

“Capacity Building and Strengthening Institutional Arrangement”

Workshop: “Environmental Impact Assessment (EIA)
(for Assessors)”

Analysis of cumulative environmental impact

Mr. Gianluca Leone, Mr. Stefano Pranzo

APAT

Agency for Environmental Protection and Technical Services

Introduction to CEA

- Cumulative effects assessment (CEA) is a systematic procedure for identifying and evaluating the significance of effects from multiple activities.
- Cumulative Impacts: Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions caused by a project, a plan, a programme or a policy. (adapted from eu guide)

Introduction to CEA

Spatial/temporal overlap between plans, programs and actions:

- Interaction of impacts from proposals in the plan with those from other plans, which affect the same receptor
- Interaction of impacts from proposals in the plan, which affect the same receptor
- Additive: total impact is equal to summation of the impacts
- Synergistic: total impact may be greater than the sum of the impacts

CEA: defining the system

- The analysis of the causes, pathways and consequences of the impacts is an essential part of the process.
 - Identifying sources – the multiple activities that cause potential impacts or environmental change;
 - Considering processes – pathways of impacts between the sources and receptors and the linkages among these impacts;
 - Effects – analysis of the attributes of these effects - whether such impacts are additive, antagonistic or synergistic.

CEA: Identifying sources

- The current state of the environment represents the effects of past actions
- Past and present activities which cause current environmental impacts: establish baseline and trends for valued resources or areas of interest
- Future activities: future plans or programs at different geographical levels (national, regional, local)
- Trans – boundary sources

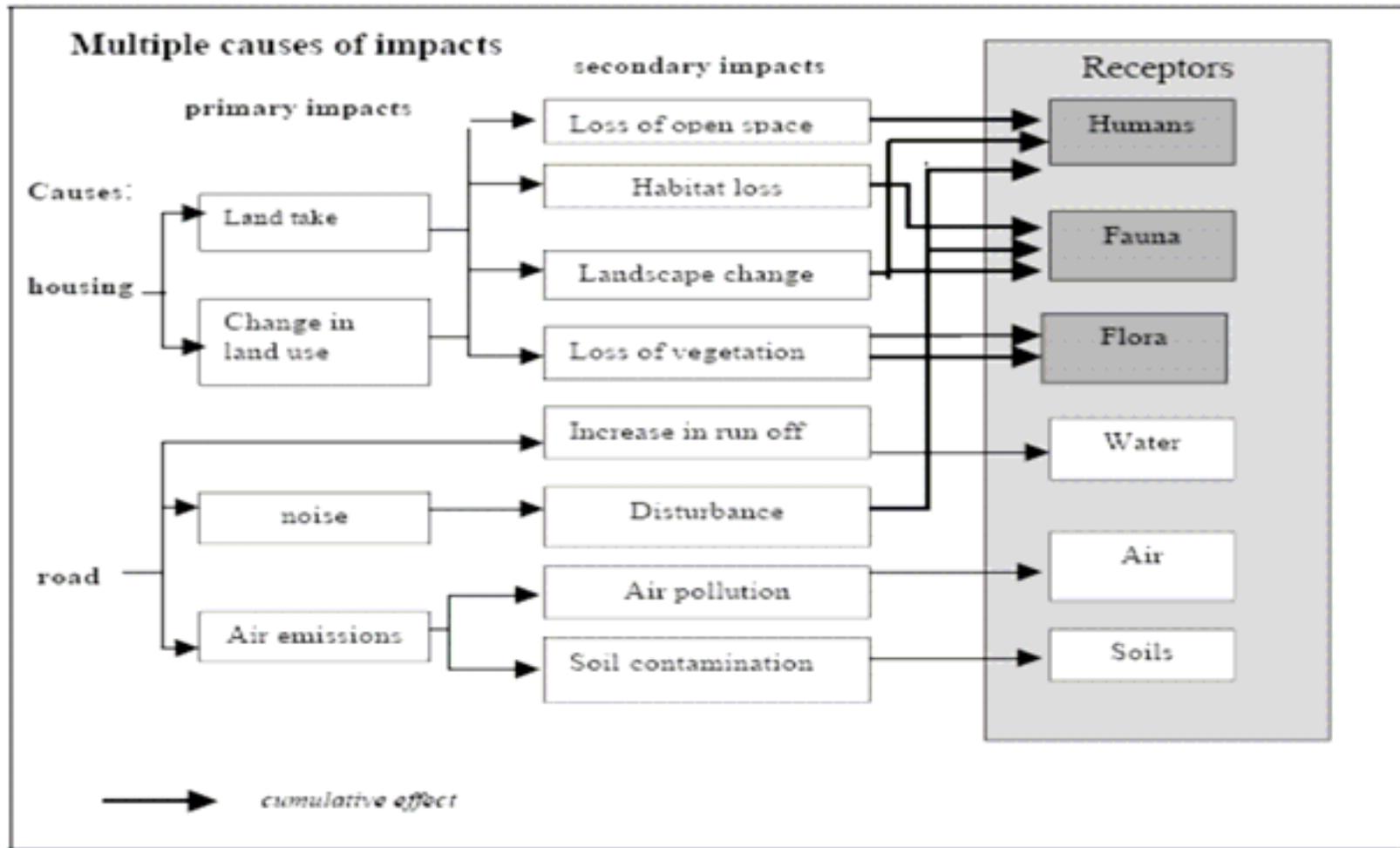
CEA: Considering processes

- Complex pathways of impacts between the sources and receptors
- Causal chain analysis aims at defining the system
- Networks and systems diagrams can be used to conceptualise cause-effect relationships
- Which are the final receptors where effects are cumulated?

CEA: Considering processes

- Areas of protection: areas that society seeks to protect
 - damage to **human health**
 - damage to **ecosystem quality**
 - damage to **resource availability**
 - damage to **man-made environment**
- Damages are impacts on valued items, such as human health or ecosystem health

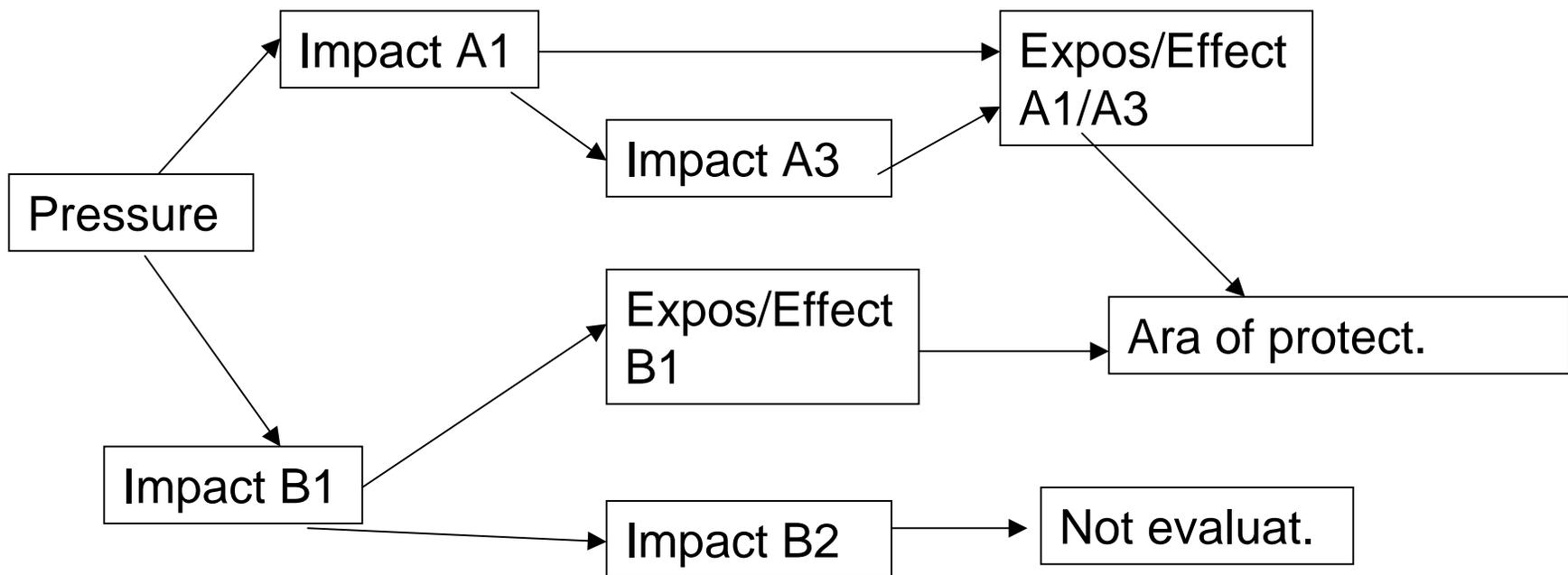
CEA: Considering processes



Cooper, L. M. (2004).

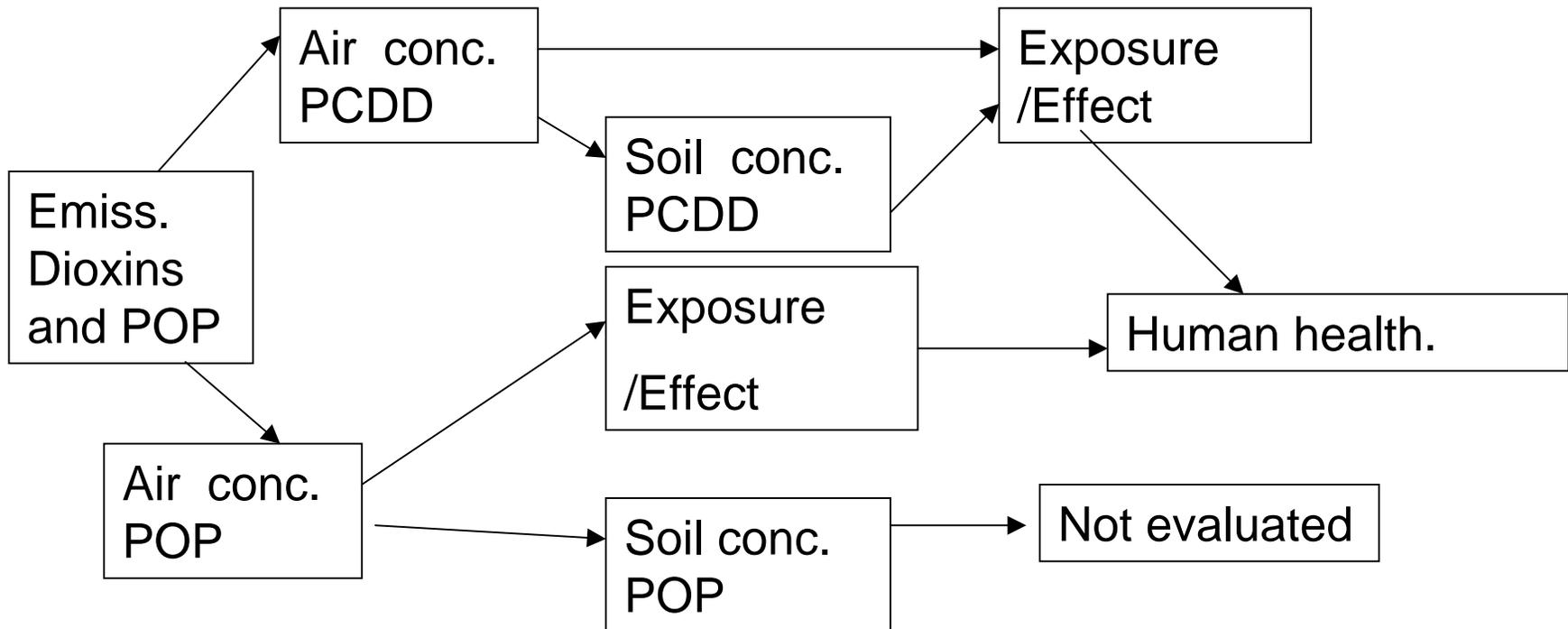
CEA: Considering processes

- Impact pathway



CEA: Considering processes

- **Short example: municipal solid waste incinerator**



CEA: Considering processes

- Indicators can be related to specific steps of impact pathways
- Loss of impact pathways because of insufficient scientific knowledge of the environmental processes
- Damage on areas of protection can be expressed as integrated indicators (YOLL, PYLL...)
- It's not suited for policies analysis (broad range of option, high level of uncertainty, low level of detail)

CEA and SEA

- **Criteria for determining the likely significance of effects(SEA directive 42/2001/EC):**
 - the probability, duration, frequency and reversibility of the effects,
 - the cumulative nature of the effects,
 - the transboundary nature of the effects,
 - the risks to human health or the environment (e.g. due to accidents)....
- **the assessment of cumulative effects should be an integral part of the SEA process**

CEA and SEA

Setting the context

Identify other relevant plans and programmes
 Identify environmental protection objectives
 Propose SEA objectives
 Propose indicators

Establish the baseline

Collect baseline data and trends
 Identify environmental problems

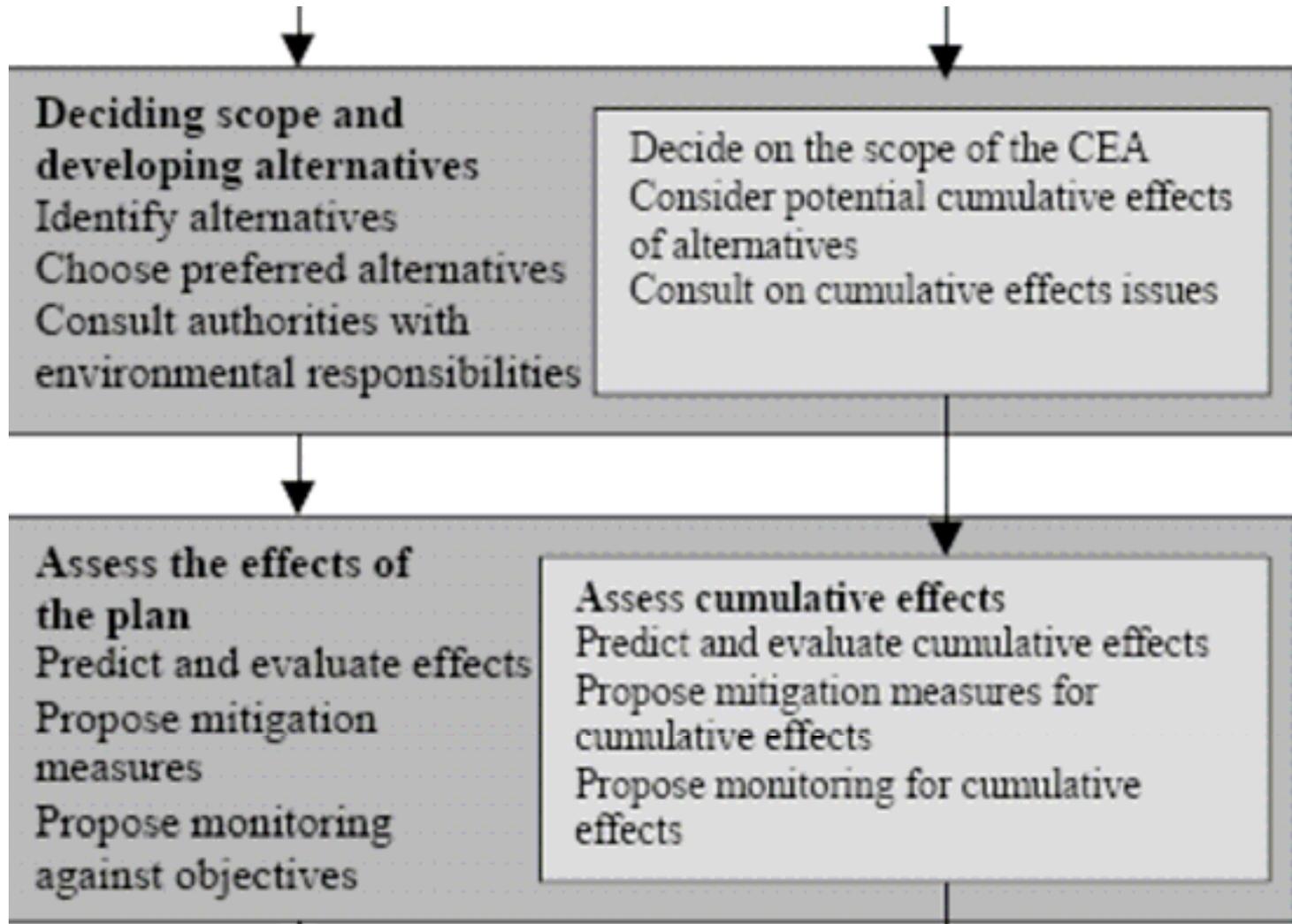
Scoping for cumulative effects

- identify cumulative effects issues
- select valued environmental resources/components
- set temporal and geographical boundaries
- identify other plans and programmes affecting valued resources

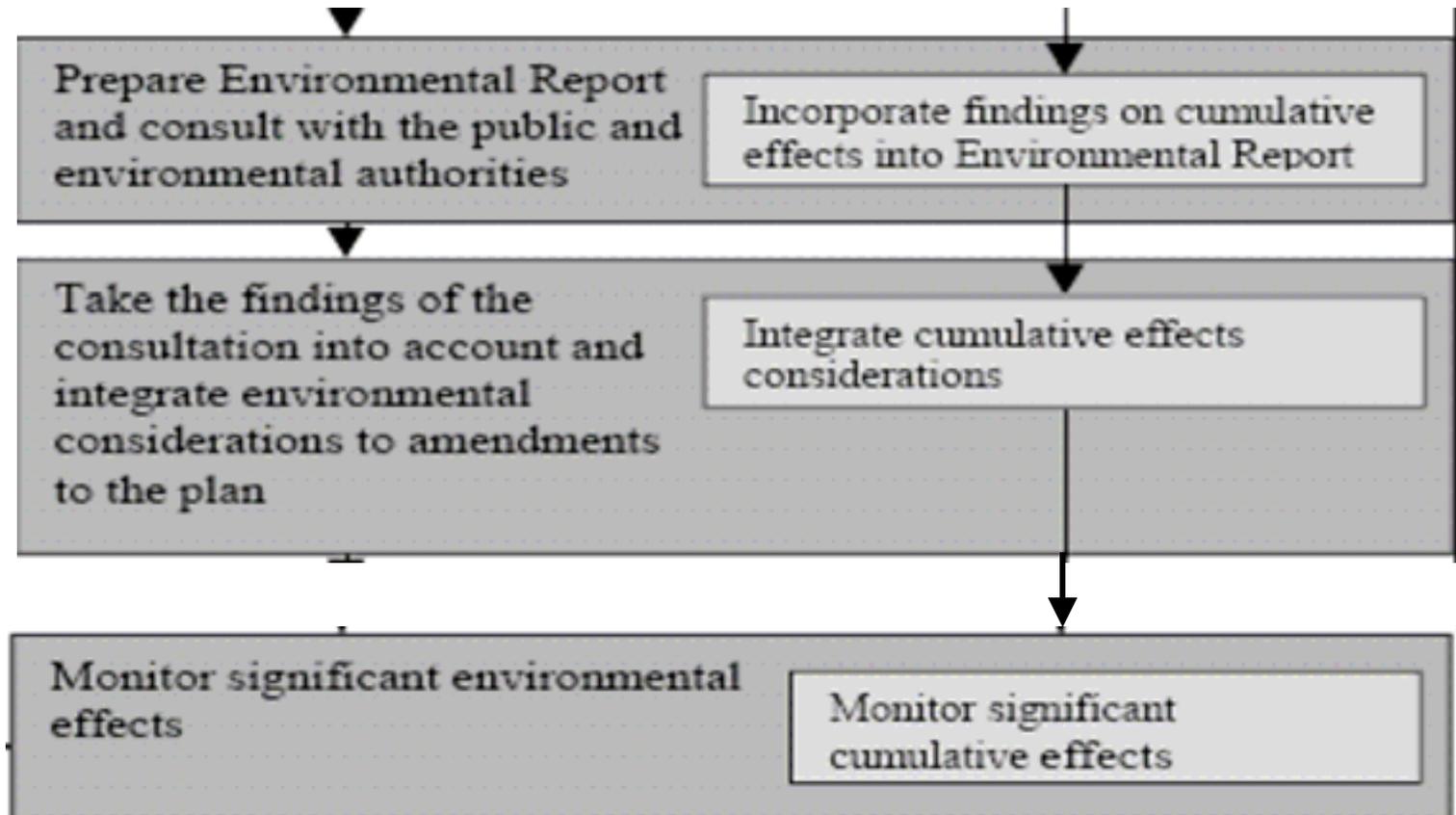


Establish baseline conditions and trends for valued resources
 Identify cumulative effects problems

CEA and SEA



CEA and SEA



Adapted from: Cooper, L. M. (2004).

Scoping

- Identify cumulative effects issues
- Define the areas of protection: it is not possible to assess the plan or programme's impact on every receptor; therefore, it is necessary to define those resources that are particularly valued by the community or near to their threshold
- Thresholds may be defined in terms of goals or targets, standards and guidelines, carrying capacity (useful for indicators)
- Identify other plans and programmes affecting areas of protection
- Applying network analysis to evaluate or neglect impacts

Scoping

- **Geographical boundaries** in a CEA: the end of the boundary will be the point where the effects can be neglected
- **Time boundaries:**
 - Different actions within a plan / programme may be implemented over different time scales
 - the effects may become significant over different time scales

Forecasting Cumulative Effects

- Several approaches adopted for CEA
- There is no single approach applicable to all situations
- The method should be practical and suitable for the plan/programme;
 - the nature of the impacts
 - the availability and quality of data
 - the ability to provide reference and plan scenario
 - the availability of resources (time, finance and staff)

Forecasting Cumulative Effects

TOOL	Assessment type
Matrices / Checklists	Qualitative
Professional judgment	Qualitative
Causal chain analysis	Qualitative
GIS - spatial analysis	Quantitative
Numerical impact modelling	Quantitative
DSS (decision support systems)	Quantitative and qualitative

Forecasting Cumulative Effects

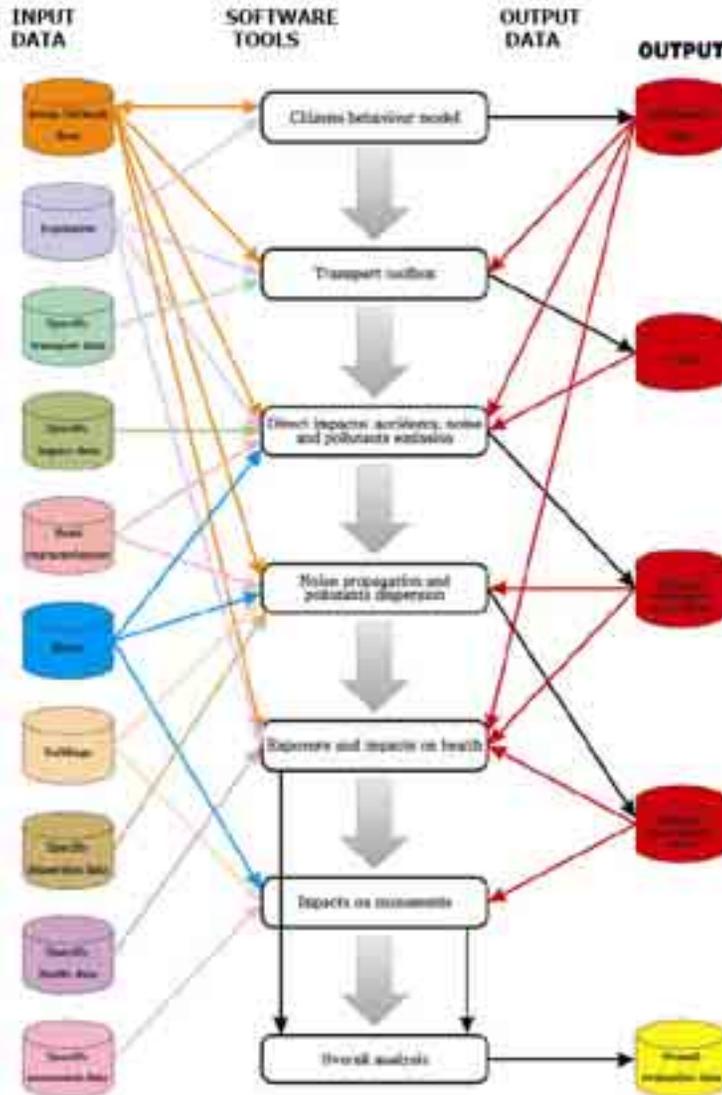
Integrated models: Causal chain analysis + Numerical impact modelling + GIS - spatial analysis

Development European project of integrated models

- ISHTAR project: Integrated Software for Health, Transport efficiency and Artistic heritage Recovery funded by European Commission

The Project ISHTAR aimed at building an Integrated Suite of software models for assessing the impacts of various types of urban policies and actions on the quality of life of citizens

Forecasting Cumulative Effects



ISHTAR project deliverable 11.6

Monitoring and Mitigation

- **Mitigation:** absence of clear and precise allocation of responsibilities among the plan or programme makers
 - Strategic CEA addresses past, present and future plans / programmes of other authorities
- **Co-operation** of the parties involved is needed to ensure that the mitigation or monitoring measure is successfully implemented.

Monitoring and Mitigation

- **Monitoring** in order to:
 - Evaluate objective achievements
 - Assess accuracy of the predictions (iterative process to improve forecasting)
 - Monitor the effectiveness of mitigation measures
 - Evaluate the residual impact

Future development

- CEA needs further development in terms of scientific knowledge of impact pathways
- Development of integrated assessment tools