

“Capacity Building and Strengthening Institutional Arrangement”

Workshop: “Sustainable Development”

**Environmental Indicators for Sustainable  
Development Communication at Local Level**

**Mrs. Marilena Flori**

APAT

Agency for Environmental Protection and Technical Services

## Environmental sustainable development

Principle founded on the concepts of:

Vertical or temporal equity



extended to  
generation relations



To meet the needs of present generations without jeopardizing the possibility to satisfy needs of future generations

Horizontal or geographic equity

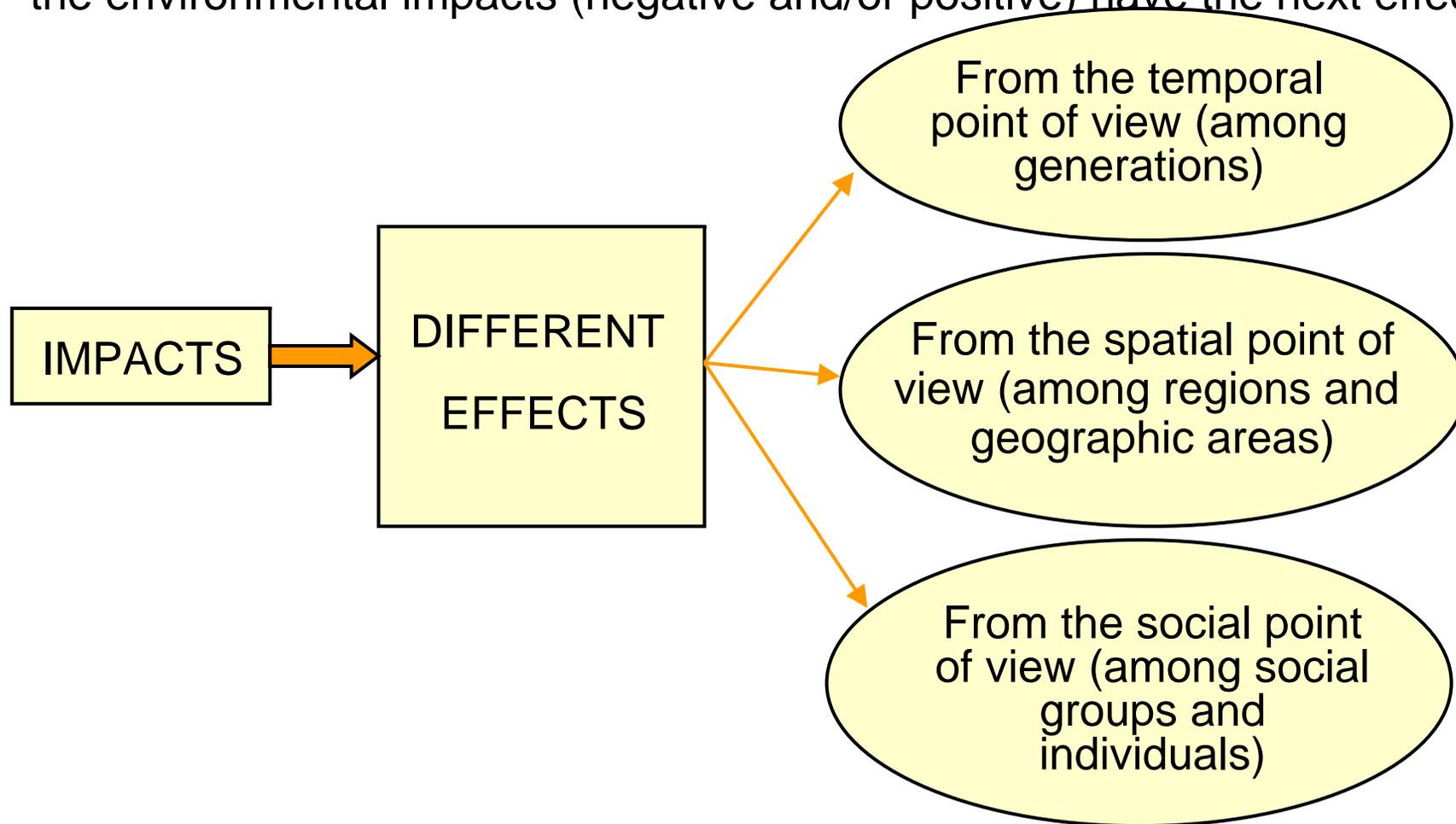


extended to  
contemporary relations



To meet the primary needs of everyone and to be in a position to pursue the aspirations of everybody for a better quality of life

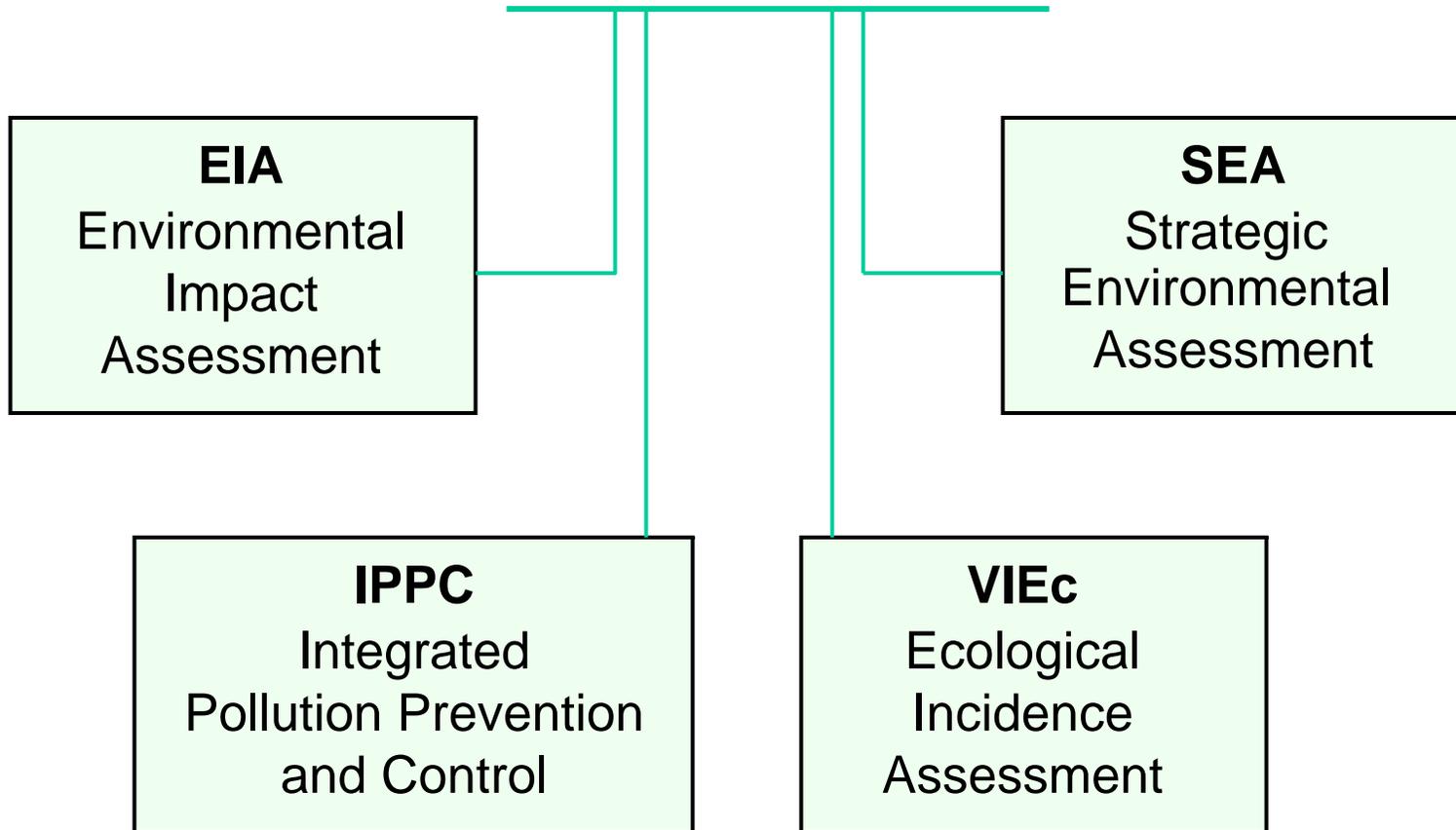
The environmental sustainable development doesn't exist without equity. In fact the environmental impacts (negative and/or positive) have the next effects:



To pursue the aims of environmental sustainable development, we must consider the following:

1. To anticipate and prevent
2. To apply the principle of the precaution
3. To consider the sources and the targets of the impacts
4. To keep the capital of the natural resources at present level or nearby
5. To verify the efficacy of the actions and mitigations connected to economic development

Tools used in the analysis of environmental sustainable development :



## ENVIRONMENTAL IMPACT ASSESSMENT

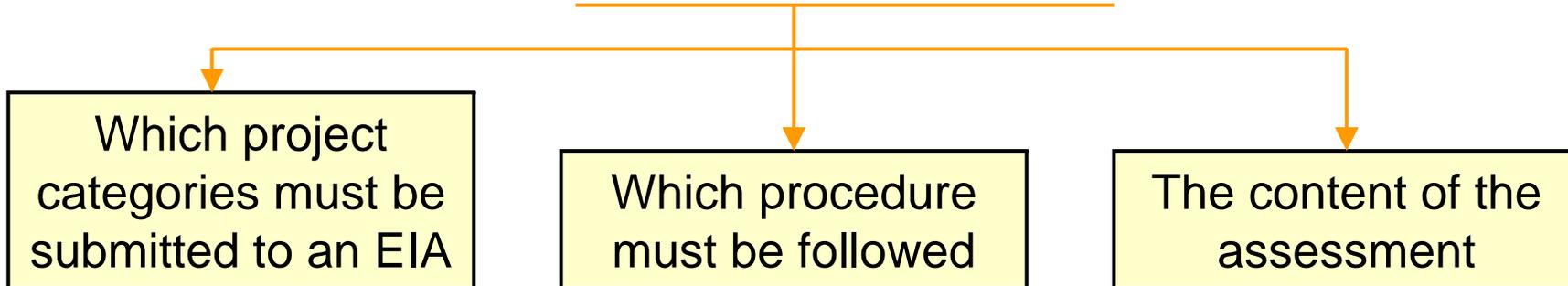
The EIA procedure ensures that environmental consequences of projects are identified and assessed before authorization is given.

The public can give its opinion that is taken into account in the authorization procedure of the project.

The public is informed of the decision afterwards.

The EIA directive (EU legislation) was introduced in 1985 (85/337/EEC) and amended in 1997 (97/11/EC).

The EIA directive outlines:



## STRATEGIC ENVIRONMENTAL ASSESSMENT

The SEA procedure ensures that environmental consequences of plans and programs are identified and assessed during their preparation and before their adoption.

The public (stakeholders) and environmental authorities can give their opinion; all results are integrated and taken into account in the course of the planning procedure.

After the adoption of the plan or programme, the public is informed about the decision and the way in which it was taken.

The EIA directive (EU legislation) was adopted in 2001 (2001/42/EC), after a first proposal in 1996 that was amended in 1999.

The SEA:



Contributes to more transparent planning by involving the public and by integrating environmental considerations

Helps to achieve the goal of sustainable development

## INTEGRATED POLLUTION PREVENTION AND CONTROL

The IPPC procedure aims to the reduction or, as far as possible, to the elimination of the pollution by intervening at the source and ensuring a cautious management of the natural resources in the observance of the principle “the person who pollutes, pays”.

The IPPC directive (EU legislation) was approved in 1996 (96/61/EC).

### The IPPC:

Identifies the objects of the prevention, for some categories of industrial activities (energy activities, production and transformation of metals, industry of minerals products, chemical industry, management of waste, and so on...)

Foresees the reduction of the emission into the atmosphere, water, soil, and waste

## ECOLOGICAL INCIDENCE ASSESSMENT

The VIEc (*italian acronym*) procedure submits plans and projects, which can have an important effect on the sites of “Rete natura 2000”.

The VIEc procedure consists of four main stages:

1. Screening: it identifies the possible important incidence
2. Appropriate assessment: the analysis of the incidence and the identification of the possible measures of mitigation
3. Analysis of the alternative solutions
4. Definition of the measures of compensation.

The VIEc procedure was introduced in 1992 with the article n. 6 of “Habitat Directive” (92/43/EEC).

The VIEc:



Constitutes the tool to ensure the attainment of a balanced relation between the satisfactory preservation of habitats and the sustainable use of territory.

## The indicators

The description and evaluation of the elements that characterize an environmental programme, call for methodical use of the INDICATORS.

Before analysing the characteristics of the indicators, we consider some definitions of the term “indicator”:

1

“Synthetic representation of a complex reality, the best peculiarity or the whole peculiarities that allow to understand a particular phenomenon”

2

OECD (Organization for Economic Cooperation and Development) – 1994: “Value derived from the parameters; it furnishes the information about a phenomenon; its meaning goes over the priorities directly associated to the value of the parameter”

3

“Model that allows to monitor and to communicate information”

The indicators can be relative to every stage of the procedure of environmental programme (feedback at all levels of the environmental procedure):

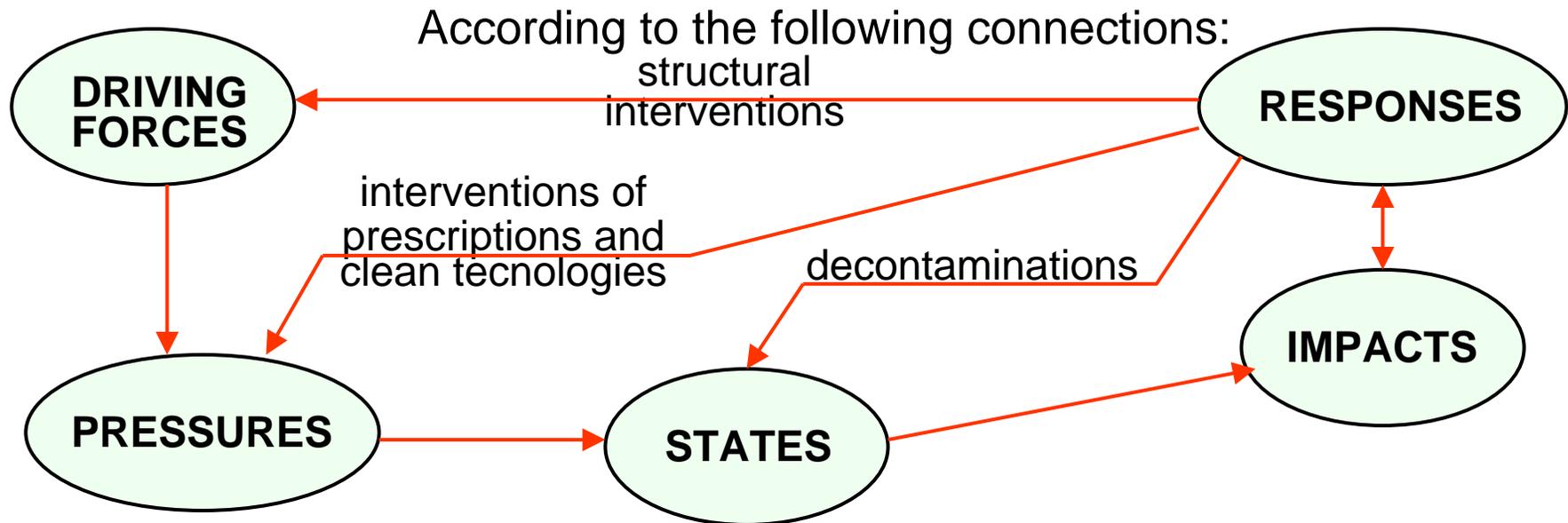
- 1 Definition of the targets
- 2 Realization of cognitive starting frame
- 3 Accomplishment of plans or programmes
- 4 Permanent assessment of progresses to estimate the point of accomplishment and positive or negative impact to achieve the target
- 5 Check of the targets
- 6 Analysis of the causes and effects
- 7 Monitoring, check and possible adjustment of the targets; possible updating of plans and programs

### An indicator can be:

- |   |  |    |  |
|---|--|----|--|
| 1 | A fair number (neither few, because insufficient to characterize the context to represent, nor too much, because dispersive or misleading)                 | 5  | Comparable with the regulations                            |
| 2 | Absolute (expressed in absolute quantity with their own units of measurement) or relative (expressed with quantity referred to other unity of measurement) | 6  | Simple, intelligible and not ambiguous                     |
| 3 | Rappresentative (they can contain important and directed informations)   | 7  | Usefully applicable in time                                |
| 4 | Scientifically valid   | 8  | Applicable in uniform way in multiple places               |
|   |  | 9  | Founded on certain data and documents                      |
|   |  | 10 | Founded on easily available data and with reasonable costs |
|   |  | 11 | Valid and continuously verifiable                          |

In Europe (EEA\* and EUROSTAT\*\*) the environmental indicators are usually represented through DPSIR model (evolution and integration of the scheme PSR by OECD\*\*\*):

DRIVING FORCES, PRESSURES, STATES, IMPACTS, RESPONSES



\* EEA: European Environment Agency

\*\* EUROSTAT: Office of Statistic of European Community

\*\*\* OECD: Organization for the Economic Cooperation and Development

The model is based on the concept of “randomness”:  
the anthropic activities exercise PRESSURES on the environment and lead  
modifications into the quality and quantity of the natural resources  
(STATE).

The society replies to this modifications through the environmental policies  
of general or sectorial economy (RESPONSES).

The latter, through anthropic activities, link up again to the PRESSURES.

In the following, we report the characterization of the categories of the  
scheme DPSIR:

Driving forces



Primary generative causes (agriculture, industry, transports, and so on...)



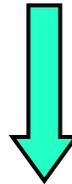
Economic sectors, human activities that produce factors of impact:

1. they single out the existing relations between factors responsible of pressures and the same pressures
2. they help the persons who decide to identify external negative sources, where and when to intervene, in order to reduce the environmental problems.

Pressures



Emissions in atmosphere, waste outputs, water wastes, water withdrawals,  
and so on...



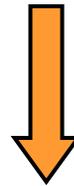
Emissions of residues or subtraction of resources, waste:

1. they single out the variables directly responsible of the environmental deterioration
2. they single out and quantify the causes of the alterations in the environmental condition.

States



Air quality, water quality, soil quality, biodiversity, and so on...

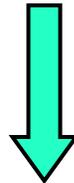


Physical, chemical, biological qualities of different environmental components that are sensitive to the factors of impact:  
this indicators outline and describe the conditions of the environment, permitting an evaluation of the degree of deterioration.

Impacts



To health, to ecosystems, to economy, and so on...



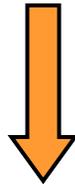
The changes of the state produced by the factors of impact on the quality of the ecosystem, health, functions, and so on....

These indicators make explicit the relations of cause-effect between pressures and states.

Responses



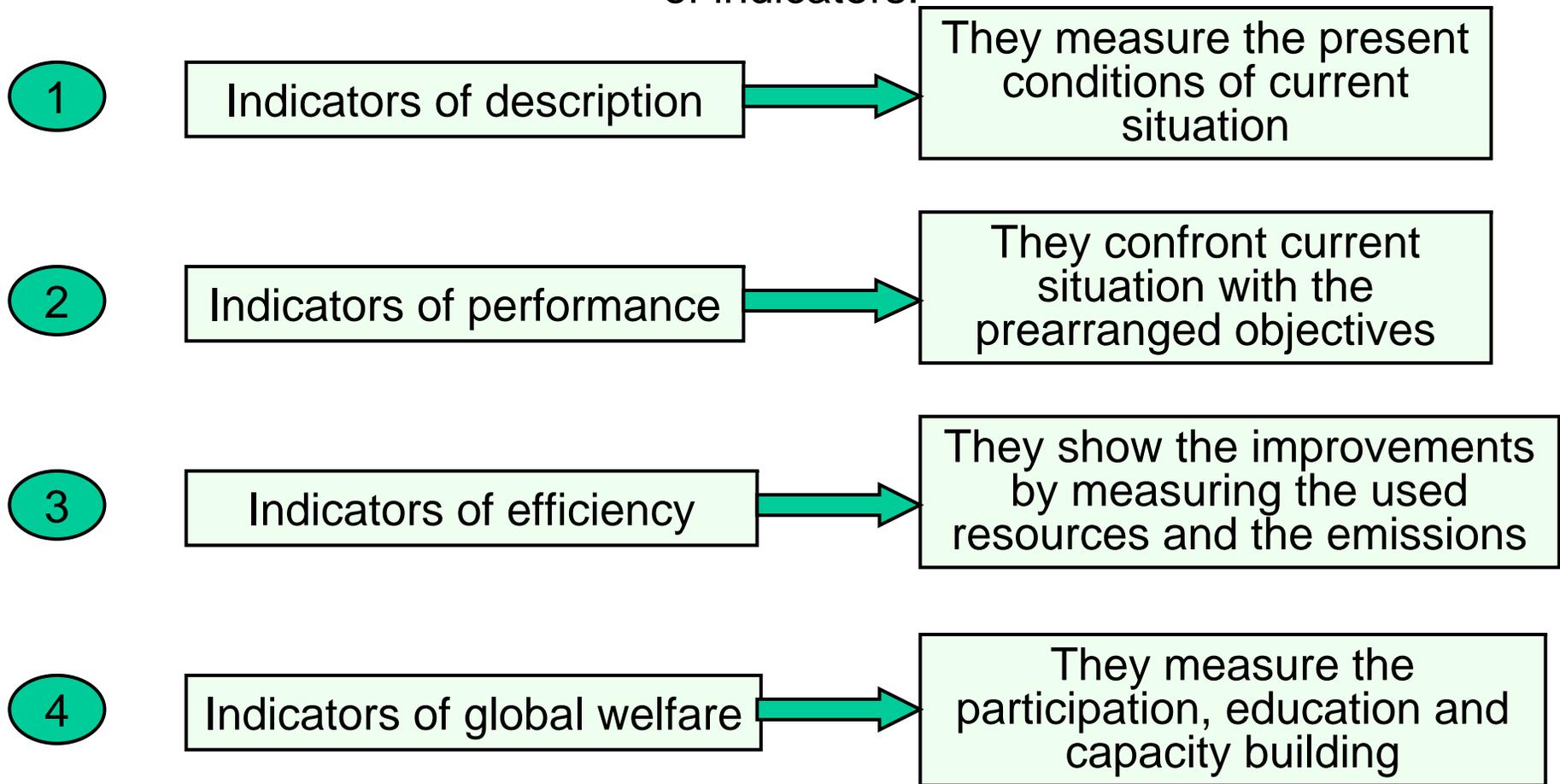
Laws, plans, programmes, prescriptions, and so on...



Actions and countermeasures undertaken to oppose the actions of driving forces; interventions of decontamination aimed to reclaim situations of unsustainable environmental and sectorial policies, legislative initiatives, planning actions , and so on...

These indicators express the operational efforts that the society has done to improve the quality of life and environment.

The European Environmental Agency has identified four macro-categories of indicators:



At world level, a lot of check-lists of indicators of environmental sustainable development have been got ready:

1

USA: core-set UN-CSD (United Nations – Commission of Sustainable Development) – 1993:

Originally were foreseen 134 indicators, then reduced to 58, divided into 15 themes:

- |                    |  |
|--------------------|--|
| 1. Equity          | 9. Oceans, seas and coasts               |
| 2. Health          | 10. Fresh water                          |
| 3. Education       | 11. Biodiversity                         |
| 4. Home conditions | 12. Economic structure                   |
| 5. Security        | 13. Models of consumption and protection |
| 6. Population      | 14. Institutional structure              |
| 7. Atmosphere      | 15. Institutional ability                |
| 8. Soil            |  |

2

WHO: World Health Organization – Project “Health cities indicators” -  
1999

It defines 52 indicators divided into four groups:

1. Public health
2. Health service
3. Environmental indicators
4. Social and economic indicators

3

### EEA: European Environmental Agency - 1996

It uses 20 indicators to characterize the periodic report about the state of european environment

4

### EUROSTAT: Statistical Office of the European Communities: Project ESEPI (Environmental Pressure Indicators) - 1999

It foresees 10 themes:

- |                                      |   |
|--------------------------------------|---|
| 1. Atmospheric pollution             | 7. Dispersion of toxic substances       |
| 2. Climatic change                   | 8. Urban environmental problems         |
| 3. Loss of biodiversity              | 9. Waste                                |
| 4. Sea environment and coastal areas | 10. Water pollution and water resources |
| 5. Rarefaction of ozone state        |   |
| 6. Excessive use of resources        |   |

5

## ECI: European Common Indicators - 2000

It identifies 11 indicators:

1. Citizens' satisfaction with the local community
2. Local contribution to global climatic change
3. Local mobility and passenger transportation
4. Availability of local public open areas and services
5. Quality of the air
6. Children's journeys to and from school
7. Sustainable management of the local authority and local enterprises
8. Noise pollution
9. Sustainable land use
10. Products promoting sustainability
11. Ecologic stamp

At italian level, the most representative and used check-lists are:

1

Yearbook of italian environmental data; realized by two italian non-governmental organizations (NGOs).

It groups together 100 indicators into 11 themes:

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1. Social and economic dimension    | 6. Waste                             |
| 2. Energy                           | 7. Climate and atmosphere            |
| 3. Mobility                         | 8. Water resources                   |
| 4. Agriculture                      | 9. Natural heritage and biodiversity |
| 5. Industry of tourism and services | 10. Urban environment                |
|                                     | 11. Environmental policies           |

2

## Yearbook of environmental data - APAT

It identifies 247 indicators grouped together into 3 theme areas and 19 chapters:

### Environmental conditions

- Atmosphere
- Biosphere
- Hydrosphere
- Geosphere
- Waste
- Ionizing radiations
- Not ionizing radiations
- Noise
- Natural risk
- Anthropogenic risk

### Productive sectors

- Agriculture and forestry
- Energy
- Transports
- Tourism
- Industry

### Conservation and protection

- Environmental quality of organizations, businesses and products
- Monitoring and control
- Promotion and diffusion of the environmental culture
- Environment and welfare

3

Guide-lines for the Strategic Environmental Assessment – Structural funds 2000-2006 – MATTM (Ministry for Environment and Protection of the Territory and the Sea) - 1999

This document was predisposed by general direction of EIA; it represents a source of information for the population and the report about the environmental state, with the collaboration of Ministry for Cultural Activities, ANPA (presently APAT) and Regions.

From the whole analysed documentation (coming by the different institutions which work at world, european and italian level), we have reported some examples of list and characterization of indicators through some type-cards:

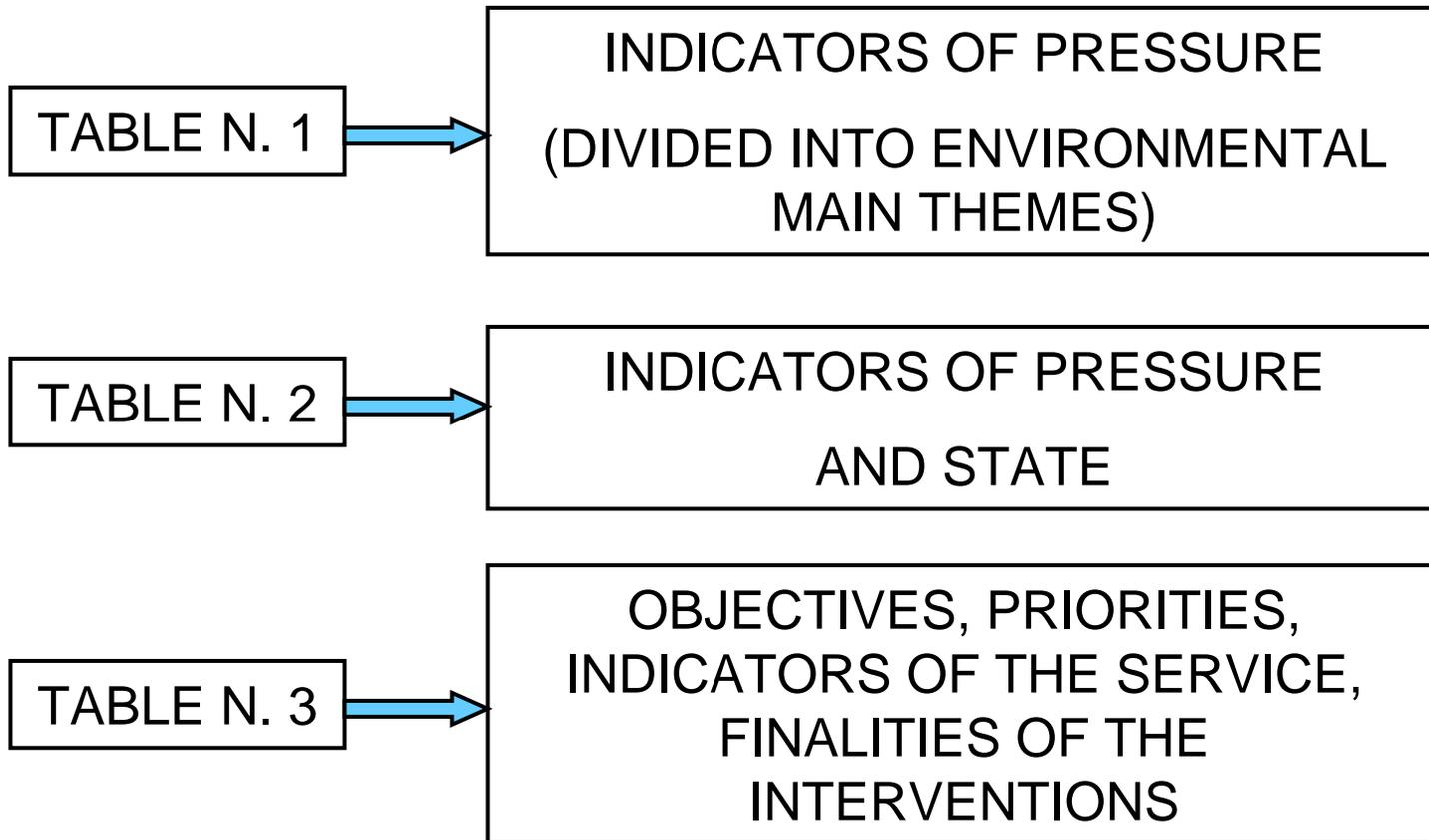
- 1 Type-scheme derived by “Manual of Indexes and indicators for the water” ARPAT (Regional Agency) - ANPA 2002
- 2 Type-scheme that are used for evaluation to submit projects for financing with structural funds 2000-2006
- 3 Type-scheme derived by “Sfida project” 2002 (Directed System to integration of the environmental dimension).

1 Scheme for the  
characterization of the  
Indicators  
(by “Manual of  
Indexes and  
indicators for the  
water”  
ARPAT-ANPA  
2002)

<b>Title (the name of the indicator)</b>
<b>Typology of the application</b>
<b>DPSIR</b>
<b>Description</b>
<b>Method of measurement</b>
<b>Object of the indicator</b>
<b>Connected indicators</b>
<b>Unit of measurement</b>
<b>Geographic level of detail</b>
<b>Document of reference</b>
<b>Normative reference</b>
<b>Key words</b>
<b>Geographic covering of data</b>
<b>Period of reference of data</b>
<b>Method of elaboration</b>
<b>Problems of aggregation of data</b>
<b>Source of data</b>
<b>Usable internet address</b>
<b>Notes, observations and comments</b>

2

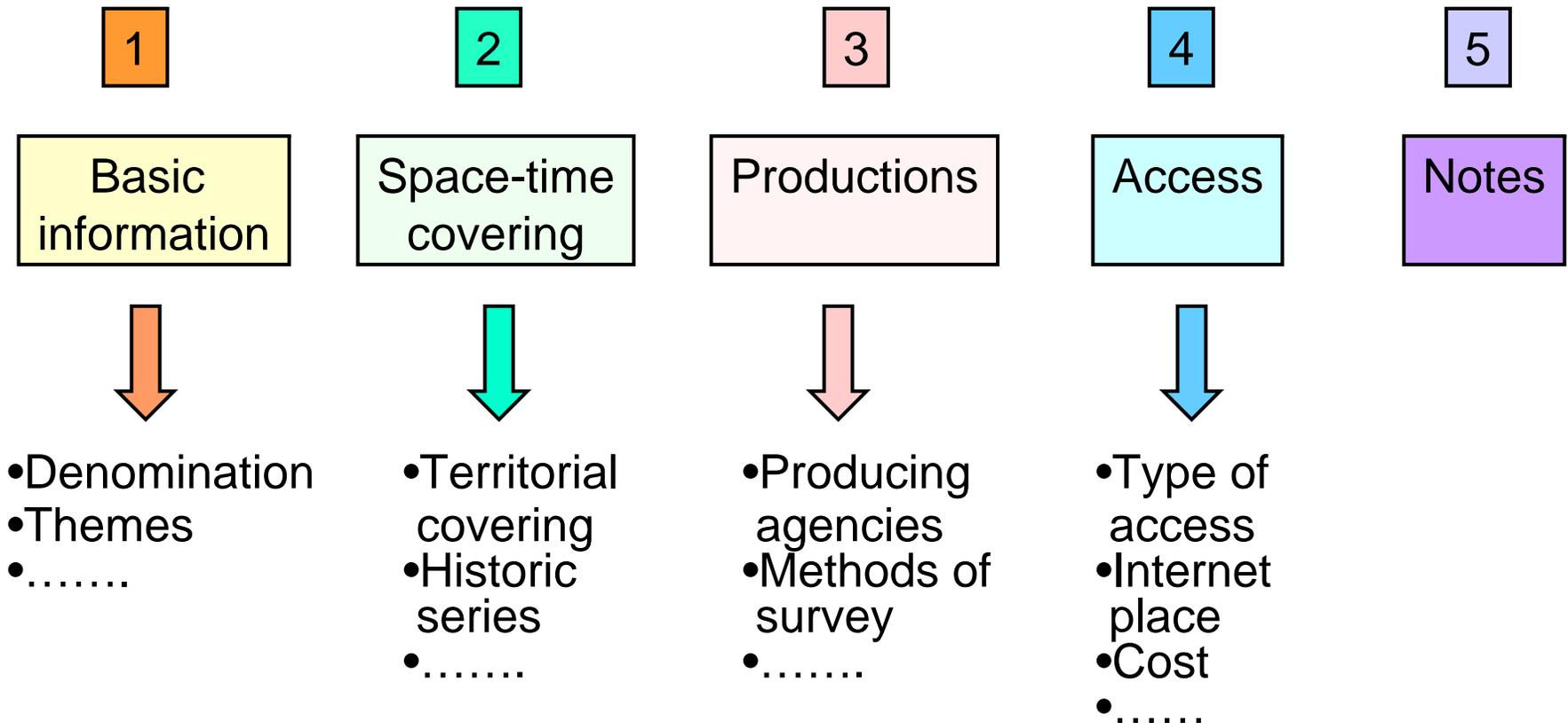
## Tables of indicators for structural funds



3

Scheme derived by "Sfida project"

Every card of information is organized into four principal sections:



The card (Sfida project) of data is divided into 5 sections:

<b>Basic information</b>	<b>Denomination</b>
	<b>Source</b>
	<b>Themes</b>
	<b>Contents</b>
	<b>Owner (corporation)</b>
	<b>Office of reference</b>
	<b>Reference Web sites</b>
<b>Space-time covering</b>	<b>Territorial covering</b>
	<b>The greatest level of territorial detail</b>
	<b>The other levels of territorial detail</b>
	<b>The greatest scale of representation</b>
	<b>The other scales of representation</b>
	<b>The last year of updating</b>
	<b>The last typology of updating</b>
	<b>Historical series: the last year</b>
	<b>Historical series: duration</b>
	<b>Periodicity</b>
<b>Temporal aggregations</b>	

<b>Production</b>	<b>Producing corporations</b>
	<b>Type of representation</b>
	<b>Georeferenced system</b>
	<b>Methods of survey/elaboration</b>
	<b>State of advancement</b>
	<b>Type of support</b>
	<b>Type of file</b>
<b>Conditions of access</b>	<b>Type of access</b>
	<b>Web site access authorization</b>
	<b>Type of file</b>
	<b>Available near...</b>
	<b>Cost</b>
	<b>The year of the last publication</b>
<b>Notes</b>	<b>Notes about the card of data</b>
	<b>Notes about the cataloguing</b>
	<b>Present in the informative system "Sfida"</b>
	<b>Comments</b>

## Example of catalogue of data and indicators

A Region of North of Italy, together with the European Union, has experimented an informative tool containing the information on data and indicators with the relevant descriptive cards.

The catalogue contains a set of metadata, the best information about indicators, that have been registered according to some standardized formats on Internet.

Its name is “Sfida Project”, 2002 (Directed System to integration of the environmental dimension).

The structure is tree-like and can be consulted easily on Internet; it is subject to a dynamic process of expansion.

In the following slides we have highlighted the structure of this informative tool, because it can be used as example of set of metadata to adapt to any local reality.

Principal shortages that influence the availability of the data:

- 1 Lack or inadequacy of monitoring nets
- 2 Necessity of revision of the present nets
- 3 Insufficient level of disaggregation of the data
- 4 Lack of some fundamental themes
- 5 Lack of historical successions
- 6 Very much inhomogeneous data
- 7 Lack of an adequate flow of data
- 8 Fragmentation of the sources of data
- 9 Necessity of correlation with the other themes

ENVIRONMENT	TERRITORY	ACTIVITIES
Water	Infrastructures	Agriculture, breeding and fishing
Protected areas	Occupation	Handicraft
Air	Population	Industry
Climate and meteorology	Residential system	Service industries (excepted tourism)
Ecosystems	Use and covering of soil	Tourism
Energy		Transports
Landscape		Education
Cultural heritage		Health
Radiations		Recreational activities
Waste		
Noise		
Soil and subsoil		

Year of updating

Availability

Type of representation

Year of reference

Through the card, the user can value:

- a) The aim
- b) The objective
- c) The characteristic time of answer
- d) The territorial scale of representation
- e) The whole information necessities to select it (or not) for a specific site

Through an interrogative mask, the user can identify  
(among the listed indicators):

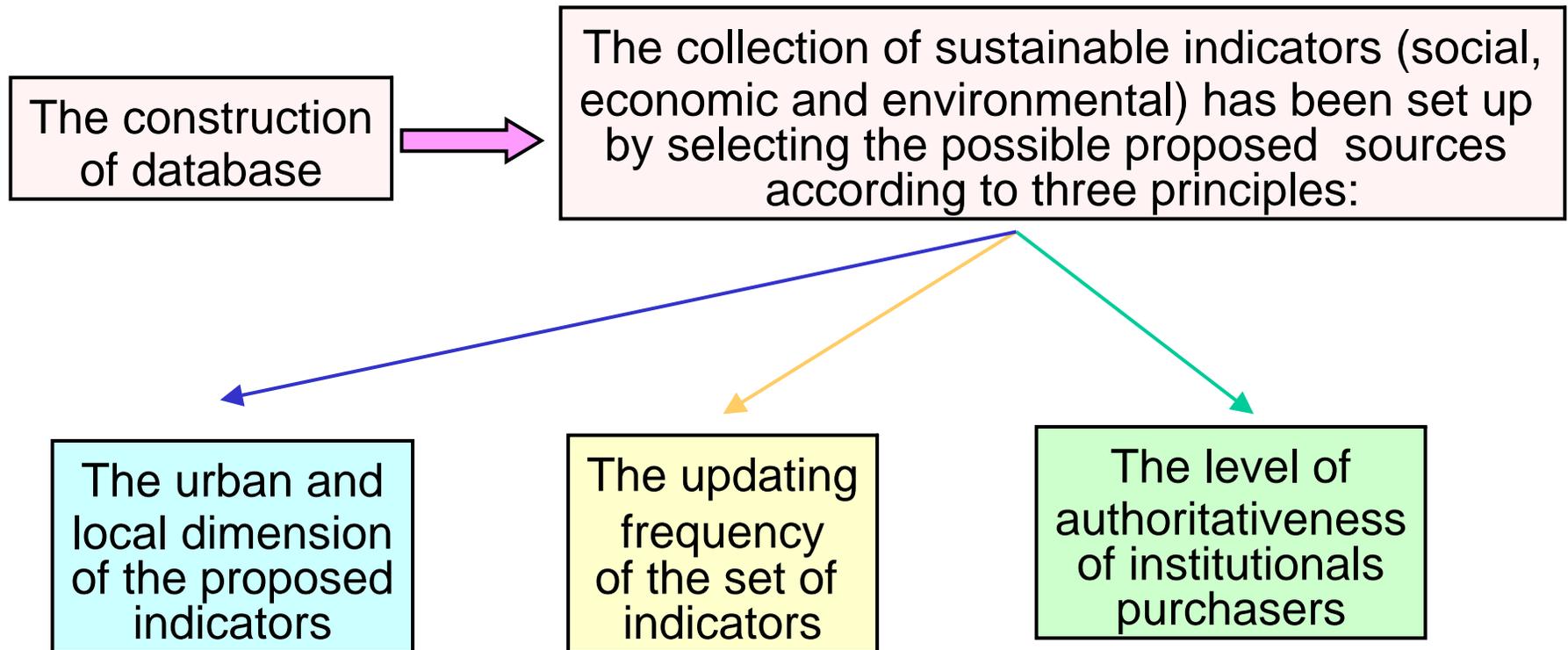
- a) The indicators relevant to the sectors of greater interest
- b) The indicators ascribed to the specific years
- c) The indicators ascribed to the level of territorial details

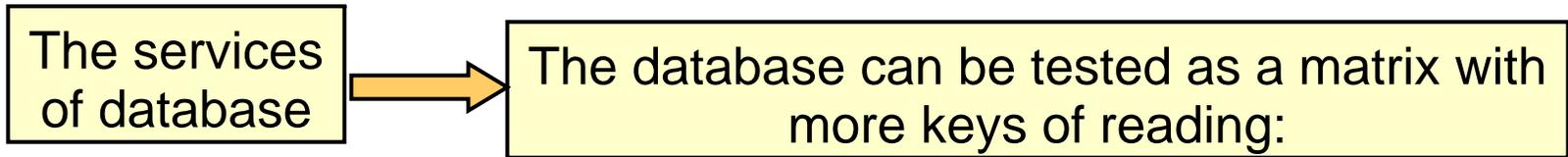
The data are represented on thematic maps.

An example of the map “cultivated areas: valuable zones”:



Example of construction of database for the indicators:





<b><u>1) The importance for the policies</u></b>	<b><u>2) The periodicity of the basic information</u></b>	<b><u>3) Characteristics</u></b>
Subject to the regulations	Systematic statistical survey	N. of recurrences in the database
Strategic elements of assessment	Occasional elaborations	Degree of importance for the policies
Accessory information	Production of local origin	Periodicity of the basic information

This is the homepage of Project “Sfida” (Italy)

