

“Capacity Building and Strengthening Institutional Arrangement”

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

**Main technical activities of Strategic  
Environmental Assessment (SEA) process  
and Italian experiences in SEA**

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## SEA in italy

### **The SEA directive transposition in italian legislation**

In Italy the SEA Directive has been transposed in 152/2006 legislative decree, but, since it is actually subjected to review, SEA is not still in force at national level.

Some Italian regions implemented the SEA and what follows here based on international and regional experiences and reference documents.

| <b>Some SEA Italian experiences</b>  | <b>Region</b>                                       | <b>District</b>   | <b>Municipality</b>   |
|--|---|---|---|
| <b>Territorial plan</b>  | Lombardia, Emilia-romagna,<br>Friuli Venezia Giulia | Padova, Prato,<br>Livorno, Milan,<br>Bologna, Parma,<br>Ravenna,<br>Modena, Varese,<br>Piacenza | Verona Vicenza<br>Ravenna Bologna<br>Ferrara Monza<br>Cuneo Jesi<br>Arluno, Impruneta |
| <b>Waste management plan</b>   | Friuli-Venezia Giulia                               | Piacenza,<br>Modena, Parma,<br>Reggio-emilia  |   |
| <b>Development Triennial Programme<br/>of National electric transmission<br/>network</b> | Piemonte, Lombardia                                 |   |   |
| <b>Water plan</b>  | Liguria, Emilia-romagna,<br>Valle d'Aosta           |   |   |
| <b>Energetic plan</b>  | Emilia-romagna                                      |   |   |
| <b>Air Quality Management plan</b>   |   | Bologna,<br>Modena  |   |
| <b>Olympic programme of Turin 2006</b>   | Piemonte  |   |   |

# Strategic Environmental Assessment (SEA)

## **SEA: an important tool for a sustainable planning**

- Strategic Environmental assessment is supposed to support a better consideration/integration of environmental aspects in strategic decision making by gathering and analysing information within a systematic and participative process
- The inclusion of a wider set of factors (environmental, economics, social and technical factors) in decision-making should contribute to more effective and sustainable solutions
- The wide participative principle aims at enabling greater transparency and integration.
- The SEA carrying out will require more structured planning and consultation procedures

## The Principles of SEA

### **SEA: an important tool for a sustainable planning**

- SEA should be applied, at the earliest stage, to all plans or programmes that may have environmental consequences.
- The initiator of a proposed plan or program should be responsible for the preparation of an SEA report
- The SEA report should be reviewed by environmental authorities and other interested parties and by the public.
- The competent authority should take the SEA report into account in making decisions about the proposed plan.
- Consultation and participation are integral to the SEA process.

## Integration into planning and decision-making

The Strategic Environmental Assessment must be carried out during the preparation of the plan and programme.

The environmental assessment procedure, therefore, should:

- be integrated into existing procedures for the adoption of plans or programmes.
- influence the way the plans and programmes themselves are drawn up. While a plan or programme is relatively fluid (at the earliest stage), it may be easier to discard elements which are likely to have undesirable environmental effects than it would be when the plan or programme has been completed. At that stage, an environmental assessment may be informative but is likely to be less influential.

The SEA is, therefore, a constructive, assessment, management and monitoring tool rather than an external tool of control

# Integration into planning and decision-making

## decision-making process

## linking

## stages of SEA

Identify objective of strategic action



Identify alternative ways to achieve objective and solve problem areas



Choose between alternatives



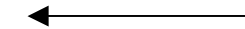
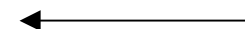
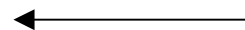
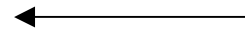
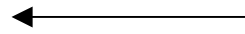
Fine-tune chose alternative



Formal decision and information



Implement and monitor strategic action



Include environmental/sustainability issues and identify relevant targets

Describe the relevant aspects of current state of environment

Predict and evaluate impacts of alternatives; assess environmentally alternatives

Mitigate impacts of chosen alternative

Write Environmental Report

Monitor environmental impacts of strategic action

## The stages of SEA Process

### The structure of SEA process:

The structure of the SEA process should depend on the planning procedure to which the SEA is linked. The following steps should be followed:

- Screening (to determine whether an SEA is necessary);
- Startup of the SEA process
- Scoping (to determine the issues to be included in the SEA);
- environmental detail analysis
- predicting impacts and assessment of the alternatives
- Implementation and monitoring;
- Consultation, participation and information of environmental authorities and public.



## Screening

### To determine whether an SEA is necessary

Plans should be screened to determine the need for SEA as early as possible.

The European Directive deems certain plans and programmes (defined in article 3, paragraph 2) to have likely significant effects on the environment.

In addition to these, the SEA should be carried out to plans or programmes (including minor modifications and small areas) which:

- set the framework for future development consent of projects and;
- are likely to have significant environmental effects.

Criteria (the so-called 'significance criteria') for determining the likely significant effects are:

- criteria relating to the characteristics of the plan or programme
- criteria relating to the characteristics of the effects and area likely to be affected

## Screening

**Plans and programmes to have likely significant effects on the environment pursuant European directive 42/2001/EC (article 3, paragraph 2)**

Plans which set the framework for future development consent of projects listed in Annexes I and II to Directive 85/337/EEC (projects to be subjected to EIA)

&

Plans which are prepared for agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning or land use

Plans which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC (any likely plan to have a significant effect on certain sites, areas designated under international/national legislation on conservation of natural habitats and of wild fauna and flora)

## Screening

### Criteria relating to the characteristics of the plans or programmes

- the degree to which the plan or programme sets a framework for projects and other activities, either with regard to the location, nature, size and operating conditions or by allocating resources;
- the degree to which the plan or programme influences other plans and programmes including those in a hierarchy;
- the relevance of the plan or programme for the integration of environmental considerations in particular with a view to promoting sustainable development;
- environmental problems relevant to the plan or programme;
- the relevance of the plan or program for the implementation of international legislation on the environment (e.g. plans and programmes linked to waste-management or water protection).

## Screening

### Criteria relating to the characteristics of the effects and area likely to be affected

- 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 magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected),
- the value and vulnerability of the area likely to be affected due to:
  - special natural characteristics or cultural heritage;
  - exceeded environmental quality standards or limit values;
  - intensive land-use;
- the effects on areas or landscapes which have a recognised national or international protection status.

# Screening

## to determine whether an SEA is necessary

Applying the criteria for determining likely environmental effects requires a comprehensive and systematic approach:

for identifying likely significant effects the 'receptors' of these effects should be considered



i.e. biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between these factors

It should also be taken into account



whether the effects are secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative

## Startup of the SEA process

Following screening, the SEA process should be carefully planned by:

- setting clear targets for the SEA report;
- setting up an interdisciplinary team;
- ensuring good collaboration exists between the planning and environmental authorities;
- laying down a SEA process timing;
- enabling effective feedback to be made;
- providing sufficient time and resources to carry out public participation
- establishing modalities for participation
- ensuring that the results of the evaluation are taken into consideration in the final decision;

## Scoping

### To Determine the issues to be included in the SEA

Scoping should help to ensure that the issues dealt with in the SEA process are confined to those relevant to plan or programme.

Scoping should involve the following steps:

- an outline of the contents, reference normative, main objectives of the plan or programme and relationship with other plans and programmes;
- definition of geographical and time scope of the plan or programme;
- an overview of the characteristics of territory likely to be affected;
- **assumption of environmental objectives**, established at international and national level, which are relevant to the PP and the way those have been taking into account (testing of plan sustainability);
- **identification of environmental aspects** which are relevant to PP (environmental baseline).

## Scoping

**Assumption of Environmental objectives** which are relevant to the PP

Environmental objectives should be based on :

- Sustainable and environmental protection policies on international, national and local level. International objectives are often incorporated in objectives on national, regional and local levels and these could often be sufficient for this purpose.

European reference documents are: the Sixth Environmental Action Programme and The EU Sustainable Development Strategy.

- opportunity to link them to targets measurable by indicators.

### **Testing the sustainability of plan**

Plan objectives should be compared against sustainability objectives in order to ensure the environmental compatibility of plan

Possible conflicts should be analyzed to change wording of plan objectives.



## Scoping

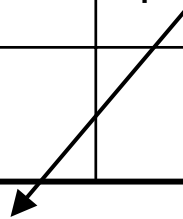
### Example sustainability objectives and indicators

| Headline objective                                    | headline indicator                           | detailed indicator   |
|---|--|--|
| To improve air quality                                | Days when pollution is higher                | Number of days per year of air pollution;<br>annual average pollutants concentration |
| To improve water quality                              | Rivers of good or fair quality               | Dangerous substance in water, Nutrients in water                                     |
| To maintain and enhance biodiversity, flora and fauna | Population of wild birds                     | Native species at risk especially protected species                                  |
| To conserve the historic environment                  | Buildings of grade I and II at risk of decay | Loss or damage to listed buildings and their settings                                |
| To reduce contributions to climate change             | Emissions of greenhouse gases                | CO2 emission by sector (tonn per years)  |
| To avoid, reduce and manage flood risk                | Properties at risk of flooding               | Numbers of people and properties affected by flood events, frequency of flood events |

# Scoping

## Example of matrix for environmental and plan objectives comparison

| Plan objectives (PO) | Environmental objectives (EO) |                     |                     |
|----------------------|-------------------------------|---------------------|---------------------|
|                      | Objective A                   | Objective B         | Objective C         |
| Objective 1          | positive compatible           | positive compatible | neutral             |
| Objective 2          | neutral                       | possible conflict   | positive compatible |
| Objective 3          | positive compatible           | positive compatible | possible conflict   |



PO: satisfy housing need by the development of some greenfield

EO: protect greenfield land

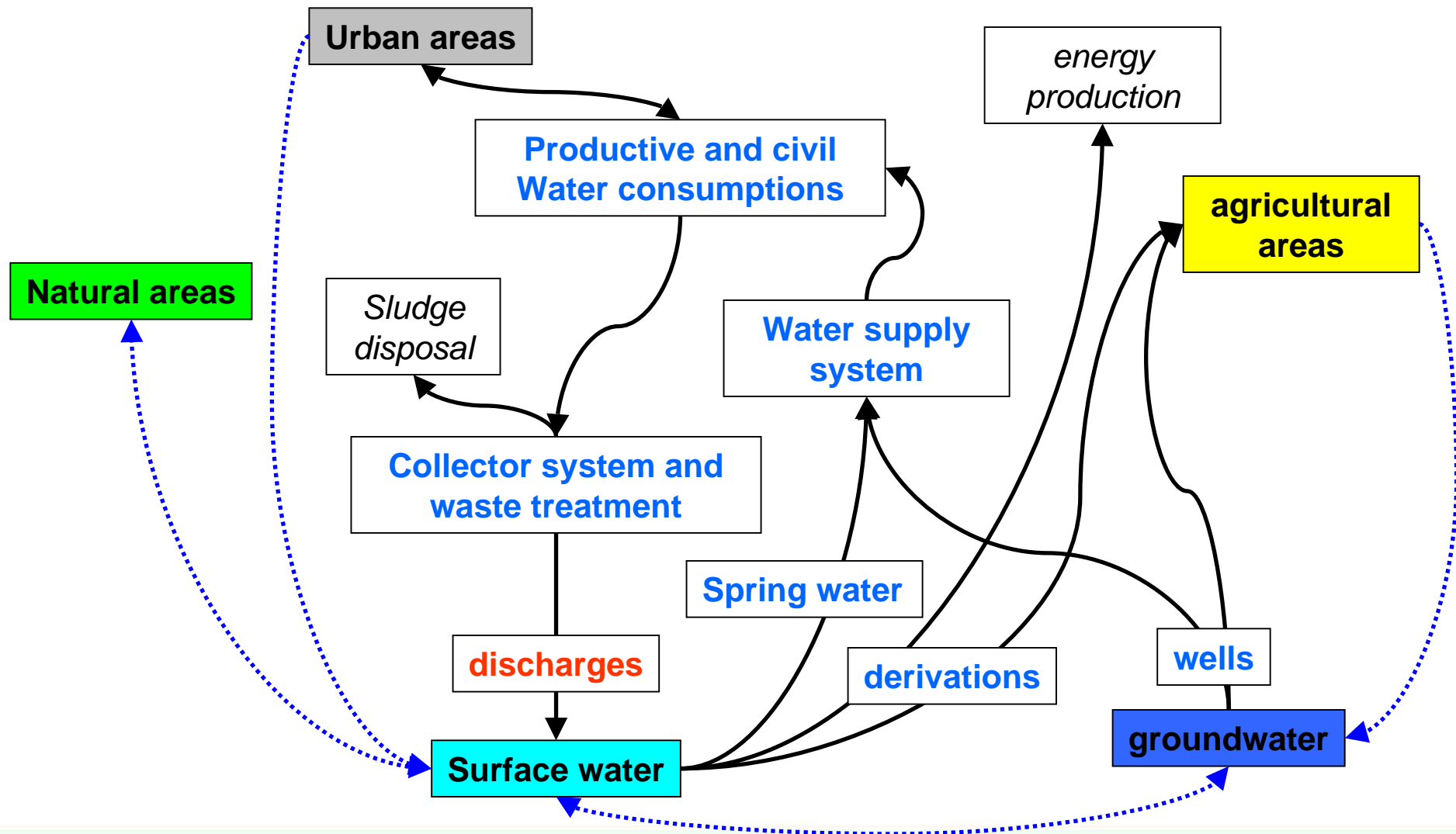
Recommendation: change wording of PO to prioritize brownfield development over greenfield, but not to rule out greenfield development completely

## Scoping

**Identification of environmental aspects/impacts** which are relevant to PP

This step should follow a systemic approach rather than being a selection of single environmental components in order to highlight the relationship between anthropic pressures and environmental sensitivities.

# Water plan of Liguria region: System considered for predicting of effects



## Environmental detail analysis

### Information to be provided is the following:

- the environmental characteristics of area likely to be significantly affected
- the relevant aspects of the current state of environment
- Areas of particular environmental importance, areas designated under international/national legislation
- any existing environmental problems which are relevant to PP
- Development of reference forecasting scenarios

## Environmental detail analysis

### **the relevant aspects of the current state of environment**

The information on the relevant aspects of the current state of the environment is necessary for the understanding of how the plan or programme could significantly affect the environment in the area in question.

## Environmental detail analysis

### **The environmental characteristics of area likely to be significantly affected**

Examples of characteristics could be:

- an area specially sensitive or vulnerable to acidification,
- an area of high botanical value
- an area densely populated (many people will be affected by traffic noise)

It should be noted that such areas could be found outside the area covered by the plan or programme.

### **Any existing environmental problems which are relevant to PP**

The purpose of this information is to provide for an assessment of how these problems will affect the plan or programme or whether it is likely to aggravate, reduce or in any other way affect existing environmental problems.

## Environmental detail analysis

### Development of reference forecasting scenarios

- Reference forecasting scenarios regards the likely evolution of the relevant aspects without the implementation of the plan or programme
- They are therefore an important frame of reference for the comparative assessment of the effects of implementing the plan and its alternatives.
- The description of the evolution should cover roughly the same time horizon as that envisaged for the implementation of the plan or programme.
- Effects of other adopted plans or programmes, or decisions made that would affect the area in question, should also be considered.

The development of scenarios consist of selection and forecasting of evolution of the main social, economical, territorial and environmental variables

i.e. demographic, industrial, energetic scenario, scenario for agriculture,, scenario for biodiversity, transport demand, supply-need water resources...



# Predicting impacts and assessment of the alternatives

## **predicting and appraising environmental impacts**

- identification of environmental impacts (impacts pathways, causal matrix, check list)
- prediction of environmental impacts (modelling, GIS)
- evaluation of environmental impacts (targets/indicators)

The choice of impact forecasting method should depend on the selected environmental indicators and on the type and level of detail of the action proposed and alternatives to be compared

## **Comparative Assessment of alternatives**

Identification of criteria/indicator and choice of techniques for appraising the alternatives

assessment of the alternatives by using integrated indicators, multi-criteria analysis, cost-benefits analysis

# Predicting impacts and assessment of the alternatives

## **predicting and appraising environmental impacts**

The purpose of impacts prediction is to appraise the effectiveness of single action lines which constitute the proposed plan and alternatives.

Indicators use is necessary for the prediction of environmental impacts/effects

Indicators should be selected to reflect objectives/targets and to distinguish between the different types of alternatives that are to be considered.

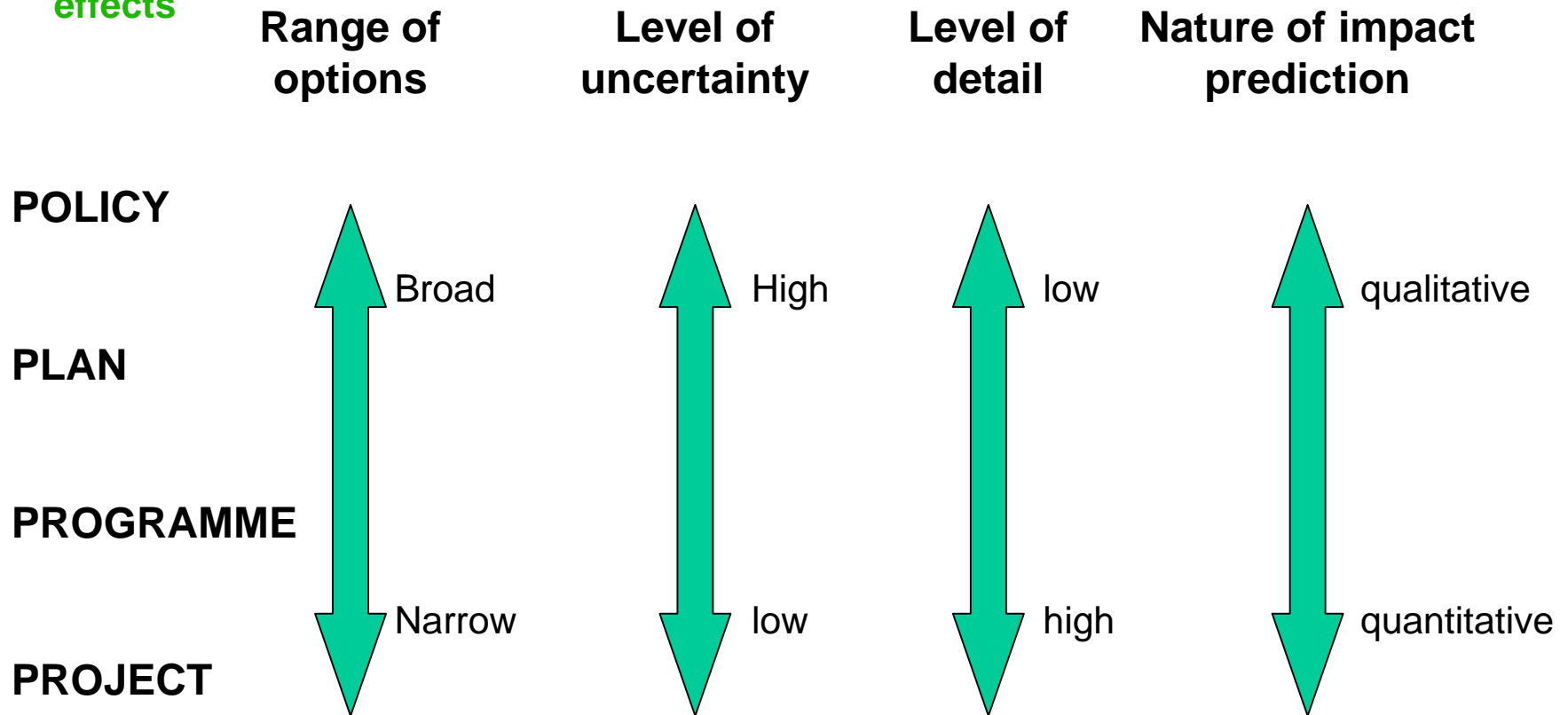
The impacts predictions can be qualitative or detailed and quantitative.

For the higher (strategic level) planning level information may be less quantitative and more general than at the lower (executive level) planning level

# Predicting impacts and assessment of the alternatives

## predicting and appraising environmental impacts

Water plan of Liguria region: Systemic considered for predicting of effects



## Air quality plan of Bologna district

### Transport reference scenarios:

- circulating vehicle fleet in year 2003
- circulating vehicle fleet to year 2010 based on trend

### Household heating reference scenario

- substitution rate of heat boilers equal to 20% to year 2010

### Industrial reference scenario

- implementing Best Available technologies (BAT) – contribute to emission negligible

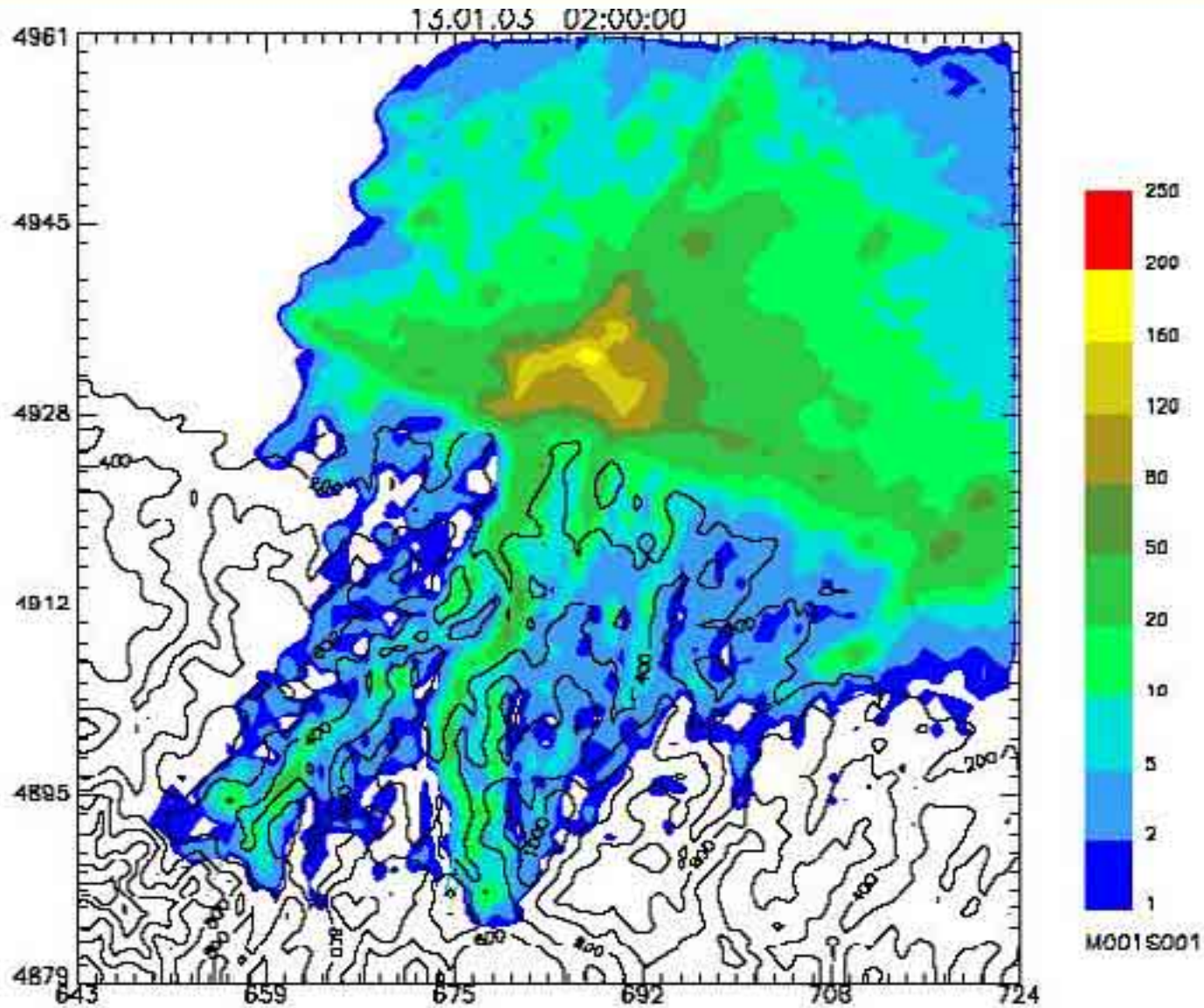


Emission decrease due to implementing of action groups

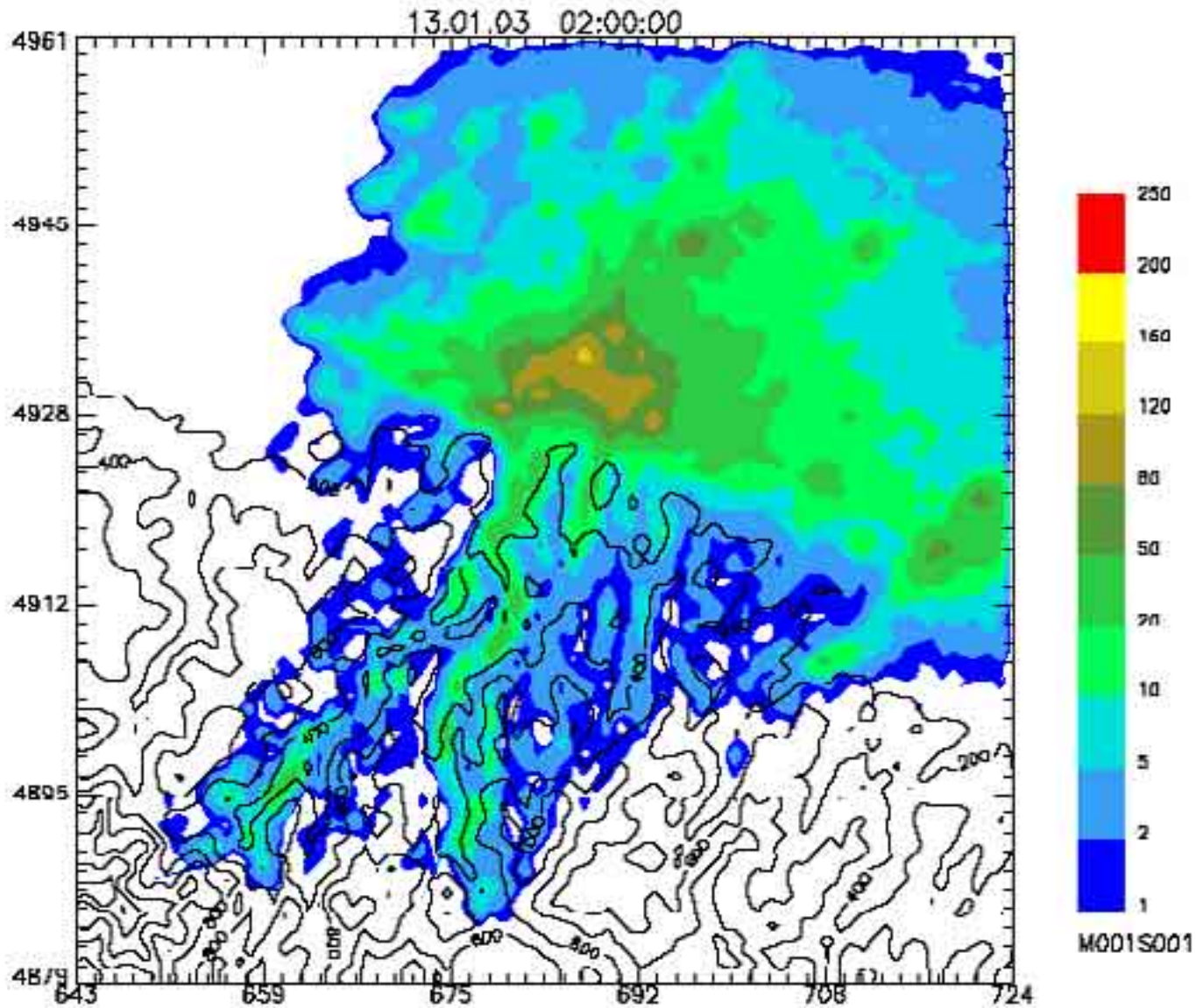
*Air pollutants dispersion modelling*



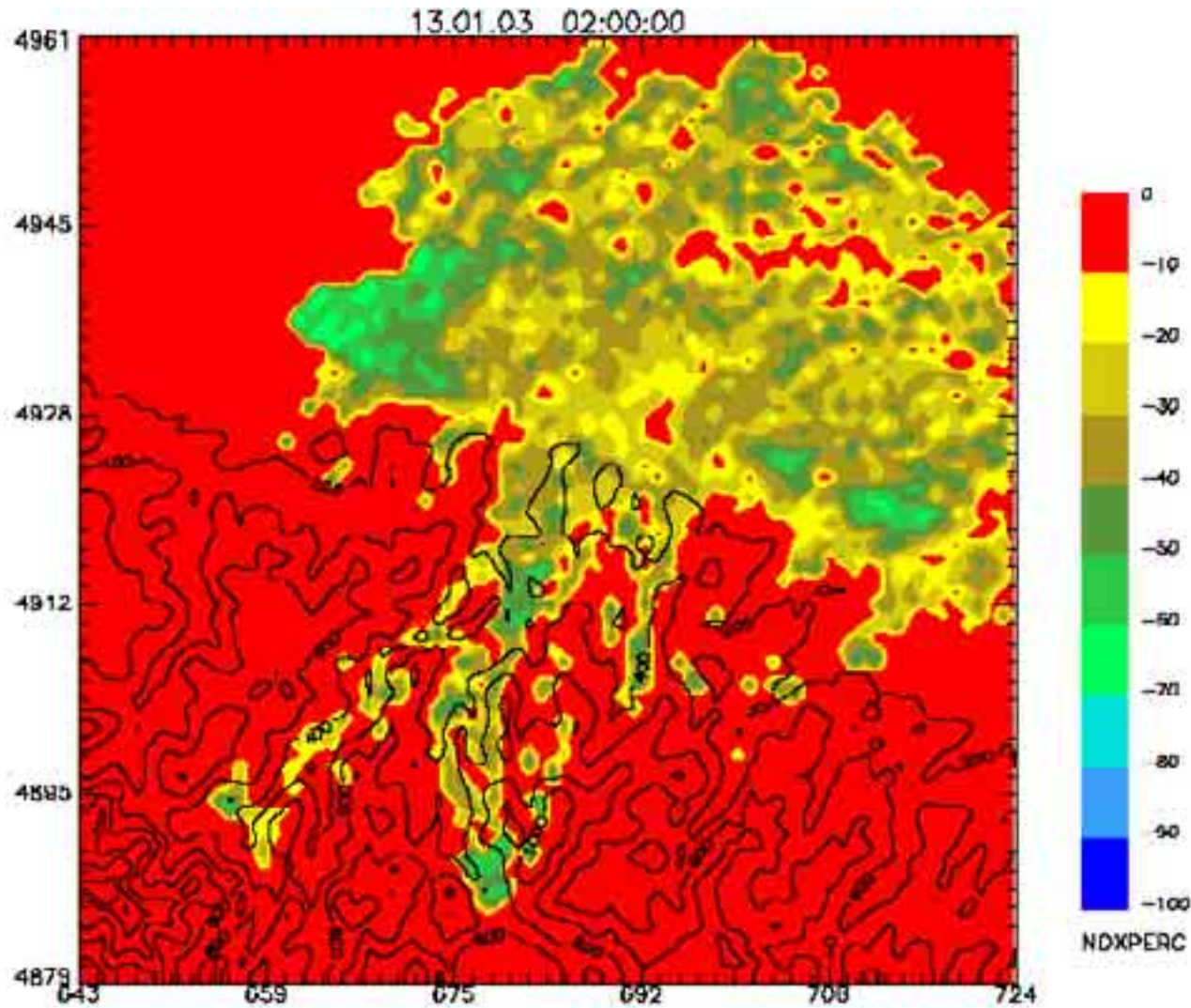
evaluation of air quality levels in two scenarios



Daily average  
 concentration –  
 NOx (current  
 state)



Daily average  
 concentration –  
 NO<sub>x</sub> (2010  
 scenario)



Daily average  
 concentration –  
 NOx –  
 percentage  
 change

# Predicting impacts and assessment of the alternatives

## Comparative assessment of alternatives

The impacts of the proposed plan should be compared with those of alternatives including the do-nothing alternative.

Alternatives may be evaluated using:

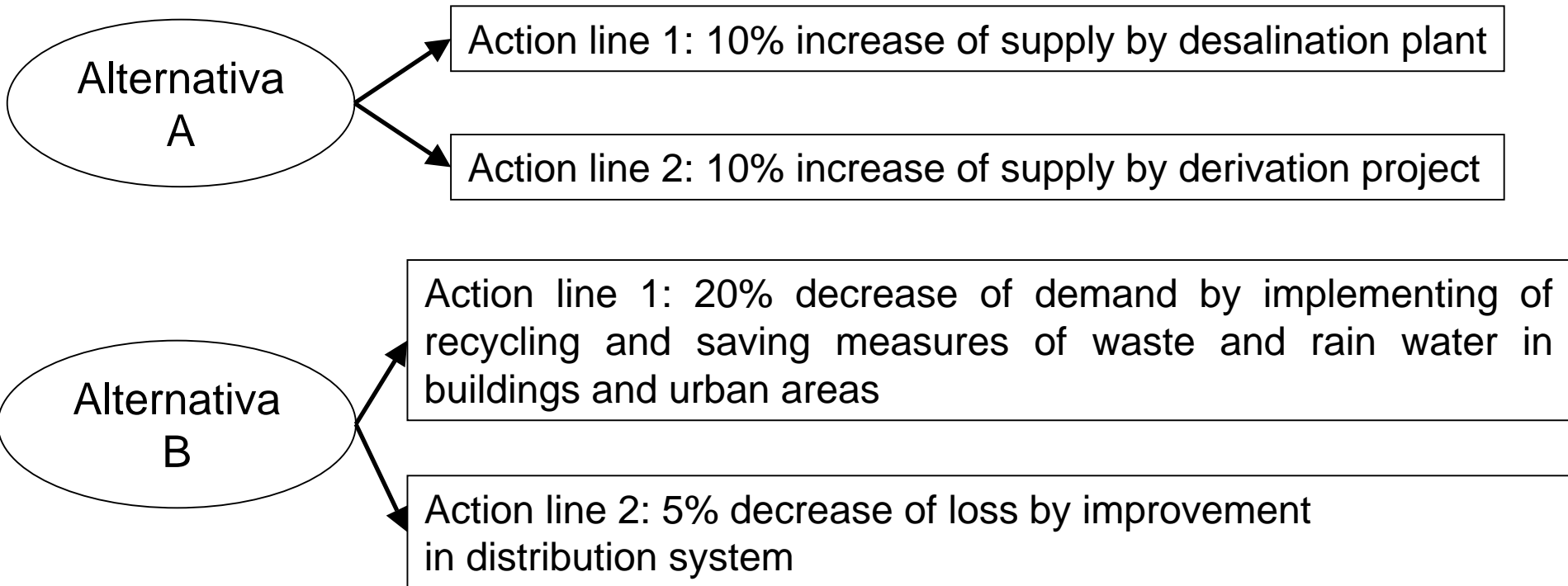
- multi-criteria analysis, aggregating the separate indicators by making use of the assumed preferences of decision-makers;
- monetary valuation of some of the impacts, expressing these in general economic cost-benefit analysis terms
- integrated indicators



## Predicting impacts and assessment of the alternatives

### water plan: simple example of comparison of alternatives

Reference scenario: growth water demand (20% in 5 years)



According to environmental criterion alternative B is better because it doesn't generate energetics impacts (use from desalination plant) and land occupation (plants)

## Predicting impacts and assessment of the alternatives

### Multi criteria decision analysis (MCDA)

The common purpose of MCDA methods is to evaluate and choose among alternatives based on multiple criteria using systematic analysis.

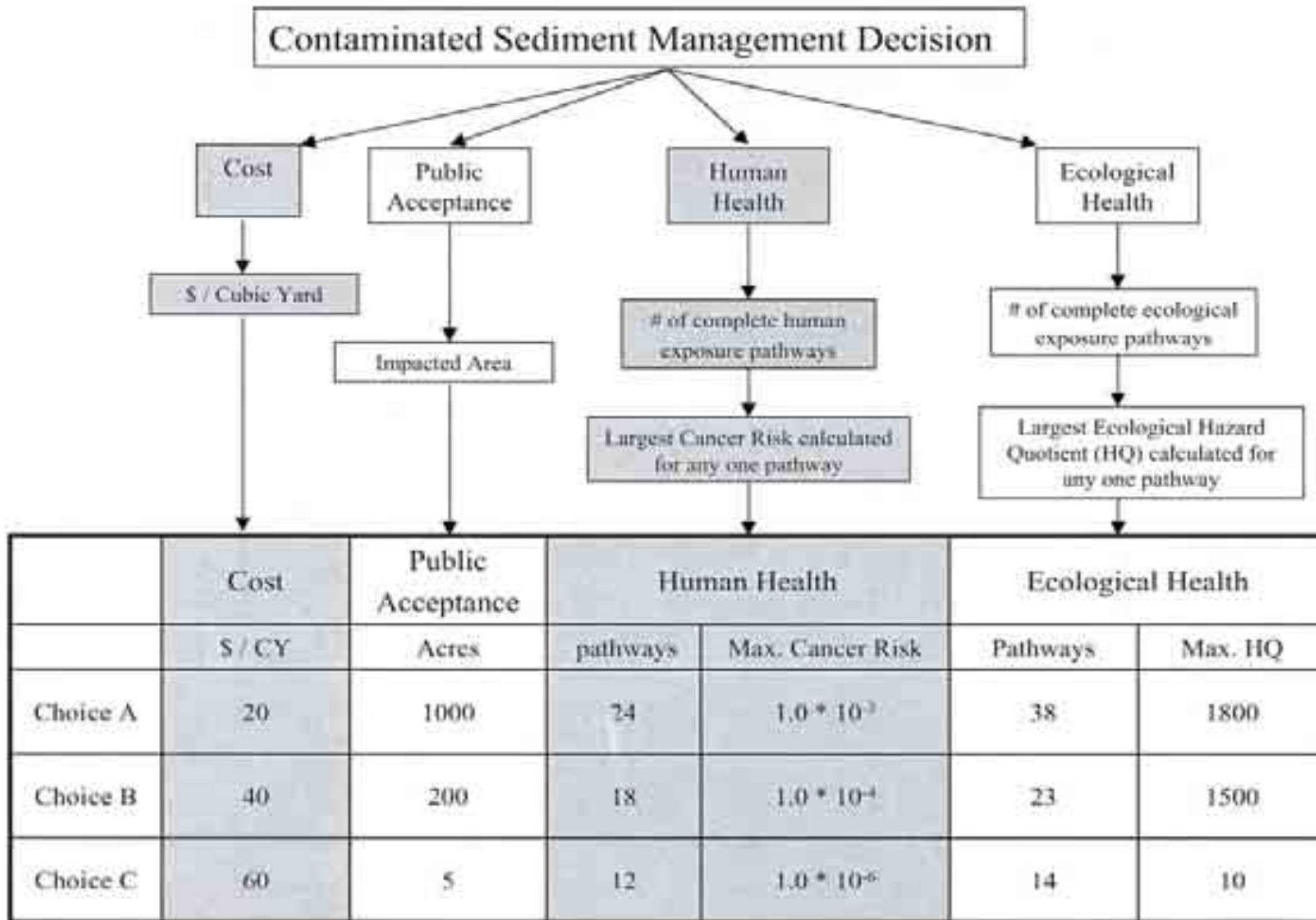
MCDA techniques can be used to identify a single most preferred option, to rank option or simply to distinguish acceptable from unacceptable possibilities.

### Multi Attribute Utility Theory (MAUT) and Analytical hierarchy process (AHP)

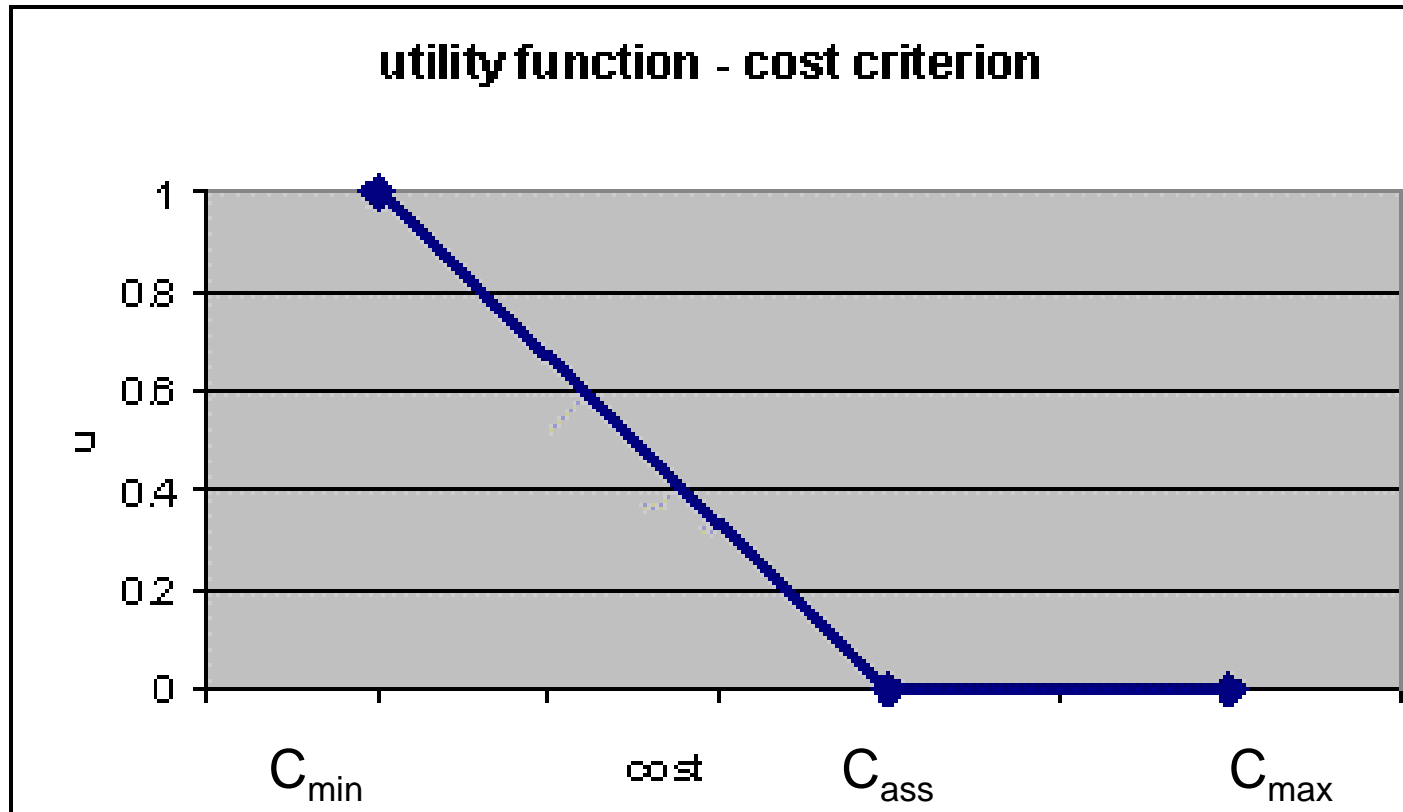
Through the use of utility/value functions, the **MAUT** method transforms the diverse criteria into 1 common dimensionless scale (typically 0–1) of utility or value. The criteria can be combined with weighting functions of the criteria within the overall decision to form a decision score for each alternative.

**AHP** uses a numerical scale and moves systematically through all pairwise comparisons of criteria and alternatives rather than using utility functions. AHP is appropriate for qualitative analysis because it makes relative judgments rather than absolute judgments.

# Example decision criteria and matrix



## Example utility function



$C_{ass}$  (assegnated cost): the utility function returns null value over  $C_{ass}$

$C_{min}$  and  $C_{ass}$  are established by experts

# Synthesis of multicriteria decision analysis

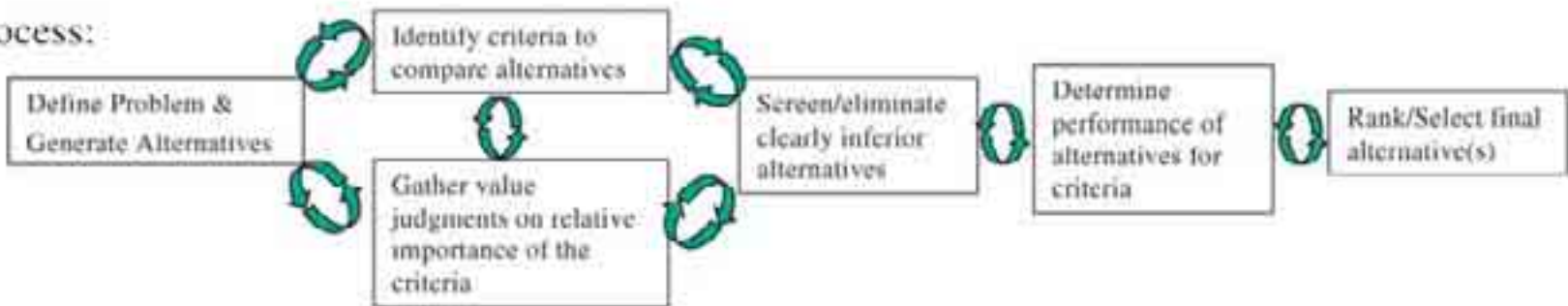
## People:

Policy Decision Maker(s)

Scientists and Engineers

Stakeholders (Public; Business, Interest groups)

## Process:



## Tools:

Environmental Assessment/Modeling (Risk/Ecological/Environmental Assessment and Simulation Models)

Decision Analysis (Group Decision Making Techniques/Decision Methodologies and Software)

## Decision support tools

### Geographical Information System

The use of overlay mapping in GIS enable to elaborate jointly environmental, territorial, landscaping, socio-political information.

This method supports the analysis of the interrelationship between the main pressure of forecast actions with the sensibilities of affected environmental receptors.

The analysis of these interrelationships between work and environment supports the development of indicators for the appraising and the setting up multi-scenarios to be compared with the current state of environment.

## Development Triennial Programme of National electric transmission network

Objective: Identifying corridors for development of electric lines

Criteria to enable to rank territory on base of possibility to carry out electric plant:

- exclusion (E) area (incompatibility with carrying out electric lines)
- repulsion (R) area (degree of resistance to host electric lines)
- attraction (A) area (suitable to host electric lines)

E1: absolute restriction established by legislation for electric lines (airport, military areas)

E2: restriction established by stakeholders agreement (continue urban areas, main environmental restriction by legislation, lakes)

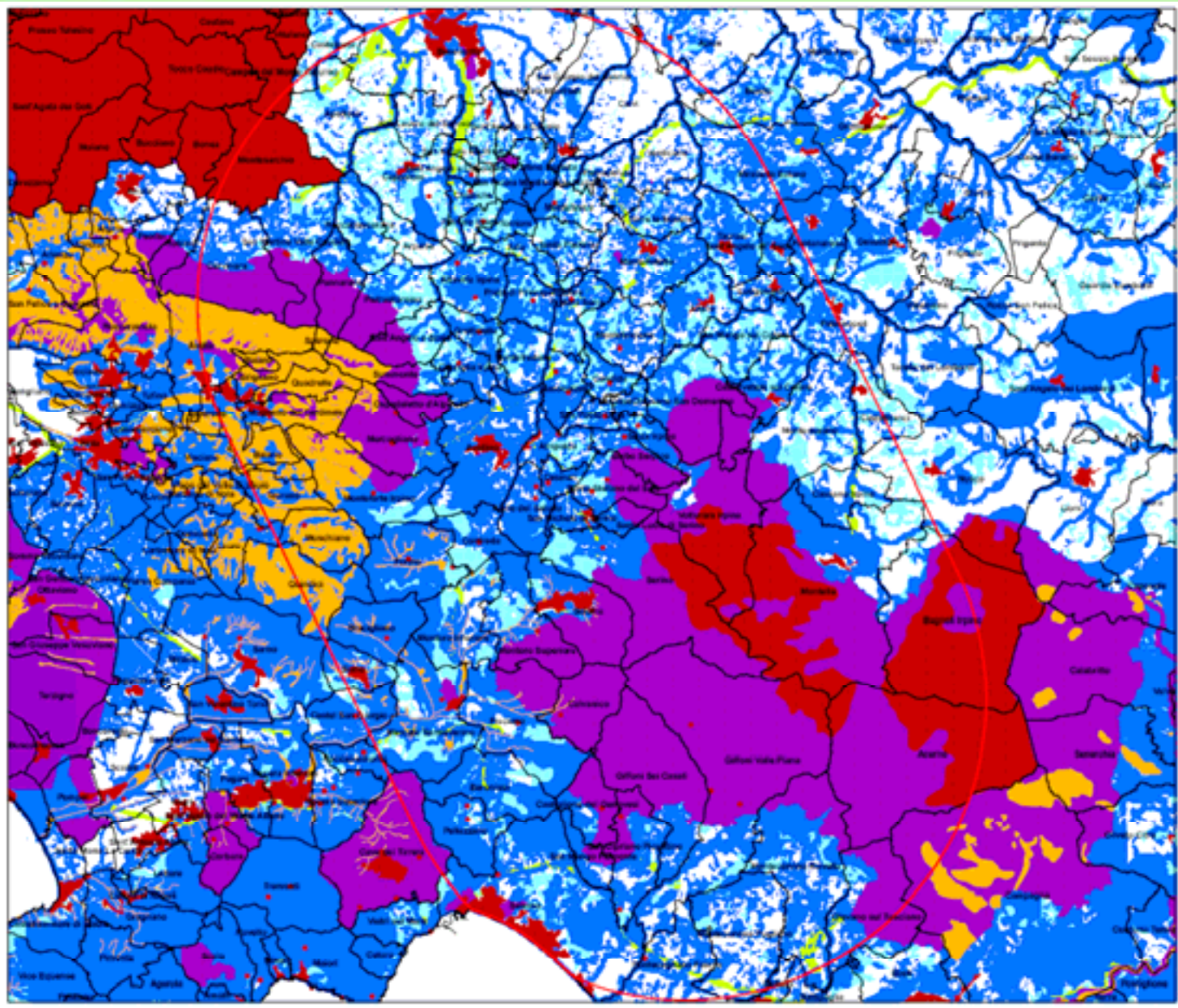
E3: restriction established by agreement for the landslide area or rivers crossing area to placement of bases; no restriction for flying electric lines over these area (hydro geological risk, active landslide area..)


R1: likely carrying out electric lines only without alternative and upon respect of prescriptions (area of high landscaping and historical value...)

R2: likely carrying out electric lines also in presence of alternatives but with respect of prescriptions (environmental restriction by legislation)

A1: likely carrying out regarding with possibility to withstand landscaping impacts;

A2: priority hypothesis of carrying out upon testing of territorial carrying capacity (industrial areas, road corridors..)



-  E1
-  E2
-  E3
-  E4
-  R1
-  R2
-  A1
-  A2



## Predicting impacts and assessment of the alternatives

### Prediction and assessment techniques

| Support decision techniques     | Assessment stages |                 |            |
|---------------------------------|-------------------|-----------------|------------|
|                                 | Identify effects  | Predict effects | assessment |
| expert judgment                 | X                 | X               | X          |
| public participation            | X                 |                 | X          |
| geographical information system |                   | X               | X          |
| modelling                       |                   | X               |            |
| scenario/sensitivity analysis   |                   | X               |            |
| multi-criteria analysis         |                   |                 | X          |
| Integrated indicators           |                   |                 | X          |
| ecological footprints           |                   |                 | X          |

## The environmental Report

Environmental Report is the part of the plan or programme documentation containing all the information relate to:

- identification, description and evaluation of the likely significant effects on the environment of implementing the plan or programme;
- reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme.

It also forms the main basis for monitoring the significant effects of the implementation of the plan or programme.

The environmental report is, therefore, the central part of the environmental assessment.

The responsible for preparing the environmental report in many cases could be the authority or natural or legal person responsible for preparing the plan or programme.

# The environmental Report

## Environmental Report contents

The Environmental Report should include:

- main objectives of the plan, contents and relationship with other relevant PP
- environmental protection objectives relevant to PP and the way those objectives have been taken into account
- current state of environment, existing environmental problem for areas likely to be significantly affected;
- the likely significant impacts/effects on the environment of implementing the plan or programme
- environmental protection measures envisaged to prevent and reduce any adverse effects
- analysis of alternatives, outline of the reasons for selecting the alternatives, description of how the assessment was undertaken including any difficulties encountered
- measures and monitoring plan
- non-technical summary of the information

## Implementation and monitoring

**to ensure that there is a mechanism for correcting unacceptable aspects of implementation**

An environmental action and monitoring plan should be proposed in the Environmental Report to ensure sufficient control of environmental impacts, including the ability to take remedial measures.

The Purposes are:

- testing the effectiveness of plan actions in the course of time (degree of objectives achievement ),
- testing state of plan implementation,
- identifying at an early stage unforeseen adverse effects

## Implementation and monitoring

**to ensure that there is a mechanism for correcting unacceptable aspects of implementation**

Monitoring plan should include:

- objectives and effects to be monitored
- existing monitoring arrangements
- effective and efficiency indicators and their linking with objectives;
- existing data sources and informative databases to set indicators
- how data will be collect, elaborate and represent
- competent authority for various monitoring activities
- monitoring activities timing
- tools for carrying out monitoring (calculation, sampling and measurement)
- defining appropriate corrective actions to reduce unforeseen adverse effects.

## The SEA Process

### Consultation and participation

Consultation and opinions of certain authorities and members of the public during the preparation of plan contribute to more transparency in the decision-making and to the quality and comprehensiveness of information to decision-makers.

A effective participation process create the bases for public acceptance of projects/measures identified by plan.

The management of a participation process should involve the following key steps:

- identifying the authorities to be consulted;
- defining how they will participate to preparation of plan or programme
- establish the participation time in the course of preparation of plan or programme

## Consultation and participation

### Which authorities to be consulted?

“authorities” to be consulted should be included in following categories:

- regional governmental units likely affected by effects of implementing the plan or programme
- relevant environmental authorities
- environmental agencies, inspectorates and research institutions performing a public task at various administrative levels
- territorial management body whose covered areas are affected by plan (management of protected areas, basin authorities)
- health agencies;
- competent sectoral authorities
- “public” meant as one or more natural or legal persons, their associations, organisations or groups.
- relevant non-governmental organisations such as promoting environmental protection and others organisations concerned

# Consultation and participation

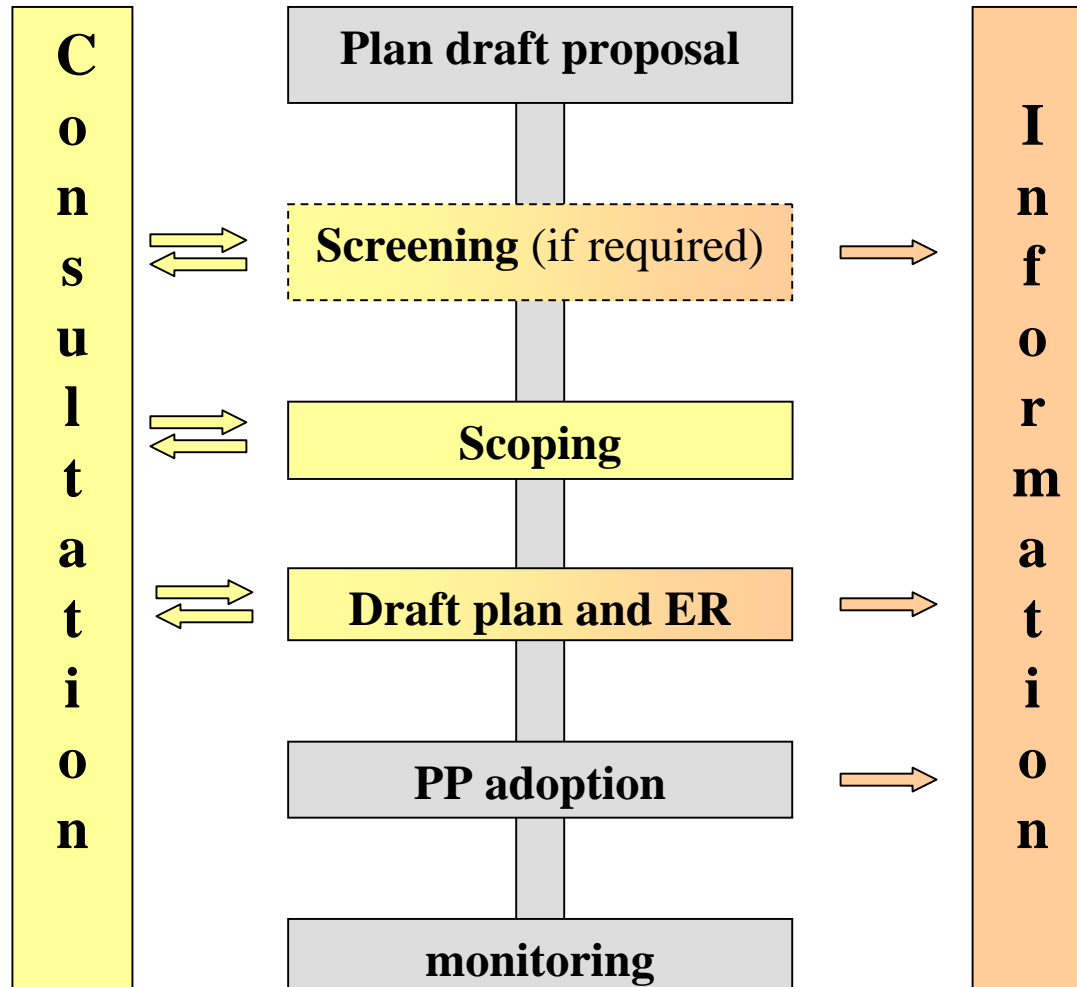
## Forms of public consultation.

Possible methods and techniques for public consultation are:

- seeking written comments on draft proposals,
- Public hearings,
- steering groups,
- focus groups,
- advisory committees or interviews
- internet forum
- newsletter



# Consultation and participation



# The potential role of Environmental Agencies in SEA

- authority to be consulted
- environmental data/indicators provider
- environmental monitoring
- environmental assessment and planning support;
- Environmental Report preparer