

Doria, Paola; Pettenella, Davide

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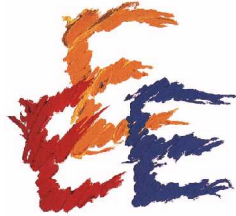
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Fondazione Eni Enrico Mattei

**The Decision Making Process in  
Defining and Protecting Critical  
Natural Capital**

Paola Doria\* and Davide Pettenella\*\*

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\*Fondazione Eni Enrico Mattei

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Fondazione Eni Enrico Mattei  
Corso Magenta, 63, 20123 Milano, tel. +39/02/52036934 – fax +39/02/52036946  
E-mail: [letter@feem.it](mailto:letter@feem.it)  
C.F. 97080600154

# THE DECISION MAKING PROCESS IN DEFINING AND PROTECTING CRITICAL NATURAL CAPITAL <sup>1</sup>

by

**Paola Doria and Davide Pettenella**

**Fondazione ENI Enrico Mattei, Milano**

*Summary.* The paper presents the steps characterising the decision making process related to the definition of Critical Natural Capital. An inventory of different components of Critical Natural Capital based on the legislative framework in Italy is presented. The different actors involved and the conflicts arising in Critical Natural Capital definition are highlighted by means of three case studies. The decision making process is analysed implementing the Advocacy Coalition theory.

Key words: Critical Natural Capital, sustainability, advocacy coalition framework, Italy.

## **1. Introduction**

The Critical Natural Capital (CNC), defined as *the set of environmental resources which performs important environmental functions and for which no substitute in terms of human, manufactured, or other natural capital exist* (CRITINC project document, 1999), is a general reference concept derived from the implementation of the strong sustainability criterion aimed at the formulation of environmental protection policies. It does not account for considerations related to the organisational aspects of decisional processes which instead play a relevant role in the actual choice of the resources to be protected. In particular the CNC concept does not take into consideration the role played by different actors and stakeholders in the negotiating process for the implementation of environmental policies.

The objective of this paper is the analysis of the decision making process (DMP) and the consequences of the CNC classification. Three case studies are reported here in order to improve the understanding of the causing factors, the constraints, and the actors involved in the decision making process about the definition of critical natural capital. The analysis of the three case studies will be conducted within the Advocacy Coalition Framework (ACF). The ACF is a conceptualisation of policy process developed by Sabatier and Smith (Sabatier and Smith, 1993) and subsequently refined by Sabatier (1998). The Advocacy Coalition approach frames a process of policy change in a time perspective and focuses on the interaction of different actors who follow and seek to influence governmental decisions in a policy area. The ACF conceptualised the public policies using the concept of beliefs systems which are defined as a set of values priorities and casual assumptions about how to realise them. An important

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<sup>1</sup> This paper presents some results obtained within of the EU research project ‘Making Sustainability Operational: Critical Natural Capital and the Implications of a Strong Sustainability Criterion’. Carlo Bravi, Davide Migliavacca and Lea Nicita (FEEM), in addition to the paper authors, co-operated in the project.

characteristic of the ACF is considering a policy domain - as in the three case studies analysed - in which actors from a variety of public and private organisations are concerned with a policy issue and regularly seek to influence public policy in that domain (Sabatier and Smith, 1994). Actors include not only administrative agencies, legislative committees and interest groups, but also actors such as journalists, researchers and policy analysts who play important roles in the generation, dissemination and evaluation of policy ideas (Sabatier and Smith 1994).

The interest for ACF is considerable among European policy scholars (see the Advocacy Coalition Framework web site) and applications for environmental policies have been developed, among others, by Lertzman *et al.* (1996), Berggen (1998), Høgl (2000) and Smith (2000).

## 2. CNC outline in Italy

The inventory of CNC in Italy has been drawn up by using the existing legislative framework, the second Report on the State of the Italian Environment (Ministero dell'Abiente - 1997) prepared by the Ministry of Environment, the Yearbook of Environmental Statistics (*Statistiche Ambientali*) by the National Statistical Institute and many other minor sources of information in order to identify those environmental functions perceived as critical, the implemented measures to preserve them and the related monitoring activities.

Environmental functions are defined by De Groot (1992) as “*the capacity of natural processes and components to provide goods and services that satisfy human needs (directly or indirectly)*”. The goods are usually provided by the ecosystem components; the services by the ecosystem processes.

Pearce and Turner (1990) have grouped environmental functions into Source, Sink and Service. Ekins and Simon (1998) have widened the previous classification by including human health and welfare functions. By using the above classifications, we specified the following functions and related environmental themes:

- sink  $\Rightarrow$  pollution,
- source  $\Rightarrow$  resource depletion, soil erosion and species extinction,
- life support functions  $\Rightarrow$  climate, ozone, ecosystem balance,
- human health and welfare  $\Rightarrow$  health and risk.

The identified/selected environmental functions and natural capital have been split in two main parts: stocks and ecosystems.

Stock analysis has been performed by using a classification based on four typologies of natural capital: soil, including sub-soil resources (minerals and fossil fuels); water (fresh surface water and fresh groundwater); air and biotic stocks.

To analyse present critical ecosystems we have employed a simple classification based on three categories: forest, wetlands, arid and semi-arid areas, biotopes and areas of outstanding environmental value for the presence of various natural and semi-natural ecosystems (national and regional parks). This classification is well suited to the need to associate the presentation of instruments which define protected areas, limits and standards to the instruments (plans, programs, acts, etc.) which outline policies (i.e. principles and criteria) of CNC definition.

Table 1 summarises the measures aimed at determining and preserving CNC. These are divided into the following two categories: (a) limits and standards and (b) policies (sometimes associated with some partial/local limitations/constraint/standards).

A general remark that can be done when observing into details the level of protection of CNC in Italy is the lack of homogeneity and overall coherence in the level of protection of natural stocks and ecosystems: air and water, as stocks, and arid and semi-arid areas, as ecosystems, have been much less

considered as CNC in relation to other natural resources. To understand this situation, it may be useful to describe the real motivations and interests related to the decision making process in CNC protection.

Table 1 - A summary presentation of the outcomes of the inventory on CNC in Italy

CNC	Sink (pollution)	Source (depletion)	Life support functions (climate, ozone, ecosystem ba
STOCKS OF CRITICAL NATURAL CAPITAL			
• Air	<b>Air quality: emission limits</b>		<ul style="list-style-type: none"> <li>• <b>GHG emissions control</b></li> <li>• <b>CFC regulation</b></li> </ul>
• Soil	<ul style="list-style-type: none"> <li>• <b>Pollution limits: max. concentration</b></li> <li>• <b>Waste disposal</b></li> </ul>	<b>Soil stability: “constraint for erosion control”</b>	
		<b>Planning of quarry use</b>	
• Water	<ul style="list-style-type: none"> <li>• <b>Water quality: emission limits</b></li> <li>• <b>Agriculture activities</b></li> <li>• <b>Fresh water quality for fish life</b></li> <li>• <b>Control of eutrophication</b></li> </ul>		
• Biotic stocks		<ul style="list-style-type: none"> <li>• <b>Limitation to flowers, mushrooms and truffles collection</b></li> <li>• <b>Limitation of hunting and fishing</b></li> <li>• <b>Designated forests for seed production</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Red list of fauna species</b></li> <li>• <b>Red list flora species</b></li> </ul>
ECOSYSTEMS			
• Forest			<i>Pan European Process for Sustainable Management</i>
• Wetlands			<b>Areas under the Ramsar Convention</b>
• Arid and semi-arid areas			<i>National plan against desertification</i>
• Biotopes, national and regional parks			<ul style="list-style-type: none"> <li>• <i>Convention on biodiversity</i></li> <li>• <b>National Register for protected areas</b></li> <li>• <b>Corine Biotopes and Corine des areas</b></li> <li>• <b>BioItaly project</b></li> </ul>
			<b>Watershed Authority Planning</b>

Note:

**Bold fonts:** Limits and standards;

*Italic fonts:* Policies (with some partial/local limitations/constraints/standards)

### **3. Three case studies to investigate the decision making process related to CNC definition**

According to the ACF the different stakeholders involved in the DMP related to the CNC definition can be aggregated into advocacy coalitions composed of people from various governmental and private organisations who share a set of normative and casual beliefs and who often acts in concert (Sabatier Smith, 1994). The various coalitions are structured according to a hierarchical beliefs system (deep core, policy core, secondary aspects) and fight each other in order to realise different plans for the definition and/or conservation of the CNC in question. The examples reported in this section show that economic interests, institutional conservatism, lobbying and negotiating capacities of the various conflicting actors affect the decision making process of the preservation of CNC much more than the implementation of the strong sustainability criterion and the clear definition of general priorities in environmental policies.

#### **3.1 Atrazine standards definition**

Atrazine was used in northern Italy as herbicide for the cultivation of maize and rice up to the second half of the 1980s (Giupponi and Berti, 1998). It was introduced in agriculture in 1964 and it was an innovative instrument for the weed control of maize because of its selectivity towards the pest and the possibility of being used both before and after crop growth. The main drawback is associated with the changes caused in weed flora, since Atrazine introduces new weeds not present in the past and leads to the selection of weed biotypes less susceptible to pests prevention.

The Atrazine case arose in 1986, when the Italian Government introduced stringent limits, following EC Regulation 80/778. The new limit for atrazine was fixed at 0.1 parts per billion (ppb) in drinkable water. This threshold is 20 times lower than the guidelines proposed by the World Health Organisation (WHO) and those adopted outside Europe. While monitoring groundwater according to the limit of 0.1 ppb of pesticide in the aquifers used for the production of drinking water, some local administrations found that many aquifers did not respect the new limit. In particular, atrazine, bentazone and molinate (substances used for maize and rice cultivation) were the pesticides mostly exceeding the threshold.

The consequence of this decision was to outlaw several groundwater sites. Since this situation was very frequent, the Ministry of Health temporarily fixed the limit from 0.1 to 1 ppb. In this framework, chemical industries tried to push the Government, by means of press releases and conferences, towards the maintenance of 1 ppb as the permanent limit. Moreover, they also tried to have a technical debate to assess the actual importance of the problem and the real toxicity. Also Universities and research centres gave their contribution by explaining that the regulation has not been supported by a scientific background that could demonstrate the real toxicity of pesticides for limits higher than 0.1 ppb.

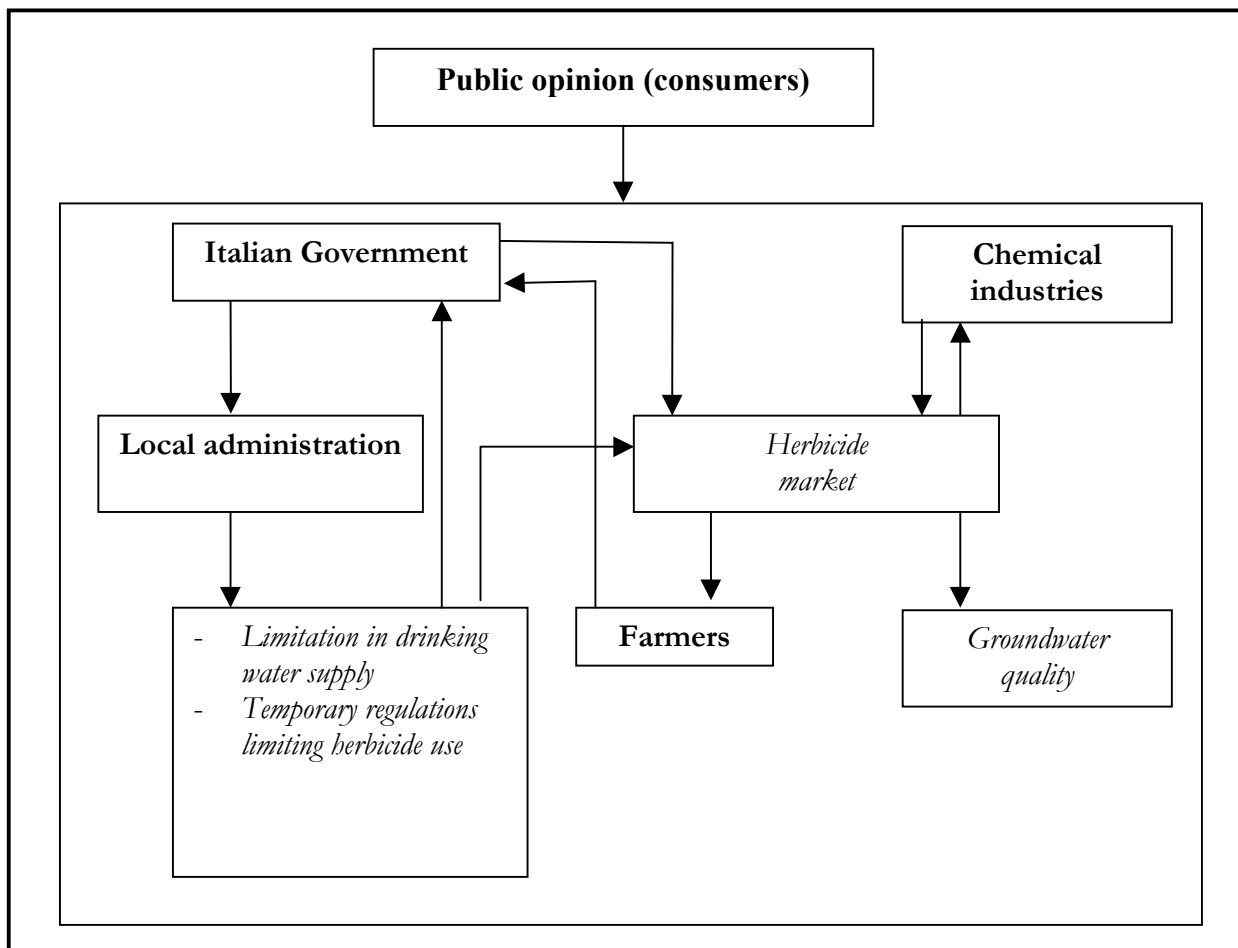
Pesticide suppliers, agricultural consultants and farmers organisations also looked at the problem from a scientific perspective. In particular, the agricultural sector compared the limits of Atrazine to those of other pollution sources of the industrial sector. The comparison had sound scientific grounds but this debate was not taken into consideration. During this transitional phase the problems were not solved and in February 1989 the European limits were adopted and herbicide banned.

The Decision Making Process (DMP) on the critical threshold was based not on scientific knowledge but rather on a highly emotional argument through the involvement of the public opinion and social parties. As a result, three of the most used herbicides were banned and relevant resources were provided in order to promote clean-up of the aqueduct infrastructure during the transitional phase when waters were still polluted by atrazine.

This example can be important to understand how the debate on an environmental problem can start and evolve, to identify the influences affecting the final decision of the government and to define the role of the different actors involved in the case.

The “Atrazine case” developed as a sequence of actions in which several actors were involved. A scheme on the role of the different actors in the atrazine case is provided in figure 1.

Figure 1 - Role of the different actors in the atrazine standards definition



Source: Giupponi and Berti, 1998

In the whole decision process, the main political parties promoted the ban of the pesticides since they did not want to appear in contrast with public interests and health without any valid technical support. However, since the ruling coalition was closed to the farmers interests, the government took a softer position against pesticides and delayed the implementation of the mandatory register of purchase and use of pesticides and fertilisers. In this way, even if the substances were banned, controls on farmers activity were not possible.

Consumers and public opinion perception of the case was only emotional. They were plainly against public administrations that allowed the temporary limits. No analysis of the problem in terms of real threat to human health was carried out.

Finally, this case was the basis for some political parties to promote in 1990 a referendum aimed at banning all the pesticides used in Italy. The referendum was not valid because the 50% quorum was not reached, but this can give an idea of how a single case can influence a whole sector.

It was a clear example of how a problem initially linked only to technical and administrative issues can change, involving other social, political and economic parts. In this process, the actual problems about CNC evaluation are distorted and the final decisions must take into account different interests. Therefore, the pressure from the parties involved in the debate, is detrimental since no technical and scientific assessment are really considered.

However, atrazine substitution can be seen as a success in terms of environmental protection policies. In fact, after this case, the quality of aquifers has grown and a lower concentration of pesticides has been found in groundwater.

### 3.2 Designation of protected areas

Designation of protected areas in Italy has followed a “stop and go” path influenced more by the specific political context than by the demand for protection or by an awareness of the critical status of natural resources.

The first National Park (*Parco Nazionale del Gran Paradiso*) has been created in 1922; 3 National Parks have been designated in the following 13 years. It took until 1968 (33 years later) to have the fifth National Park designation.

In the 1970s the Ministry of Agriculture and Forestry was decentralised. According to the decentralisation act approved in 1972, land managed by the Ministry through the *Azienda di Stato Foreste Demaniali* (State Forest Agency) should have been transferred to the regional authorities. However, before the official transfer, more than 100 natural reserves were designated (the present number of State reserves is 147) and, as a consequence of this designation, they remained under the State control.

After the approval of the 1973 regional law by the *Lombardia* Region adopting the transfer of institutional competencies on conservation areas, many Regional Administrations started an active process of nature protection through the designation of Regional Parks. The geographical distribution of designated conservation areas is not homogeneous (Bardi *et al.*, 1996). Regional protection policy has been mainly influenced by the different political equilibrium in the ruling regional coalitions. The results of this situation are evident: some Regions (*Abruzzo, Sardegna, Trentino Alto Adige, Lombardia, Liguria, Val d'Aosta*) have more than 12% of the regional territory protected, while others (*Sicilia, Umbria, Molise, Umbria*) have less than 2% (see table 2). On the whole however, the area protected by State and Regional regulations doubled between 1984 and 1991.

Following the creation of the Ministry of Environment (1986), a National Act on protected areas was approved (Law 394/1991). Since 1991, 13 new National Parks have been designated and now protected areas cover officially more than 7 percent of the territory.

However, the extension, number and typology of designated areas are not always good indicators of effective protection of critical natural resources. In Italy, as in other Mediterranean countries, attention has been paid more to the need to respond to a demand by the large public living in urban areas rather than to the interests of the local stakeholders of designated conservation areas. In the last 20 years, public spending capacity by local authorities to support local economies in designated areas and to provide incentives and compensation to the residents in protected areas has not been sufficient.



Table 2. National and regional designated conservation areas in Italy

<i>Region</i>	<i>Land area (km<sup>2</sup>)</i>	<i>Conservation Areas (% of land area)</i>	<i>National Conservation Areas</i>		<i>Regional Conservation Areas</i>	
			<i>(km<sup>2</sup>)</i>	<i>(no.)</i>	<i>(km<sup>2</sup>)</i>	<i>(no.)</i>
Valle d'Aosta	3263.52	12.8	377.00	1	40.33	10
Piemonte	25398.94	6.0	447.10	2	1072.55	53
Lombardia	23859.07	5.9	662.41	3	733.80	75
Veneto	18364.56	6.7	829.01	13	394.98	4
Trentino	6217.88	6.1	727.97	1	100.31	42
Alto Adige	7400.43			1	0.75	15
Friuli Venezia Giulia	7844.13	5.6	5.26	3	431.30	2
Liguria	5418.11	11.5	0.16	1	622.63	6
Emilia Romagna	22124.42	4.4	458.19	18	521.34	22
Toscana - terrestrial areas	22992.49	3.6	317.46	37	505.74	23
- marine areas			567.66			
Marche	9692.83	7.7	690.51	4	58.20	1
Umbria	8456.04	6.9	174.24	1	408.75	6
Lazio	17227.40	7.3	440.79	11	815.29	28
Abruzzo	10794.13	31.3	2794.92	17	586.14	11
Molise	4437.64	1.3	56.06	4	1.05	1
Campania	13595.33	22.1	2365.17	6	642.76	3
Basilicata	9992.27	10.4	955.69	8	83.25	6
Calabria	15080.32	12.7	1912.84	20	7.50	2
Puglia	19357.01	6.0	1160.06	19	7.15	2
Sicilia - terrestrial areas	25706.68	7.7	17.06	3	1971.22	16
- marine areas			632.10			
Sardegna - terrestrial areas	24089.89	0.3	51.34	1	30.41	10
- marine areas			150.46			
TOTAL - terrestrial areas	301302.08	7.2	12643.24	174	9035.45	339
- marine areas			1350.22			

Note: data refer both to those areas included in the National Register for Protected Areas (Official Italian Government Bulletin, G.U. 14/97) and to those areas not yet in the Register but in the process of being officially recognised by the Italian Ministry for the Environment.

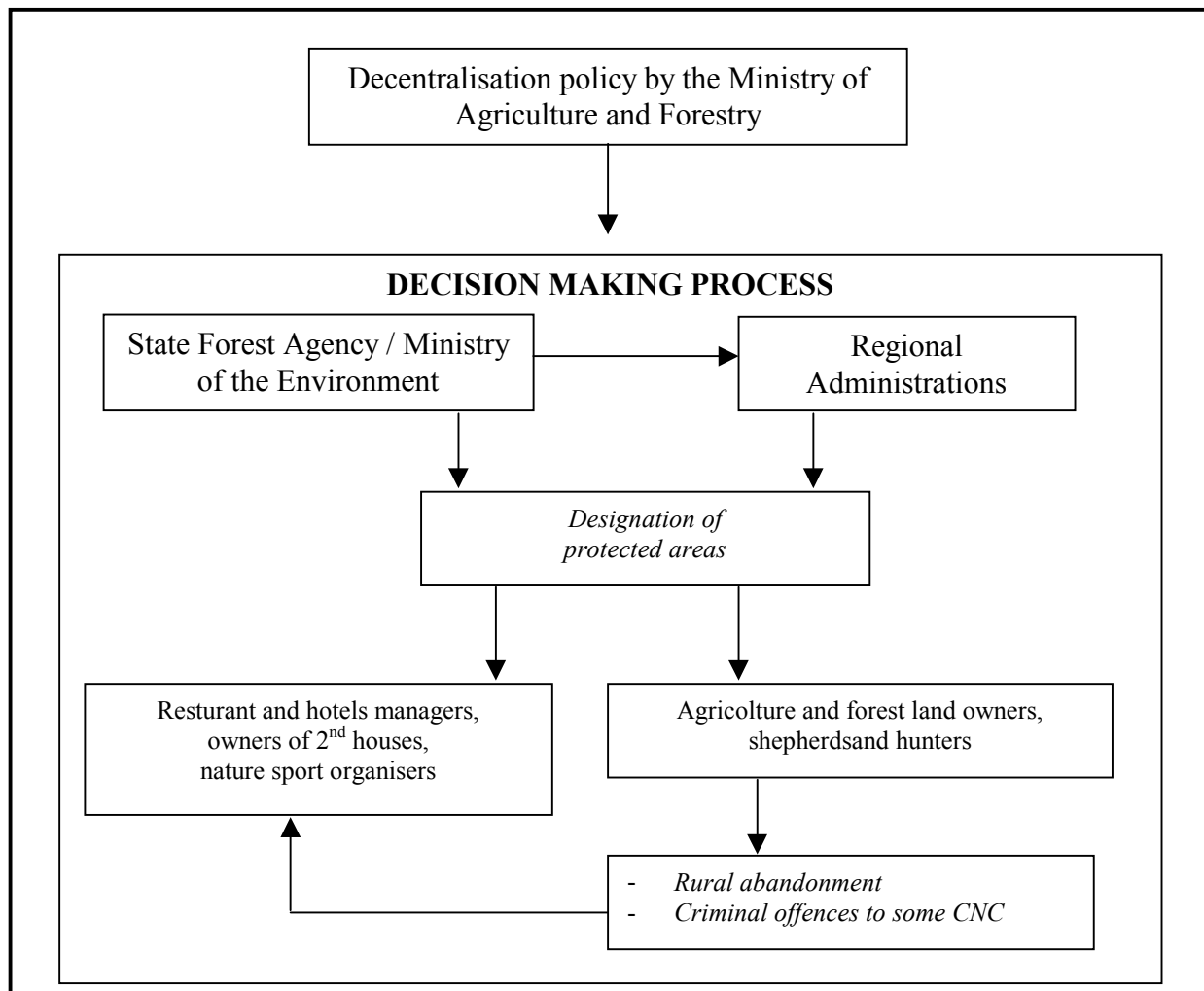
Source: Nature Conservation Service, Italian Ministry for the Environment, 1998.

As reported by Marino (1994), in the late 1980s-early 1990s, the intensification of the process of Regional and State Parks creation coincided with a 20% decrease in public spending on compensation and incentives to local stakeholders in 1989, 33% in 1990, and 54% in 1991. The lack of local stakeholders' participation in the decision making process, the progressive reduction of the content of land ownership, without providing compensation or effective legal protection has created two social classes among the local residents (Rojas-Briales, 1999): the winners (restaurants and hotels managers, owners of second houses, nature sports organisers, etc.) and the losers (agriculture and forest land owners, shepherds and hunters, etc.). Two clear indicators of this policy failure are the accelerated rural abandonment of farmland and increased number of criminal offences (man-made forest fires, illegal grazing and hunting, etc.) to some critical natural resources recorded in conservation areas of recent designation. Figure 2 summarises the steps of the decision making process.

This case study is useful to understand how an analysis of the protection level of CNC based only on the presence/absence of a legal framework may be misleading. In the protection of some natural

resources that have been influenced by human activity for a long time (for example: even-aged simplified forests, deer and wild boar population) the imposition of some constraints (no timber cuts, no hunting) is seldom an effective measure for protection. As previously mentioned, more than 7 percent of the Italian territory is under a special regime of nature protection, but an active, voluntary participation of the concerned parties in protection policies of critical natural resources in many Italian parks is seriously lacking.

Figure 2 – The decision making process related to the selection of protected areas



### 3.3 Voluntary agreements on petrol composition

At the end of the 1980s urban air quality was so deteriorated as to require the definition of strong measures to cut emissions. One of these measures aimed at reducing the content of some pollutants in fuels and petrol in order to change the production processes and products of national oil companies.

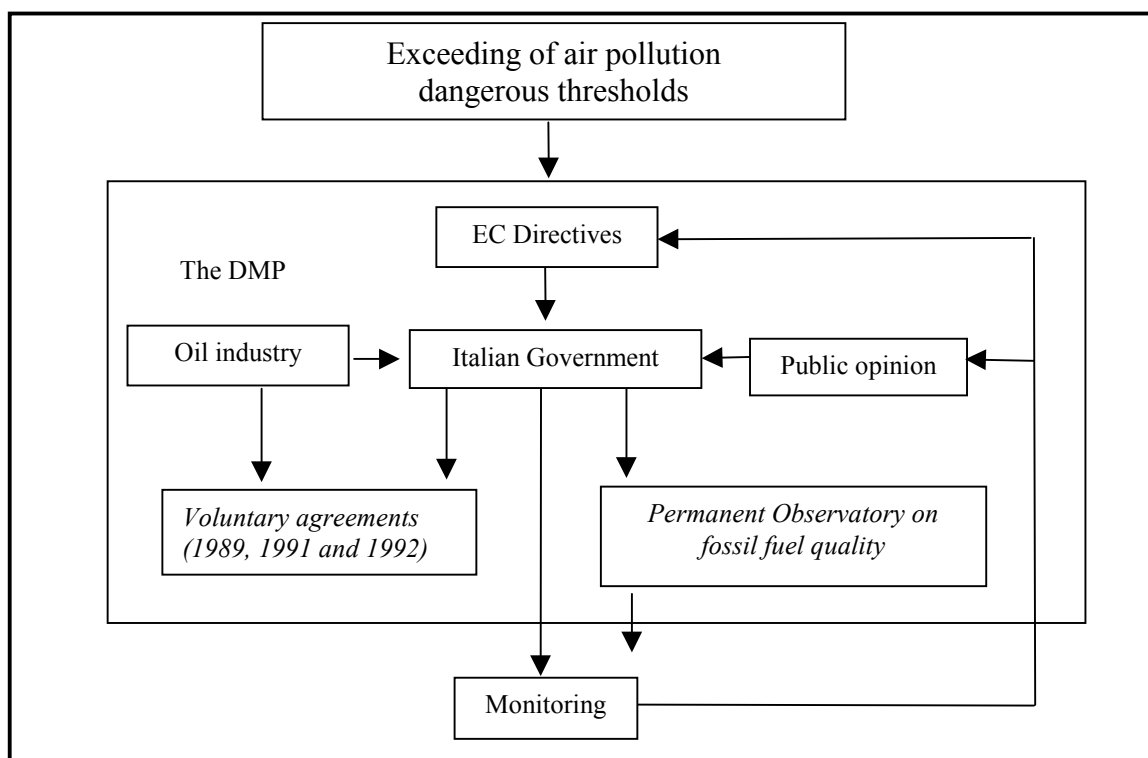
From that period until now, a number of EC Directives and National Laws aimed at improving air quality were issued. In addition to the command and control instruments (and stimulated by them), three voluntary agreements between Agip and Unione Petrolifera (the Italian oil industry association)

and the Ministry of Environment were elaborated. The agreements' objectives were twofold: (a) to reach a rapid improvement of air quality, thus calming public opinion, and (b) to avoid heavy economic repercussions on the oil industry (Amadei *et al.*, 1998). This was also confirmed by a more recent European project on Voluntary Agreements (NEPOL, 2000) where FEEM has been involved as partner.

The first agreement, signed in 1989, aimed at reducing aromatic hydrocarbons in unleaded petrol on the national market. It was a consequence of both the enforcement of EC Directive 441/87 on the composition of fuels and the increasingly frequent exceeding of dangerous limits of some air pollutants. The second agreement, signed in 1991, was implemented by a Ministerial Ordinance (binding legislative provision with specific aims) for the control of atmospheric pollution in the metropolitan areas. The third agreement, signed in 1992, anticipated some choices made at EU level. It provided for industry commitment to extending activities aimed at improving the quality of petrol products in several regions.

A permanent observatory of fuel quality was established. It supervises compliance with the agreements and gathers data related to the quality of unleaded petrol at national and European level. Figure 3 illustrates the different steps of the negotiation process.

Figure 3 - Different steps of the negotiation process on petrol composition



This case is important in the Italian context because (a) for the first time a voluntary instrument was used to regulate pollution emission from an industry and (b) the agreement was successful. As a consequence of the

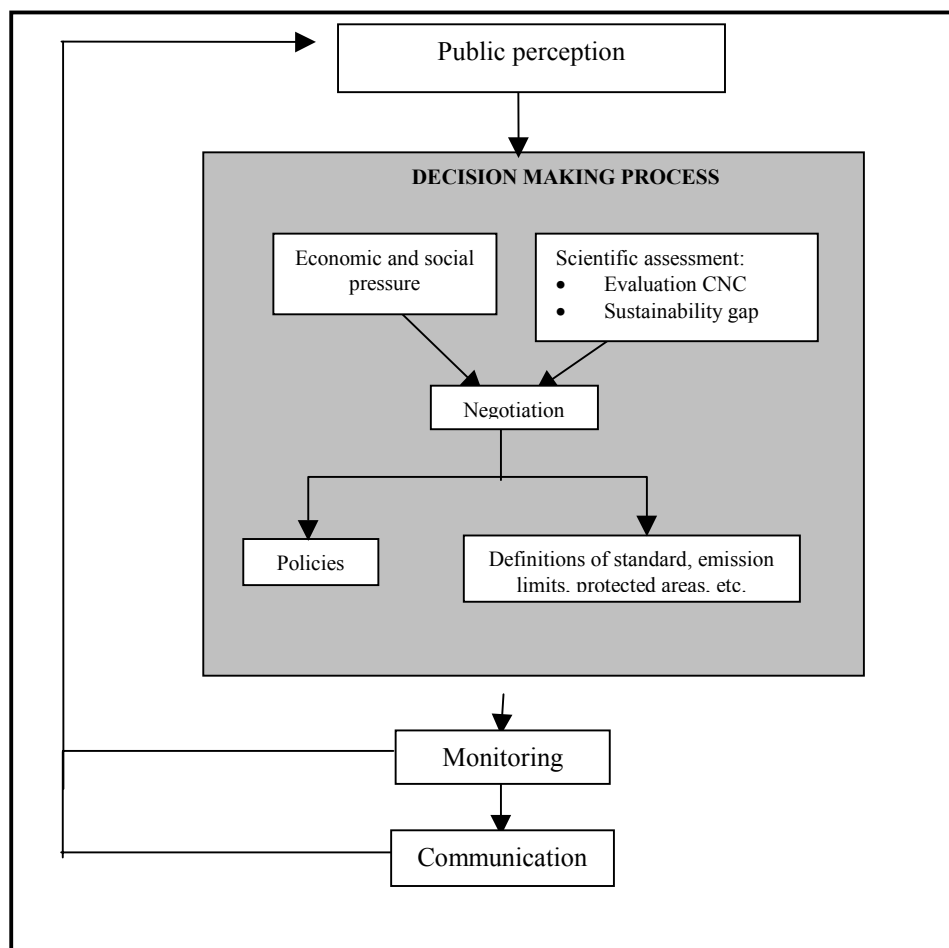
measures adopted under the voluntary agreement framework, Italian oil companies at present produce petrol with 33-34% of aromatic hydrocarbons (against the European 37% average), and 1% of benzene (only Austria and Sweden have the same percentage of benzene).

So, in the case of urban air pollution emergency, voluntary agreements were very effective in rapidly tackling the problem and responding to public opinion concern.

#### 4. A theoretical framework in the implementation of the CNC concept

We have seen how the decision making process on CNC definition and or/protection is an iterative process which can be framed into the Advocacy Coalition approach with different agents involved and different perception of criticality of natural resources conditions, also in relation to the state of research progress, problems understanding and natural capital monitoring. A general framework to describe this iterative process is presented in figure 4.

Figure 4 - Decision making process on CNC evaluation



The negotiation process reflects on the one hand the (direct or indirect) involvement of economic and social stakeholders and on the other the scientific assessment. Economic interests move towards an

exploitation of sink and source functions while some social actors are engaged in preserving the human health and welfare functions. Scientific assessment should provide an objective/impartial evaluation of the “criticality” of natural capital, its sustainable thresholds and its current state. The difference between the last two terms may be defined as the sustainability gap.

The mediation of different interests leads to the definition of measures such as policies, limits or standards to be implemented. The thresholds defined by the process can substantially differ from the sustainable ones, thus showing the limits of the DPM. This is often due to the lack of priority given by the DMP to the scientific criteria in the elaboration of policy measures.

After the selected measures are implemented, the data provided by monitoring activity on the state of the natural capital allow to assess their efficacy and might trigger the DMP again depending on (a) the sensitivity of decision makers to environmental issues, (b) the measured effectiveness of existing environmental policy and (c) the strength of the influence of public opinion on decision makers.

## **5. Conclusions**

From the three case studies analysed in the previous sections we can conclude that the DMPs related to the conservation of CNC may often have unexpected outcomes because of their dependence on the beliefs system of the various actors involved.

In the Italian experience, as a short term response to public pressure, the definition of CNC preservation thresholds has often involved on the one hand the introduction of ambitious objectives and standards and on the other hand the use of exceptions to them. Moreover, the presence of a legal framework does not always ensure the maintenance of fragile semi-natural ecosystems whose protection implies an active involvement of concerned parties.

The lag between real behaviour in CNC protection and theoretical normative framework is also depending on the increased number of institutional actors in environmental policies development. In the past few years the Italian environmental policies have more and more often been designed at the EU level. At the same time the decentralisation process has given more responsibilities to local autonomies. The erosion of traditional central power of State authorities has also been enforced by the privatisation of some public monopolies and by the establishment of autonomous bodies (i.e. Authority for Energy). The resulting effect of the whole process has been the creation of a new conflicting arena and new variables in the decisional process related to CNC protection.

Another aspect characterising CNC protection policies is the increasing use of economic, voluntary and informative instruments (taxation, incentives and disincentives, voluntary agreements, ecolabel, certifications). This will further increase the role of private actors. The use of non legislative instruments such as voluntary agreements, proves to be more efficient than command and control measures in reducing environmental problems since it entails lower economic costs. In order to reinforce the effectiveness of CNC protection policies it is therefore essential to pay more attention to the DMP actors and to the effectiveness of negotiation instruments through a broader use of non legislative instruments. According to the a general perception (Ambiente Italia, 2000), Italy is still late with such instruments and still more has to be done.

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