2009).

Darby S et al. (2006). Residential radon and lung cancer—detailed results of a collaborative analysis of individual data on 7148 persons with lung cancer and 14 208 persons without lung cancer from 13 epidemiologic studies in Europe. *Scandinavian Journal of Work, Environment and Health*, 32(Suppl. 1):1–84 (http://www.sjweh.fi/show_abstract.php?abstract_id=982 (abstract only for non-subscribers, accessed 2 July 2009).

Second hand smoke

European Commission (2009). *Survey on Tobacco. Analytical report*. Brussels, EC Directorate General Health and Consumers (Flash Eurobarometer 253; http://ec.europa.eu/public_opinion/flash/fl_253_en.pdf, accessed 1 March 2013).

WHO (2010a). *Second-hand smoke: Assessing the burden of disease at national and local levels*. Geneva, World Health Organization (Environmental Burden of Disease Series No.18; http://www.who.int/entity/quantifying_ehimpacts/publications/SHS.pdf, accessed 1 March 2013).

WHO (2010b). *Global estimate of the burden of disease from second-hand smoke*. Geneva, World Health Organization (http://whqlibdoc.who.int/publications/2010/9789241564076_eng.pdf, accessed 1 March 2013).

3.6 Module D – Training of Trainers

Developed by Franziska Matthies⁹ and Francesco Mitis¹⁰

3.6.1 Module summary

The Training of Trainers (TOT) module has been developed as a set of tools to raise trainee awareness of didactic and other participatory methods that can be utilized in the teaching of the technical modules featured in this manual. TOT provides an opportunity to reflect on what has been learned from a methodological point of view and is meant to foster a future multiplier effect of newly acquired knowledge.

This module uses participatory approaches and a mix of training exercises, facilitated group work and discussion with the aim of demonstrating various training techniques and methods. It incorporates general contents like presentation skills, tools for lecturing (e.g. group work, case studies, presentation skills, brain storming, visualizing, etc.) and knowledge on group dynamics. The teaching strategy utilized in the TOT module is to actively use various participatory approaches and exercises, instead of giving a theoretical overview. The module illustrates an array of effective methods for training and capacity building while giving participants the chance to actively experience and contribute to a participatory approach. It also provides participants with practical steps for future continuation of work carried out during the training event. It is expected that after completion of this course and the TOT module, participants should be able to organize training courses on EH in their own countries.

This module has been developed from a pool of materials and can be assembled according to the needs of the group being trained. The content is intended to remain open and flexible. All slides or a selection of slides can be used and new ones can be added to supplement the existing set. To best reach participants, groups should be limited to a maximum of 25 participants.

3.6.2 Module aims

The aims of this module are to:

- explain factors that promote and explain adult learning; and
- provide theory theoretical and practical information for designing and running a training module or course.

3.6.3 Target audience

Potential future trainers in the EH area.

⁹ Consultant, Germany

¹⁰ WHO Regional Office for Europe

3.6.4 Learning objectives

Upon completion of the TOT module, participants should be able to:

- describe different learning styles;
- identify a range of presentation and group work techniques (like facilitated group discussion, buzz groups, brainstorming, power point presentation, flip charts, pin-board techniques etc.);
- differentiate between the roles of a trainer and a facilitator;
- provide examples on how to use the potential of working with groups; and
- structure and draft the outline of a module/course on a specific environment and health topic.

3.6.5 Expected outputs

- list of different training methods; and
- outline of a one day workshop on environment and health.

3.6.6 Proposed module format

The TOT module has been implemented as the last module of a five day training event but it is flexible and can also be carried out over the course of a two to three day period if time permits and depending on participant needs.

Train the trainers consists of the following seven separate sessions:

1. Train the trainer – This session is an introduction to module and course outline with aims and learning objectives.
2. Learning and the brain – This session describes factors that influence memory and multi-sensorial learning approaches.
3. Learning styles – This session employs a tool to help participants identify their own learning style, how to use different learning styles and value the importance of using different teaching methods to address the mix of learning styles found in groups of trainees.
4. Roles of trainers and facilitators – This session provides information on the difference between trainers and facilitators and describes the roles and behaviours of each.
5. Tips for presentations – This session provides participants with tips on how to make the most out of the training environment they are in and how to best communicate their message to the audience.
6. Giving instructions to learners – This session identifies important elements to use when giving instructions to learners.
7. Working with groups of trainees – This session provides information on how to best recognize the potential in a group and how to deal with difficult situations that groups may present.

The following format can be used for a one day module.

Morning slot

- 10.30 – 11.00 Recap/feedback on teaching styles in previous day modules (scoring exercise and discussion)
- 11.00 – 11.30 Learning and the brain
- 11.30 – 12.00 Working with different learning styles

Afternoon slot

- 13.30 – 14.00 Trainers and facilitators
- 14.00 – 14.20 Tips on presentations
- 14.20 – 14.40 Giving instructions
- 14.40 – 14.50 Working with groups of trainees
- 15:15 – 16:00 Designing a course – an exercise

3.6.7 Methods to be used

- different presentation techniques
- brainstorming
- group work
- scoring exercise
- buzz exercise

3.6.8 Recommended readings for participants

Forehand M (2005). Bloom's taxonomy: Original and revised. In: Orey M, ed. *Emerging Perspectives on Learning, Teaching, and Technology*. Athens, GA, University of Georgia (<http://projects.coe.uga.edu/epltt/> , accessed 1 March 2013).

Forrest C (2003). Writing training objectives using SMART. In: *Train the Trainer, Issue 3*. Littleport, Fenman Ltd.

3.6.9 Recommended case studies for participants

See Case studies on giving instructions (see Annex D).

3.6.10 Required materials for the training delivery

- PC & beamer
- flipcharts – poster papers
- post-it (big different colours)
- sticker dots (different colours)
- pins to hang up flipchart sheets
- Coloured marker pens

3.6.11 Module references

Detterman DK (1975). The von Restorff effect and induced amnesia: production by manipulation of sound intensity. *Journal of Experimental Psychology Human Learning and Memory*, 1(5):614–628.

Ebbinghaus H (1885). *Über das Gedächtnis. Untersuchungen zur experimentellen Psychologie*. Leipzig, Duncker & Humblot.

Ebbinghaus H (1913). *Memory: A Contribution to Experimental Psychology*. New York, Teachers College, Columbia University (<http://psy.ed.asu.edu/~classics/Ebbinghaus/index.htm>, accessed 1 March 2013).

Honey P, Mumford A (2000). *The learning styles helper's guide*. Maidenhead, Peter Honey Publications Ltd. (http://www.nwlink.com/~donclark/hrd/styles/honey_mumford.html, accessed 1 March 2013).

4 Using the modules most effectively – A theoretical background of the training concept

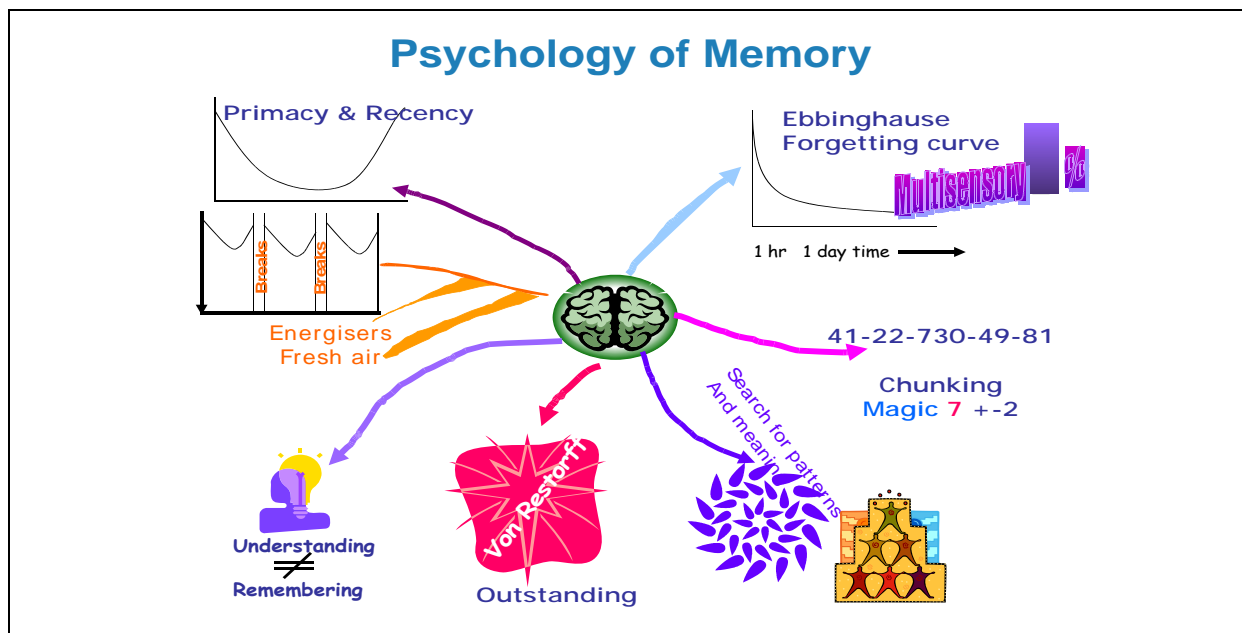
This chapter will give some theoretical background to the training concept used for the modules based on the contents of the TOT module. The aim of this chapter is to provide potential trainers with information on issues that are important to consider when planning and conducting a training course.

The TOT module was taught using participatory approaches as opposed to traditional lecture alone. It employed a mix of training, facilitated group work and discussion. The following sections provide information on the learning process followed by techniques that can be adopted by course facilitators or trainers.

4.1 Learning and the brain

An understanding of learning and the brain is useful in the context of a training programme as the use of a mix of approaches keeps the brain active and helps to “cement” the new knowledge acquired. When considering the psychology of memory **primacy and recency** explain the importance of timing learning sessions and breaks in the right way (e.g. proportion, duration and frequency). For example, information provided at the beginning and at the end of a session are usually remembered best. This has implications for the time table and structure of a training course and its delivery. Lengthy lectures run the risk of losing trainee attention early on as does delivery of consecutive lectures without breaks. It is preferable to alternate lectures with exercises, interaction and discussion, not leaving the latter for the end (Sousa, 2011).

Fig. 2 Psychology of Memory



Source: PBL Consulting LTD (2009)

With respect to retention of new information, according to the **Ebbinghaus “Forgetting Curve”**, working on short term memory is inefficient. This curve shows that unrelated pieces of information are easily forgotten with recall rate after one hour being 50% and after one month, 20% (Ebbinghaus, 1885).

Studies have shown that the optimal number of elements for the memory seems to be around seven, plus or minus two. People find it a challenge to recall lists of more than seven items, a

technique that can be dated back to Alexander Graham Bell when **chunking** telephone area codes and individual numbers (Miller GA, 1956).

To increase the memory curve, **meaning, association, pattern and principles** must be found in learning material. In the absence of strategies to associate information, long term memory information is quickly lost. As learning is a dual process involving the conscious and the subconscious, emotional and intellectual, any learning initiative should combine as many of the six key multisensorial pathways to the brain as possible: seeing, hearing, tasting, doing, touching, tasting and smelling (Dryden & Vos, 1999).

Memory involves forming new links to existing networks of information. Identifying principles and patterns leads to much better medium- and long-term recall since deeper processing requires conscious involvement and leads to connections with familiar material. The **von Restorff effect** states that we remember elements that stand out more easily such as shapes, coloured text or well known names. Furthermore, the higher arousal associated with the outstanding element can also have an increased effect on surrounding information (Detterman, 1975). Such “brain arousal” techniques should be employed when planning the delivery of information within a training course be it a lecture or group work.

In 1998, Johnson-Laird proposed a five-step process for understanding and remembering which includes:

- 1) the registration of information and decision to remember;
- 2) the mental representation of the information;
- 3) the maintenance of the memory;
- 4) retrieval of the memory; and
- 5) and the retention of the memory during thought processes (Johnson-Laird, 1998).

4.2 Learning styles

The importance of acknowledging different teaching methods to address mixes of learning styles must also be taken into consideration when designing a training course. Practical tools for assessing learning styles exist such as the Honey and Mumford’s learning styles questionnaire. This questionnaire is designed to identify trainee preferred learning styles and pinpoint learning preferences (Honey et al, 2000). After answering a series of questions replies are grouped into four learning styles: activist, pragmatist, theorist and reflector.

Box 1. Four learning styles

Pragmatist	<ul style="list-style-type: none"> • keen on trying out new ideas, theories and techniques • tend to be impatient with open-ended questions • likes making practical decisions and solving problems
Activist	<ul style="list-style-type: none"> • happy to be dominated by immediate experiences • open-minded, not sceptical, enthusiastic about anything new • acts first and considers consequences later • brainstorming
Theorist	<ul style="list-style-type: none"> • adapts observations into complex but logically sound theories • faces problems through in a step-by-step process • assimilates disparate facts into coherent theories • perfectionists, analytical, keen on basis assumptions, principles and theories
Reflector	<ul style="list-style-type: none"> • thinks a lot before coming to any conclusions • considers every possible angle and implication before making a move • cautious, takes a back seat in meetings and discussions

	<ul style="list-style-type: none"> • low profile • needs evidence, listens to others before making a point
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Source: Extracted from Honey Mumford’s learning styles questionnaire, 2000

A course facilitator should try to collect as much information as possible from trainees in advance such as educational background, function, gender, nationality and other relevant information in order to form a preliminary plan as to which learning activities to employ. Nevertheless as trainers will never know what the learning styles of the audience are they will have to train, it is important to offer activities that appeal to each of the four learning styles, examples are listed in the Box below.

Box 2. Learning activities for four learning styles

Pragmatist	Activist	Theorist	Reflector
<ul style="list-style-type: none"> • discussions about practical application of knowledge • planning how to apply learning • case studies • problem solving and discussions 	<ul style="list-style-type: none"> • brainstorming • problem solving • group discussion • puzzles • competition • role play 	<ul style="list-style-type: none"> • models • statistics • stories • quotes • background information • application of theories 	<ul style="list-style-type: none"> • prefers one to one work • self analysis • questionnaires • down time • observation • paired discussion • small group work • individual thinking before responding

Source: Extracted from Honey Mumford’s learning styles questionnaire (2000)

4.3 Implementing the training course: the role of trainers and facilitators

While an ideal training situation would have both overall course facilitator and trainers, oftentimes due to resource constraints, this is not possible so a trainer needs to take on the role of a facilitator. A clear understanding of the role of trainers and facilitators, the difference between these and the merging of roles within the context of a training workshop or seminar is critical to its successful delivery.

Trainers provide information and knowledge about skills which trainees are not familiar with. They are usually technical people well versed in the topic at hand and are generally responsible for presenting information, keeping content and the didactic process under control, engaging, motivating and persuading trainees to get involved. Trainers use facilitation techniques and usually summarize, debrief and evaluate overall trainee performance and course delivery.

Facilitators on the other hand usually do not necessarily need to be technical experts in the topic being taught. As overall “managers” of a training initiative, their role is critical since they are charged with keeping control of the training process, focusing the group, encouraging active participation, managing time available, bringing out and helping to resolve any conflicts, stimulating debate and summarizing discussions. Facilitators need to keep an open mind and leave preconceptions and assumptions behind. They must be tactful and deal with a variety of people, manage discussions in a neutral way, while tactfully enforcing any rules that have been set for the overall group functioning. The facilitator must also be ready to manage differences among people and diverse personalities while recognizing individual expertise and talent.

4.4 Dealing with a vast array of personalities

The following section uses stereotypical personality types and behaviours to illustrate various situations that may arise during a training course – and how one could deal with them (Mitis F, personal communication). When working with groups of trainees, the facilitator or trainer must find ways to best recognize everybody's potential in the group as well as deal with a vast array of personalities. The trainer or facilitator will need to assess whether or not following suggestions are appropriate as they depend on the roles, functions and levels of participants.

Box 3. Talkative participants

Bill is a very experienced senior officer who likes to share his knowledge and is very **talkative**.

Behaviour: Bill is very **talkative** and tends to **dominate** most discussions. This could be because he is more experienced than other participants.

Result: Others keep silent.

Solutions:

- direct questions to the other participants
- gentle reminders – “Thank you Bill for your input. Now, let’s see what others have to say on this. Mark, do you want to share your thoughts with us?”
- or: “I would love to hear more from you; however we need to complete this task, how about discussing it after the class”
- if the situation does not change: private discussion

Source: Adapted from presentation on “Working with Groups of Trainees” given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

A **talkative participant** should not be allowed to dominate the discussion. Overall participation during a training course is essential since the success of the training initiative relies heavily on group contributions and the learning derived from the diverse points of view that arise. Sometimes a person may dominate a discussion because they are more experienced or more senior than the other participants. In this case, other trainees often sit back and give up the floor. The person may be truly an expert in which case the trainer should show respect for what they bring to the discussion. Their knowledge can be used to help the learning experience of others but mental limits should be set as to how long the person will be allowed to talk. Use of body language could give a subtle indication to this person as to when they should stop talking. If this does not work, the trainer can ask a question to the other participants to draw them in and change the focus of attention, while avoiding eye contact with the dominant person.

Box 4. Argumentative and provocative participants

Dolores likes to **argue** and **provoke discussion**.

Behaviour: Pre-conceived ideas, a know-it-all. She enjoys lively discussions focusing on the controversial.

Result: Others keep silent, often the focus of the exercise gets lost in the discussion and the training time schedule falls behind.

Solution:

- as trainer, you must keep cool
- give the participant an opportunity to express herself and “get her message out”
- remind her of training course rules and that all comments will be considered
- ask to use the “parking lot” for an issue without immediate resolution
- “irritation” of other participants can help
- immediately following your intervention ask a direct question to other participants to move the discussion again

Source: Adapted from presentation on “Working with Groups of Trainees” given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

Argumentative or **provocative** individuals may have pre-conceived ideas, feel they already know the material or may simply like to provoke discussion. A few questions directed at that individual trainee to give them an opportunity to get their ideas out in the open often provides a trainer the chance to move on to the main topic at hand. Often such individuals may begin to disturb the other trainees and once aware of this, they often cease their disruptive behaviour.

Box 5. Separate meetings of participants

Eileen and Kieron start a **separate meeting**.

Behaviour: Eileen and Kieron are whispering with each other.

Result: Small discussions among a few participants within the context of a larger event is inevitable but can become a problem. If prolonged, direct neighbours and the trainer might have difficulties concentrating on the course and the discussions could even spread throughout the room, bringing in other participants and deviating the focus of the training.

Solution:

- stop talking and look at them
- invite them to share their ideas: “Do you have an interesting point to make?”
- invite them to raise their questions if there was anything unclear from the issues discussed previously, as it might also be a problem for other participants.

Source: Adapted from presentation on “Working with Groups of Trainees” given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

Small separate discussions are more likely to occur in large groups. They may result from a talkative individual’s need to speak when unable to address the group or the result of a more cautious thinker’s desire to test an idea before bringing it up, or someone not being really interested in the topic discussed. Side conversations are inevitable in meetings and are often brief. They become a problem only if prolonged. This situation can be handled by pausing and looking at the talking participants or by inviting the individuals to share with everyone what they are talking about. Typically, this will interrupt the private conversations for a while.

If the separate meeting takes place within the context of an exercise, the persons involved can be given active roles and/or separate them in different groups for the time of the exercise.

Box 6. Participants not contributing to the course

Roberto talks too little or **does not participate**.

Behaviour: Roberto appears shy or introverted, talks too little or **does not participate**.

Result: You might miss important or interesting viewpoints that could help the discussion.

Solution: value everyone's contribution and try to engage this participant.

- create an open atmosphere
- check if person's boss is around
- ask person a question about a topic he/she knows well; solicit an opinion
- do not force the person to talk but do acknowledge efforts
- use small group work exercises

Source: Adapted from presentation on "Working with Groups of Trainees" given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

It is important to set an atmosphere of openness and trust from the outset so even the most timid or introverted participants can find it easy to get involved. Often such individuals are keepers of great wisdom. Whether such a person feels uncertain because of inexperience, is unwilling to speak due to fear of embarrassment or is simply an introvert, they can be posed questions in an area where they feel comfortable. Ask the person for their opinion about something; then they cannot make a mistake, because it is only their opinion. Be careful to acknowledge any contribution they do make. Usually, once the ice has been broken and anxiety dissolved this individual will become an active and thoughtful contributor.

If a senior and a junior person who work together are in the same groups, the junior person might be silent since they are afraid of being judged. Try to avoid this situation when forming groups or vary the ways in which groups are formed so there are more chances they fall into different groups.

Box 7. Open conflict between participants

Lise and Joao have a **conflict**.

Behaviour: They constantly argue with each other and even make it personal.

Result: If prolonged such discussions can be damaging to the training course. Others keep silent, the focus of the exercise gets lost in the discussion and the training time schedule falls behind.

Solution:

- as facilitator, do not intervene too early
- when you do intervene, de-personalize the issue and emphasize points of agreement
- draw others into the discussion if possible
- ask to use the "parking lot" for an issue without immediate solution

Source: Adapted from presentation on "Working with Groups of Trainees" given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

When facing a conflict between two persons in the context of a training course, the facilitator should be aware of the situation, but should not intervene too early. If intervention is necessary, then you should first attempt to de-personalize the issue and emphasize the points of agreement that you have been able to identify. Drawing others into the discussion may be effective in diluting the intensity of the discussion. If an immediate solution is not possible, it may be appropriate to get the participants to agree to 'park' it for the time being. You can come back and deal with it later, when the situation has calmed down.

4.5 Initiating discussion

An effective technique that can be used to initiate discussion on a given topic is brainstorming. Basic rules to follow when managing a brainstorming session are: suspend judgment; go for quantity of ideas as the more ideas generated lead to better ones; encourage wild ideas so trainees can think out of their traditional “box”; and build on other ideas by enriching or merging ideas from others with trainer or facilitator ideas as well. The box below illustrates some key principles for brainstorming.

Box 8. Brainstorming tips

- **Write down everything** exactly as trainee has said it. **Do not interpret** or put in your own words.
- **Do not argue, debate or disagree with trainee input.** Let ideas flow freely. There is time to listen and talk later.
- **Give everyone a chance.** During the brainstorming session, write down **all** ideas, even if you do not think it is a good one.
- **Keep discussion for later.** When trying to generate ideas do not initiate discussion on them until everyone has had a chance to list his/her ideas.
- **Do not take over brainstorming session.** As a trainer or facilitator you are not obliged to make a comment after every trainee contribution.
- **Encourage trainees.** If there are more reserved people in the group ask if they can build on any of the ideas that are already posted.

Source: Adapted from presentation on “Roles of trainers and facilitators” given at the WHO Capacity Building for Environment and Health training workshop, 23 March 2012, Riga, Latvia.

To give everyone a chance to express their ideas and thoughts, you can also give participants the possibility to write down each idea on a separate post-it. After 5 minutes the post-it are collected and posted to the wall, if possible post-it groups of similar ideas/thoughts can be formed. This way a person who does not like to talk in bigger group can contribute more easily as this technique also allows some anonymity.

4.6 Giving instructions

Confusion is reduced and learning activities are more effective when instructions on how to carry them out are given clearly. When giving instructions to trainees, it is important to follow these guidelines: use clear and simple phrases, handle logistics first, provide clear timeframes and advice for quality assurance, explain the method of presenting and describe the output or delivery (Davidson, 2001).

4.7 Tips for presentations

When preparing a presentation or set of presentations a number of items need to be taken into consideration that considerably influence delivery and audience receipt of information. Logistics, structure of the presentation, slides and content should all be taken into account. With regard to logistics, the room should be comfortable allowing for viewing of the presentation from many sides. Needs for electronic equipment should be assessed prior to the event as well as that of interpreters. Questions from the floor and subsequent audience interaction should also be taken into account along with the target audience of the presentation. Presentations should be kept straight to the point using a simple and easy to read template consisting of a title slide, an objectives slide, a structure slide indicating timings, content slides and a summary slide. As mentioned in the previous

section on memory, precious time should not be spent on long introductions that risk losing participant attention. Slides should also follow the old but still valid one minute rule, meaning spending no more than one minute explaining each slide. Slide transitions should be smoothly inserted to make the presentation flow well. Use of pictures, images and animation should be used but not excessively. If web links are provided on a slide, this information should be made available to participants in another form as well as people seldom have time to copy down this information from a screen.

5 Conclusion

Building capacity on EH is an obvious need. The burden of issues related to EH is substantial and yet there is a high need in most countries to further tackle these issues. There are many deficits that exist in terms of capacity to deal with EH issues, and training is an important priority to address.

This training manual is one attempt developed specifically to support and facilitate countries dealing with EH issues by learning from different examples of training courses in areas with a high need of capacity building. It is based on the best available knowledge, is comprehensive and well-conceived and has been developed under the coordination of WHO Regional Office for Europe by some of the foremost technical experts in their area of work. It can be adapted to local EH problems and used with a broad variety of training audiences.

The primary objective of this manual has been to allow trainers using the material to be more effective. The contents of this manual are also supplemented by the PowerPoint slides, exercises and case studies available on the CBEH CD-ROM itself as well as on the publication area of WHO EH web site (WHO Regional Office for Europe, 2013d). Both of these will provide useful further information and resources relevant to capacity building.

Training is only one element of capacity building. WHO will continue to strengthen the CBEH training material and how it is implemented, while also contributing to addressing other capacity building needs that fall within WHO mandate.

WHO wishes all trainers who will be using the CBEH training materials success with their training endeavours as well as with their future work in the larger picture of capacity building for environment and health.

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WHO Regional Office for Europe (2013d). Health impact assessment: Publications [web site]. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/health-impact-assessment/publications>, accessed 1 March 2013).

7 List of Annexes

Module A. Health in environmental impact assessments

- a) Presentation with notes of trainers
- b) Case studies
- c) Homework

Module B. Health in strategic environmental assessments

- a) Presentation with notes of trainers
- b) Bellacasia case study
- c) Roadmap for trainers
- d) Homework

Module C.1. Contaminated Sites

- a) Presentation with notes of trainers
- b) Exercises

Module C.2. Quantitative risk assessment methods

- a) Case study
- b) Demo materials and exercise
- c) Wrap-up presentation

Module C.3. Environmental burden of disease

- a) Presentation with notes of trainer
- b) Exercises

Module D. Training of trainers

- a) Presentation with notes of trainers
- b) Exercises and questionnaire
- c) Case study
- d) Outline of a training course – template

The contents of this manual are supplemented by slides, exercises and case studies listed in the annexes, available electronically upon request.

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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This training manual is designed to support and facilitate countries dealing with environment and health issues, by using different examples of training courses. Materials are based on the best available knowledge and evidence, are as comprehensive as possible and compiled under the coordination of the WHO Regional Office for Europe by technical experts. It can be adapted to local environment and health problems and used with a broad variety of training audiences.

The primary objective of this manual was to allow prospective trainers to use the materials effectively in further capacity building activities. The contents of this manual are also supplemented by slides, exercises and case studies currently available upon request. They will provide useful further information and resources relevant to capacity building.

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