

“Capacity Building and Strengthening Institutional Arrangement”

Workshop: “Sustainable Development”

**Eia Environmental Indicators for
Sustainable Development**

Ms. Marilena Flori

APAT

Agency for Environmental Protection and Technical Services

To select the indicators directed to an EIA study, we should specify that it includes the following stages:

1. Cognitive picture of programmatic, planning and environmental reference (ascribed to the global context and to the environmental elements)
2. Sensitive analysis of the environmental context for changes introduced by the projects to realize
3. Analysis of the foreseeable impacts on the environmental elements
4. Study of the mitigative and compensative interventions of the residual impacts
5. Monitoring of the adopted mitigative and compensative interventions

The most suitable tool for the characterization of the five stages of an EIA study, is the “Indicator”.

The indicators will have a different sense, aim and use, for every stage to which they refer.

1

The indicators concerning the first cognitive stage

will be very detailed, because the in-depth knowledge of the environmental context in which we work, in order to let us not ignore all characterizing elements

2

The indicators concerning the intermediate stage of evaluation of the probable impacts

we will consider also all those variables that at the moment aren't interested, but could be in the future (the possible impacts can also concern the economic sphere and the spatial-temporal ambit)

3

The indicators concerning the intermediate stage of mitigative and compensative measurements

These indicators will have a narrow character and will consider only the aspects of the directly involved environmental elements

4

The indicators concerning the last stage of monitoring

These indicators will be relevant to the control, but they will consider only those aspects directly concerning the impacts, omitting all the other elements that haven't been involved

In the following some examples of indicators are listed, divided into environmental elements (8) and activities characterizing the sustainable development (3); moreover into the five categories of DPSIR

For every indicator, the user shall compile a card of characterization.

In the following, we have reported an example of the card of the indicator “Atmospheric concentrations of NO₂” relevant to Atmosphere, Air quality.

The DRIVING FORCES (*) considered for all the environmental elements, are:

- human activities
- infrastructures: road, port, railway and airport
- existing vehicles
- n. parkings
- n. industries
- n. homes
- agricultural areas
- resident population

(*) *see following pages*

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Atmosphere Meteorology		<ul style="list-style-type: none"> •emission •desertification 	<ul style="list-style-type: none"> •temperature •rain •wind •fog 		
Water environment		<ul style="list-style-type: none"> •water per capita consumption •water withdrawal for agricultural, industry and drinkable use •unloading into the rivers 	<ul style="list-style-type: none"> •rivers •drainage •flow •downflow •speed •banks and bed of the river •chemical and physical parameters •drinking possibility 	<ul style="list-style-type: none"> •bathing possibility •not drinking possibility •decrease of the flow 	<ul style="list-style-type: none"> •population served by purification plants •population connected to the sewer system •forest and hydraulic settlement •canalization of the rivers •banks •dykes

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Atmosphere Air quality		<ul style="list-style-type: none"> •emission of green house gas •emission of acidified substances •emission of carbon monoxide •daily flow of private and/or public vehicles 	<ul style="list-style-type: none"> •concentrations of ozone •concentrations of nitrogen bioxide •overcoming of normative limits 	<ul style="list-style-type: none"> •n. of patients (for typology of pollution) •n. of dead men (for typology of pollution) •change of wealth of flora and fauna 	<ul style="list-style-type: none"> •regulations •territorial planning •controls on polluting sources •specific measures in matter of air quality •working monitoring centrals •monitored air pollutions

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Soil and subsoil		<ul style="list-style-type: none"> •density of population •builded houses •water withdrawal for drinking use •quarries •mines •dumpings 	<ul style="list-style-type: none"> •altitude •gradient •superficial erosion •landslides •morphologic types:coastal, fluvial, vulcanic •faults •stratum 	<ul style="list-style-type: none"> •lowering of the stratum •not wooded areas •population at risk 	<ul style="list-style-type: none"> •seismic planning •plantation (reafforestations) •surface changed into biological agriculture

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Vegetation and ecosystems		<ul style="list-style-type: none"> •forest cuts •fishing activity •hunting pressure •waterproofed surface 	<ul style="list-style-type: none"> •wealth of flora •wealth of fauna •wooded surface •present habitats •humid areas 	<ul style="list-style-type: none"> •threat for vegetable species •wooded fires •threat for animal species •fragmentation of habitats 	<ul style="list-style-type: none"> •wooded territory subordinate to management •protected areas •interdict areas for fishing and hunting •special protection areas •urban green areas

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Noise		<ul style="list-style-type: none"> •acoustic emissions •flow of transports •n. of demands for authorization for new houses, industries and services 	<ul style="list-style-type: none"> •exposed population •overcoming of limits •controlled sources 	<ul style="list-style-type: none"> •illnesses that trace to noise •variation of economic value of the building 	<ul style="list-style-type: none"> •plans for the acoustic areas •interventions of reclamations by noise

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Radiations (ionizing and not ionizing)		<ul style="list-style-type: none"> •radio and television transmitters •expansion of the electric lines 	<ul style="list-style-type: none"> •overcoming of the regulations •exposed population •percentage (%) of time spended at the exposure 	<ul style="list-style-type: none"> •illnesses that trace to radiations 	<ul style="list-style-type: none"> •observatories

Environmental elements	Categories DPSIR				
	D (*)	P	S	I	R
Landascape		<ul style="list-style-type: none"> •use of the soil •occupation of the soil •use of the matters •level of the building expansion 	<ul style="list-style-type: none"> •geomorphologic elements •hydrogeologic elements •vegetation •agricultural and industrial elements •urbanization •historical elements •perceptive state 	<ul style="list-style-type: none"> •fragmentation of the territory •neglect of areas •fall of the economic value •loss and/or deterioration of the historical properties 	<ul style="list-style-type: none"> •town planning •protection planning •restrinctions •planning permissions

Besides listing the indicators about environmental elements, they will considered some examples of indicators about important activities characterizing the sustainable development

	P	R
Transports	<ul style="list-style-type: none"> •level of motorization •registration of the vehicles •total transfers •divided transfers for typology 	<ul style="list-style-type: none"> •supply of public transport •pedestrian precinct •limited traffic areas •urban traffic plans
Energy	<ul style="list-style-type: none"> •energy consumption •occupied areas for energy plants 	<ul style="list-style-type: none"> •renewable energies •use of green petrols •energy plans
Refuses	<ul style="list-style-type: none"> •production of urban waste •production of special, toxic and bad refuses 	<ul style="list-style-type: none"> •differentiated waste disposal •differentiated typology of removal •removal waste plans •recovered energy by removal wasted plants •recovered matters

Among the various schemes for the characterization of the indicators, we have chosen the more suitable for the use in EIA

Identified elements	Category
	Sector
	Typology
	Unit of measurement
	Local purchasers
	Institutional purchasers
	Sources
Normative references	Normative references
	Objectives/standards
Description and importance for the policy	Description of the indicator
	Importance for the local policies
Connections with other indicators	Among categories
	Among sectors
	Among indicators
Bibliography	Web sites
	Bibliography of reference

In following, we report the scheme (described in the previous slide) for the characterization of the indicator: “Atmospheric concentrations (NO₂)”

Identified elements	Category	Environmental
	Sector	Atmosphere
	Typology	State
	Unit of measurement	Computed annual average; 98% percentile; µg/mc (microgram per cubic metre)
	Local proponents	Municipalities, provinces, regions
	Institutional proponents	Ministry of Environment, Canada Environment, ICLEI, OECD, UK Departmental Environment, UN-CSS
	Sources	Municipality, Province

Normative references	Normative references	DPR 203/88 “Accomplishment of the directives CEE 80/779, 84/360, 85/203, that concern rules in the matter of air quality, with regard to specific polluting agents, and pollution produced by industrial plants
	Objectives/ standards	Limit: 98% percentile of the hourly detected values during one year: 200 µg/mc ; guide-value: 50% percentile of the hourly detected values during one year : 50 µg/mc

<p>Description and importance for the policy</p>	<p>Description of the indicator</p>	<p>It measures the concentrations of nitrogen dioxide (NO₂) in atmosphere. The emissions of this pollution are caused by mobile and fixed sources; particularly by combustion processes at high temperature: vehicular traffic, energy consumption and industrial concentration; during meteorologic conditions of stability and of strong insulations it contributes to the formation of photochemical smog. It can react with the water giving rise to nitric acid, which causes the phenomenon of the acid rains. The last are irritating for the mucous membranes and gives rise to pathologies of the respiratory apparatus (alterations of the pulmonary functions, chronic bronchitis, pulmonary emphysema and asthma).</p>
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		<p>The air pollution damages, besides human health, also vegetation, building materials, monuments and so on. It is closely connected to the density of urban population and the environmental policies.</p>
	<p>Importance for the local policies</p>	<p>It can be an indicator of the vehicular traffic management and of control of industrial emissions within the municipal territory.</p> <p>Some parameters influence the indicator:</p> <ul style="list-style-type: none"> a) the presence of plans of moderation of traffic b) the increase of green and pedestrian areas c) the political choices of investment on the system of public transports and on the substitution with electric and methane motor vehicles.

Connections with other indicators	Among categories	<p><u>Demography:</u> demographic density <u>Health:</u> respiratory illnesses</p>
	Among sectors	<p><u>Mobility:</u> level of motorization; pedestrian precincts and ZTL (areas with limited traffic); transfers by public transports, public transports with low emissions <u>Soil:</u> urban reutilization</p>
	Among indicators	<p><u>Atmosphere:</u> NO₂ limits overcomings (nitrogen dioxide); atmospheric emissions of NO₂; working monitoring stations; stoppage of circulation of vehicles; controls of emission; controls of industrial sources.</p>