ELSEVIER
Ecological Indicators 2 (2002) 187–196
ECOLOGICAL INDICATORS
This article is also available online at:
www.elsevier.com/locate/ecolind

The forgotten construction process of indicator sets The social dimension of air pollution measurement in the Greater Lyons area (France)

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Abstract

Contrary to an idea that is widespread among technical stakeholders, technical data are no exception to social and local construction processes. Similarly, decision processes do not simply proceed, in a linear and mechanical way, from measurement to indicators, and from indicators to decision. On the contrary, indicators and monitoring devices, as technical tools, may well be conditioned by social, historical, political, economic or local factors, that could intervene at every level of their production.

We will base our demonstration on the study of air quality measurements and indicators in the urban area of Lyons (France). After outlining the political and administrative background, we will present the historical context that generated observation and measurement of the environment, particularly air pollution, within the Greater Lyons area. Finally, we will consider the issues of indicator development within the Greater Lyons administrative authorities.

Keywords: Air pollution; Decision-making process; Environment measurement; Indicators; Lyons

According to an idea commonly expressed by technicians, the principal difficulty in 'measuring the environment' lies in finding a suitable technical adaptation of models of measurement that have been developed in a laboratory (Bourrelier, 1998). 'Measuring the environment' is not, however, purely a matter of technology or technicians: for surely each one of them is no isolated, interchangeable individual, but belongs to social fields that are submitted to institutional and political logics and to power struggles that have been shaped by history. Moreover, technology in itself is no sanctuary, especially when the issue of measures and measurement is at stake. Indeed, environmental issues "involve administrative and political measures (in the sense of decisions), the debating and justification of which may be based on measuring (in the sense of quantifying), the ends to be met and measures used to achieve them" (Desrosières, 1992). Surely, the technical tools—i.e. the indicators—are also caught up in social and political logics, and shaped by these logics throughout their development process. Is it not true to say that their scientific legitimacy then tends to cause the conditions surrounding their development to be forgotten, all the more so as this legitimacy is "an invaluable resource enabling agreement between stakeholders who are both dispersed and heterogeneous" (Desrosières, 1997)?

In our view, indicators are *hybrid objects*, involving "science, politics, economics, law, religion, technical applications and fiction" (Latour, 1991), and related to the questions raised by scientific–technical and social sciences. Artefacts more than material objects, they lead to concomitant analysis of 'what they are'

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1470-160X/02/$ – see front matter
PII: S1470-160X(02)00038-9

concretely and of 'how they were made' socially. From this perspective, indicators could be seen as analyzers, opening up to a broader range of objects and questions. They entail investigation of social and historical conditions: where do they come from? In what social and spatial context were they born? What transformations have they had to undergo? Their dimension as a 'process' may well be more important than their strictly 'objectal' (or 'rational') one. Having established these very basic hypotheses, the analysis of indicator sets is complicated by their hybrid profile, insofar as the subject of investigation is a question of (*experimental*) *sciences*—for which nothing exists other than experimental reality—*social sciences* (which consider nothing but society), and *deconstruction approaches* (which consider nothing but discourse).[1] In order to bring together issues which are usually divided between several academic disciplines, we have chosen to refer to social anthropology[2] and social geography.[3]

Our paper will be based on a specific case study: the production of sustainable development indicators for air pollution in the urban area of Lyons (France).[4] We will firstly present the political and administrative context of the study. Then by giving a brief history of COPARLY,[5] a non-profit-making association responsible for the sensors network and the diffusion of measurements, we shall see how the production of data and indicators is influenced by the genesis and status of the structures that are responsible for so doing. Finally, by bringing to light the 'black box' behind the development of air monitoring indicators, we shall question the influence of technicians in this process.

1. The political and administrative background of indicator production

The population of the Greater Lyons administrative area (which covers 55 municipalities)[6] is 1,167,532 (1999). Lyons is an old city, whose development began in the 15th century with the growth of the silk industry. The birth of modern chemical industries (derived from silk-manufacturing) can be situated in the second half of 19th century, and led to the current 'Chemical Corridor', the greatest concentration of chemical industries in France after the Greater Paris area. Numerous elements, related both to the economic and industrial history of the region and to the topographical and meteorological characteristics of the site, make the Lyons area particularly sensitive to atmospheric pollution and risk: the concentration of chemical and petrochemical plants to the south of the conurbation,

[1] Latour refers (very) briefly to three famous authors, each in their own domain: J.-P. Changeux (neurologist), P. Bourdieu (sociologist) and J. Derrida (philosopher).

[2] In our view, a unified approach to technical subjects and social phenomena is possible, even in our 'technical' societies. From the same viewpoint, we are particularly attentive to the symbolic dimension of social objects in general, and of indicators in particular: indicators are made and used by talking beings, and cannot be understood without referring to their underlying meanings, even if these meanings are implicit, or unvoiced.

[3] One of its interests is to settle the problem of the spatial determination of social phenomena. This perspective seems highly relevant to the indicator issue: how can the problem of scale be addressed? How should the non-isotropic characteristics (physically and socially speaking) of a large urban area be integrated?

[4] These results are part of the European Project Promoting Action for Sustainability Through Indicators at a Local Level in Europe (PASTILLE), directed by Dr. Yvonne RYDIN, London School of Economics and Political Science. This 30-month project is part of the European research program 'Energy, Environment and Sustainable Development', Key action 4 'City of Tomorrow and The Cultural Heritage' (5th FP5).

[5] 'Comité pour le contôle de la Pollution atmosphérique dans le Rhône et dans la Région lyonnaise' (or Rhône and Lyons Region Air Pollution Control Committee), created in 1979.

[6] Politically and administratively, France is organized into a hierarchy of four levels: the state, the region, the 'department' and the 'commune'. The large number of communes in France has encouraged successive governments to create a nationwide intercommunal management scale. Urban communities are intercommunal bodies funded by direct taxation. Their resources come from various taxes, mainly from the local tax on businesses, paid by firms. In addition to these direct resources, they (like the 'communes') receive state grants within the framework of territorial solidarity. The competence of the urban communities, and therefore that of the Greater Lyons area, is 'levied' on that of the 'communes'. Their sphere of competence mainly covers urbanism and living conditions (housing projects, urban planning, the equipment of industrial and trading parks, etc.), public services (highway maintenance, transport, parking, new cemeteries, firefighting, etc.), especially those related to hygiene (water, wastewater disposal, garbage collection), and to economic development. Today, the intercommunal assembly is not elected by universal suffrage, but by the elected representatives of the 'communes'. However, there is recurring debate on the creation of a true fifth hierarchical level, the intercommunal structure, in the French political–administrative scene. Traditionally, the Mayor of Lyons is elected by his colleagues as President of the Greater Lyons area.

the prevailing winds (south–north and north–south), and its specific topography, with two hills in the town center, thus influence the quality of the city's air. Finally, another major source of atmospheric pollution is road traffic within the conurbation itself and the heavy through traffic on the Paris—south of France highway that crosses the city. Lyons is, moreover, often referred to by journalists as 'the most polluted city in France'. The stakes involved in this issue make it even more relevant to observe the social construction process of air quality measurements.

At an administrative level, apart from 'Mission Ecologie' (or the 'Urban Ecology Mission'), there was no such thing as a specific department responsible for the environment in the Greater Lyons area. In 1998, the 'Prospective and Strategy Mission', directly linked to the Greater Lyons presidency, initiated a process called 'Millénaire 3' (Millennium 3) in order to promote public debate and set up a coherent development project. Within this process, a group entitled 'Urban Ecology and Quality of Life' worked on a Local Agenda 21 project, opening the way to sustainable development concerns whose aim was to structure the future of the Greater Lyons area. Environmental issues have been specifically (but not exclusively) within the competence of 'Mission Ecologie' (part of the Urban Development Delegation), since its creation in 1990 (see Fig. 1). The original purpose of this body was to devise an 'Urban Ecology Charter' (concerning only the environmental field), which was voted unanimously by the Greater Lyons assembly in 1992. A new charter was voted in 1997 in the same conditions, and at the time, included the creation of an environmental observatory, OCEGLY,[7] whose task was—among others—to define 'objective indicators' in order to monitor environmental quality in the Greater Lyons area. With regards to air pollution, the indicators were developed using several (national and international) systems of norms, the European RESPECT project and measurements from COPARLY. The appointment in 2001 of a Vice-president responsible for sustainable development and urban ecology markedly favored the rooting of these themes in the public policies of the Greater Lyons area.

[7] 'Observatoire des changements de l'environnement du Grand Lyon', or Environmental Change Observatory in the Greater Lyons.

2. Indicators and their history

For nearly 40 years, the conurbation of Lyons has been equipped with sensors that measure the atmospheric levels of substances that are harmful for human activity. These measurements are widely used in the construction of air pollution indicators. However, rapid historical analysis shows that the structuring of this organism around two main pillars, one technical, the other administrative, and the ensuing choices as to the location of the sensors considerably influence the nature and form of the results.

2.1. A network created to measure industrial pollution alone

In 1959, a first network was established a few months after a similar one in Paris. There was no legal obligation at the time, but persistent debate in the media on the issue of industrial pollution could account for this decision. The network was entrusted to the 'Municipal Hygiene Bureau' of the city of Lyons, a body created in 1890 and later called the 'Urban Ecology Department'. A second small network was established in 1963 around a coal-burning electricity power plant in the extreme south of the urban area, its purpose being to measure industrial dust produced by the plant. In 1975, a third network was created by legal obligation in the 'Chemical Corridor', and was run by the manufacturers, under the close supervision of the DRIRE[8] (the authority representing the Ministry of Industry at a regional level).

The first network was placed clearly under the authority of a 'technical body' in the field of sanitary policies, the Urban Ecology Department (city of Lyons). It measured the proportion of dust, CO and acidity, which was rapidly replaced by SO_2 measurements. The other networks were run—in their own way—under the supervision of the DRIRE, which, though seemingly more administrative in nature, assigns these issues mainly to engineers.[9] The sensors assessed chronic pollution and exceptional effluents,

[8] 'Direction régionale de l'Industrie et de la Recherche' (Regional Direction of Industry and Research).

[9] 'Ingénieurs de Mines', literally 'mining engineers': a section of the French administrative authorities specialized in industrial and mining issues, whose members are trained in the same engineering schools, after passing the same competitive recruitment procedure.

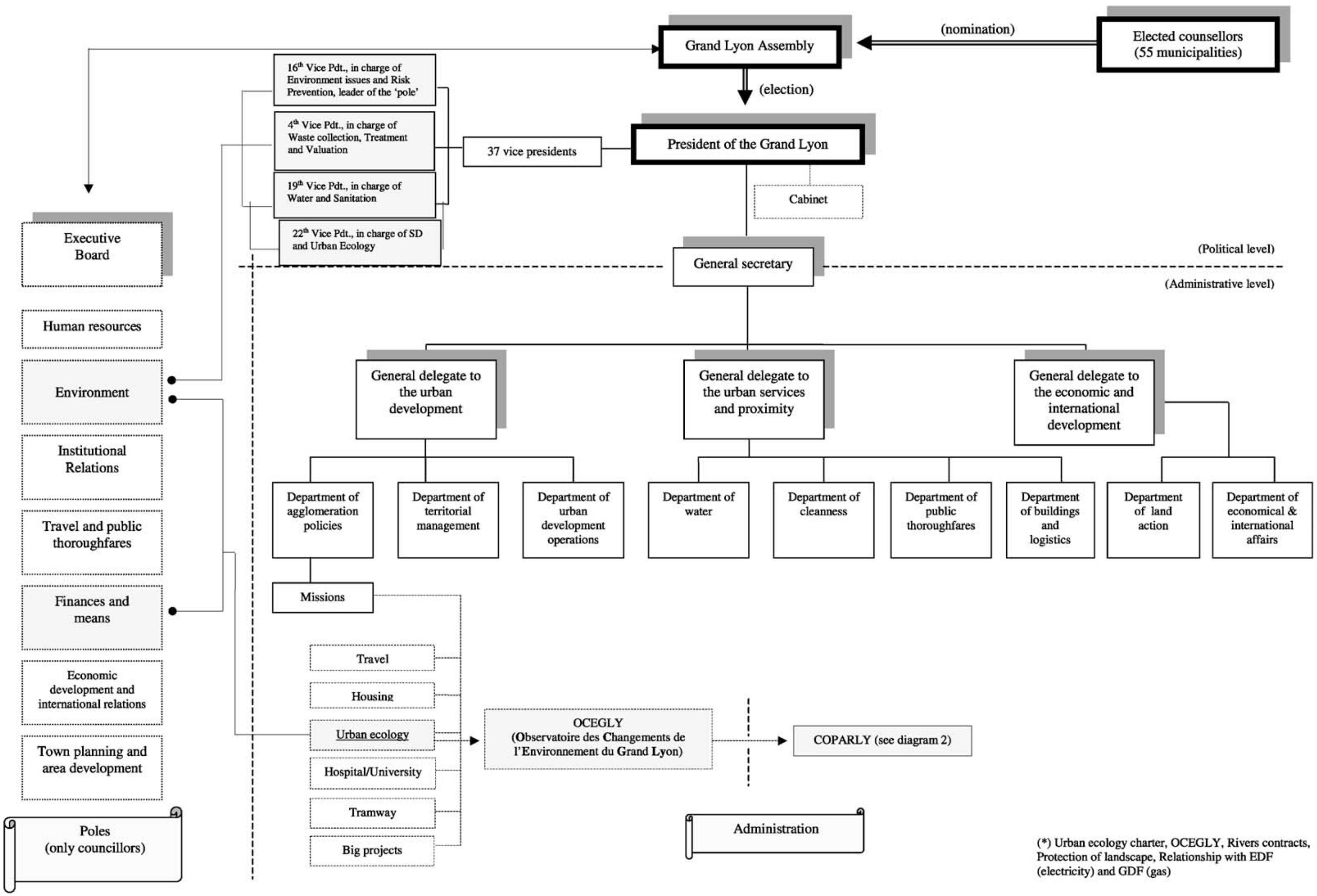

Fig. 1. Main structures involved in environmental matters within the Grand Lyon (August 2000).

by monitoring levels of SO_2, NO_x, and volatile organic components. Dust was to be measured later, insofar as it is related to SO_2 emissions. It is therefore clear that these networks were set up to measure industrial pollution above all.

In 1979, the DRIRE was given the task of unifying the three networks, in order to harmonize and federate the measurements. COPARLY was created with a non-profit-making status (see Fig. 2). The board of directors included three main 'colleges': local representatives of State authorities, municipalities—but not the Greater Lyons—and representatives of manufacturers. Nevertheless, the network unification project had to face the mistrust of manufacturers, who feared they would control over the measurement data. The Urban Ecology Department of the city of Lyons, however, subscribed to the project, their aim being one of entryism.

In 1991—no technical unification had yet been completed—five peak pollution levels were detected by COPARLY over a short period. They provoked a minor crisis that revealed the absence of political leadership on the issue. The President of the Greater Lyons area met the minister of Environment and embarked on a battle with the manufacturers. Finally, with the help of the DRIRE, the three networks merged in 1993. Their territory was extended to the Greater Lyons area, in exchange for which

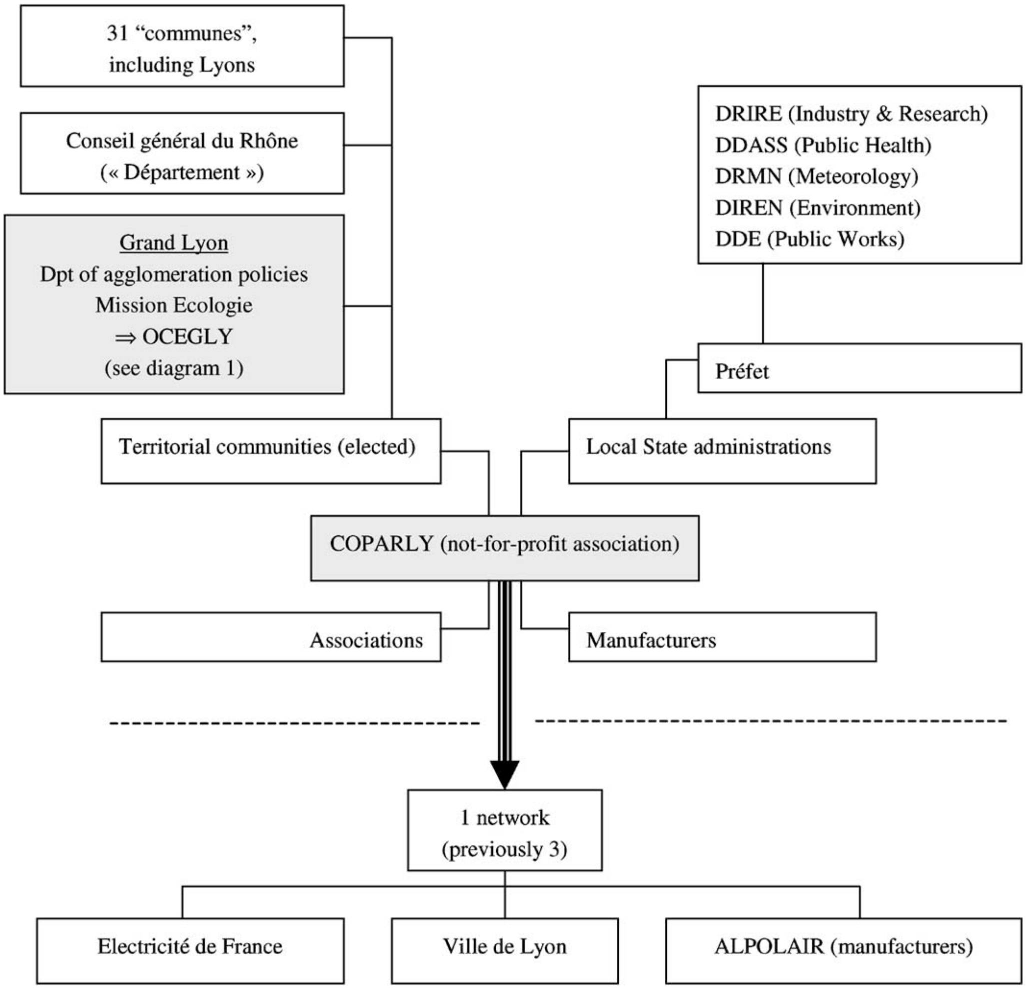

Fig. 2. The bodies involved in the air pollution issue (August 2000).

the Greater Lyons joined COPARLY. The technical aspects of the new network were governed by the Urban Ecology Department (city of Lyons), as it was thought to be more independent of the manufacturers.

The network was therefore unified under the authority of its two main stakeholders: the DRIRE, in charge of administrative management, and the Urban Ecology Department of the city of Lyons (the former Municipal Hygiene Bureau), in charge of technical follow-up. At the time of the survey, there was no explicit political leadership of the network, but it was, to a certain extent, a political decision to let COPARLY remain a simple measurement body, as the industrialists wished, whilst communication was assigned to councilors and major administrative actors.

2.2. The same network to monitor and forecast air quality

In 1998 a new project, entitled 'COPARLY 2000', came on the scene. Very briefly, the first factor of change was the identification of road traffic as a major source of pollution—SO_2 basically reveals industrial pollution, whereas NO_x more specifically indicates road traffic pollution. Industrial pollution seemed to be decreasing as a result of legally imposed efforts made in the 'Chemical Corridor'. Although, the details concerning the spread of atmospheric pollution remained unknown, most experts agreed that car traffic pollution, together with industrial pollution, was now a major pollution source, which led to infighting among members of the COPARLY board. Even based on scientific models and measures, the extent to which industry and car traffic are respectively responsible for pollution still bears considerable implications in our field of study (Larrue, 1998). The second change was linked to national policies on air pollution. The 'Air Pollution Law' specifies that every urban area of over 100,000 inhabitants has to establish an air pollution measurement network. Armed with this tool, they then had to harmonize its development with an Urban Travel Plan,[10] with the result that air pollution and car traffic are now legally linked. In this context, COPARLY was intended to be the cornerstone of an important crisis management system. In the meantime, the Greater Lyons authorities were demanding more information about their territory, going far beyond the 'technical' territory of the measurement network. Finally, the growing weight of political representatives, within the COPARLY board, led to new requests with a view to 'geographization', i.e. links between air pollution phenomena and specific areas (in most cases, an electoral district)—even if these requests cannot be satisfied at present, mainly for technical reasons.

But the evolution was not only external: important changes occurred within the organization of COPARLY itself. First, a serious debate divided the administration board on the problem of modeling. This is of course a difficult question, from a technical and scientific angle. Furthermore, air pollution is not just a local problem, so close cooperation between the existing regional networks seemed desirable. But it entailed a new distribution of roles within the stakeholders system, in that as it was linked to the question of 'regionalization' of the measurement network. In fact, the local set-up, especially as regards the role of the Hygiene Municipal Bureau described above, would not correspond to the interests of the newly involved actors. Hence, the technical debate was coupled with a more strategic one. Two 'patterns' were hotly debated between the network executives. The first, more 'federative' one proposed overall technical coordination and network maintenance. The second, which was more 'integrated', led to a single regional—and centralized—system. The small networks and the Urban Ecology Department (city of Lyons) defended the first option,[11] while the DRIRE, with the help of regional manufacturers, defended the second. This phase revealed fierce struggling between stakeholders, some pointing out a risk of technical monopoly (on the part of the Urban Ecology Department), others excessive 'proximity' of the interests of the DRIRE and the manufacturers. At any rate, in 2000, the Urban Ecology Department laboratory was abruptly closed down—for other

[10] The 31 December 1996 Air Pollution Law requires that these urban areas adopt an Urban Travel Plan (PDU) which aims to encourage public transport.

[11] The Urban Ecology Department (city of Lyons) wanted to be responsible for the technical maintenance of an extensive regional network.

reasons[12]—by the Mayor of Lyons, and therefore vanished as a stakeholder.

2.3. Measurements are (also) social constructs

A spatial approach to the air control network reflects some of the contradictions revealed by history.

First, each stakeholder refers (even implicitly) to different territories. For instance, the cartography of the measurement network reveals, for the time being, a spatial concentration of sensors in the Rhône valley axis (north–south). The consequence of this established, historically explicable fact, is a clear heterogeneity between the Greater Lyons territory on the one hand, and the measurement network on the other. At the time, the Vice-president in charge of the environment considered the possibility of making two different organizations responsible for measurements and public information. The new COPARLY, an independent body, was to produce air quality measurements, whereas an organism governed by the Greater Lyons area would use these measurements to produce indicators that could be communicated to the general public. This point could become a bone of contention if, as is probable, the Greater Lyons area were to take over the State's responsibility for the monitoring of air quality. Indeed, local representatives would not have measurements that were custom-made for their territory, and would have to content themselves with data extrapolated from modeling that was, by definition, imprecise.

Secondly, there is no coherence between municipal boundaries and the spatial distribution of the sensors within the Greater Lyons territory. This implies major distortions between collected data and rightful demands from elected representatives (mayors or councilors at a municipal level), and thus explains why some years ago some municipalities installed their own sensors, which were belatedly included in the COPARLY network after negotiations.

[12] This surprising situation occurred when a new technical certification became necessary for the Urban Ecology Department laboratory. This would have necessitated considerable, costly work: the Mayor of Lyons decided to stop the project and therefore to close the Urban Ecology Department laboratory (the former Municipal Hygiene Bureau laboratory), which could no longer operate without certification.

There is a further distortion between the way the sensors were located and the way they are now used as a network. In the archives we analyzed, we found only the final decision, but neither the process nor the discussions that led to that decision. Our interviews gave us the impression that these choices were based on logics that were opportunistic, sometimes even political. But, when technicians and political councilors use the data produced by the network, they act as if the location of the sensors was completely controlled in order to ensure maximum coverage of the territory. In other words, they act as if the location of the sensors constituted a rationally built network, and forget the way in which it was produced (Duchêne, 1999).

3. Designing of indicators, but erasing many choices

We should now like to address the question of 'social demand' for environmental indicators, with reference to what we have observed in the Greater Lyons area. Indeed, sociologists who study the health system and its 'needs' have had occasion to show "the role of supply in the constitution of a practice, the influence of organizations that are fighting to set themselves up, the political influence of dominant professions, the dynamics of institutions and the effects of monopoly (that exist within these different fields)" (Peneff, 2000, p. 12). We would like to apply this kind of reasoning to the opening statement in the discourse of many of the technicians we met. Then, equipped with this new lens, we shall observe the way in which the indicators were actually produced.

3.1. Environmental indicators, a social demand that is primarily that of the technician

Today, a great number of French conurbations base their definition of environmental indicators on the European RESPECT program. But the origins of this project are not to be found on a European scale. In France, they go back to the early 1990s, when, faced with insistent demands from the media, certain municipal officials in departments handling environmental issues sought to develop their own system to reflect the state of the environment in their town. The Greater Lyons area, via 'Mission Ecologie', found itself deeply involved in this project. It all started, in fact, with a 'An environment honors list of French cities', published by various newspapers and weekly magazines that had sent out a questionnaire on the environment to a number of municipalities. The questions were thought to be 'badly phrased', and so, finding it difficult to reply, and above all, impossible not to do so,[13] the persons in charge of the departments concerned decided to develop their own indicators rather than have to reply to a framework imposed by the media. The project swiftly took on broader proportions: in addition to the mere need to reply to the journalists came the will to construct a tool that would be both appropriate for management needs and suited to various types of demands, including those of the media, and on a more day-to-day basis, those of the elected representatives.

The AIVF,[14] an association of engineers in local collectivities, was both a base and a go-between for the development of this project. The group working on the theme of the environment was joined in 1992 by a sub-group named 'Instrument panels and indicators'. The objectives were then defined: to measure the state of the environment and its evolution, to answer the different types of inquiry, to involve other departments in the collectivity in the production of data. A second stage, from 1995 to 1997, involved the development of indicators in the framework of an 'operational' instrument panel for the collectivities, with a view to decision support. The collectivities involved ran out of funds financing the work, and decided to continue it within the framework of the European program LIFE 2 from 1998 to 2000.

Thus, the genesis of the RESPECT project reveals an absence of demand on the part of both the elected representatives and the population and associative movements.[15] This 'demand' in fact seems like an a posteriori legitimization of the expertizing carried out by technicians, a social group within the administrative bodies. What is more, supply in the field of indicators does not derive from a single source, which leads to a certain amount of interference. Nonetheless, we refute the supposedly decisive role of social demand when it comes to quantifying the environment. It is, however, clear that the RESPECT project has imparted fresh legitimacy to the Greater Lyons Observatory of the Environment (OCEGLY) and to the knowledge and procedures it embodies. In effect, some of the Observatory's indicators seem to have fueled the RESPECT project and have thus 'grown in stature' by being incorporated into a methodology shared by some fifty European cities. Beyond this, officials at the Observatory see RESPECT as a more dynamic tool, with objectives to be met in terms of numbers, whereas previously indicators were conceived in 'absolute' terms. This can no doubt be seen as a form of fascination with all numerical productions, which, since they mask the context and the means deployed in their construction, can once more be considered ex nihilo.

3.2. *The making of indicators: the forgotten 'black box'*

We would now like to focus on the process of indicator production, which, in the light of what has just been said, is largely the domain of technicians. This has been confirmed by analysis of the initial and ongoing functioning of the Greater Lyons Observatory of the Environment. The construction phases of measurement tools are, in fact, the responsibility of the technicians, and are governed by problems of a technical nature. The general impression that emerges from our survey is that the Observatory of the Environment is relatively unknown to the elected representatives of the Greater Lyons area. No traces of public involvement were to be found in the documents consulted, and this was confirmed by our investigation. It is consequently understandable that processes which are 'costly' (in terms of time, financial and human means, and also 'social'—or even 'symbolic'—capital, as Pierre Bourdieu would say) result in a sort of fetishization of the end product, i.e. the indicator, or more broadly speaking any numerical production. Numbers seem to make it easy to resolve all sorts of difficulties (in comparing, decision-making, etc.), and it is tempting to forget the way in which data and indicators were produced, as well as the shades of meaning attached to them.

[13] Towns which had not replied were designated as such with no further explanation, in a rhetoric shaded with suspicion.

[14] Association des ingénieurs des villes de France, similar in function to a trade union.

[15] Elected representatives in particular seem to be more interested in the follow-through of projects, particularly of their environmental aspect, than in monitoring the state of the environment in general.

However, work within the frame of RESPECT is clear proof of the difficulties involved in the development of indicators designed for collectivities of varying sizes and means, and (in the European phase) belonging to political, administrative and social systems whose foundations and modes of functioning are sometimes vastly different.[16] In the field of air pollution monitoring in Lyons, for instance, 'Mission Ecologie' and COPARLY have met regularly to review the relevance of the indicators provided by RESPECT. But discussions on each indicator raise a great number of questions, for example, on the thresholds set by current regulations, on their possible evolution at national and European levels, on measuring protocols in the conurbation, on the objectives to be set for each indicator and their relevance with respect to the situation in Lyon. Similarly, some people wonder whether it is relevant to model the spread of pollutants and therefore the quality of the air,[17] whereas for others this goes without saying, perhaps obeying a predominantly economic logic: the development of COPARLY. The 'technical' construction of the indicators has also been questioned, and has led to debate on the way in which they are presented: in mean values by COPARLY, in medians by 'Mission Ecologie'. In the search for 'relevance', the year of reference to be chosen for the measurement of possible changes has led to debate over meteorological influence. Similarly, the possibility of comparing data with that of many years ago is linked on the one hand to the availability of those data, and more particularly to their homogeneity over years in the interval. It is to be noted, for instance, that the COPARLY network underwent considerable change around 1993. Another issue is that of spatial scales: 'Mission Ecologie' is interested in measurements on the Greater Lyons territory whereas the territory covered by COPARLY is much more extensive, thus reflecting the historical logic underlying the setting up of the sensor network.

All these questions, which spark considerable scientific and technical debate, finally vanish into nothing, leaving only numbers behind them. In other words, to obtain measurements that are easy to use, the conditions in which the indicators were developed, and notably the many compromises ratified during the process, must be forgotten.

And when these conditions and compromises are forgotten, there appears to be broad scope for numbers, ultimately 'embodied' by indicators and their concomitant effect of reality. The numbers then tend to be used to represent reality whilst all they really represent is that part of reality that can be 'easily' measured. In effect, as we have seen, the initial question of measurement and indicators is often a complex one from a strictly technical point of view. It implies a great number of adjustments, renouncements or compromises that are often erased by a final result that is given in terms of numerical values. These transactions apply equally to the production of data and to their organization into indicators. The logics underlying the production of measurements and indicators are also influenced by the structuring of the groups of actors involved and the relationships between them, which are left aside in the later phases of the 'presentation' of the results. In other words, indicators are not mere neutral objects. We have demonstrated that they have a history and can be interwoven with power struggles.

As a result, it is perfectly legitimate to question the linear nature of the relation between 'measurement' and decision. In effect, no special reference was made in the interviews with elected representatives to the indicators provided by the Environment Observatory. Furthermore, the heads of Greater Lyons departments gave no instances of the actual using of the Observatory's products. This under-utilization could, of course, be attributed to the unfinished nature of the project despite its several years of existence. But it would, to a certain extent, be naive to consider that indicators are external data fueling a linear decision-making process from the outside. On the contrary, the case study shows that air pollution indicators are largely configurated by a decision-making process that is much more complex and integrated

[16] Is it desirable to abandon 'relevant' indicators built on data which small towns are known to be unable to produce for financial reasons? How can one resist the easiness of 'producing' certain indicators without questioning their 'meaning' and their effective link with an objective that often remains to be clarified? How can one resist the temptation to use means indicators—e.g. the number of waste containers—rather than examine an indicator that accounts for the objective—i.e. the recovery rate?

[17] This operation is considered to be highly complex, the difficulty being the importance of a meteorological factor that is little known locally. Surveys on Lyon use meteorological data from a station on the eastern outskirts, thus implying a whole series of poorly controlled transpositions and just as many approximations at each of the stages involved in this procedure.

than it appears to be. In other words, indicators are variables that depend on this process, and the question of their (non-) utilization within it means relatively little. Nonetheless, the apparent lack of rooting of the Observatory and its products could eventually raise the question of the purpose of the indicators. Their utility can no doubt be sought elsewhere than in the dull mechanics of decision-making. For if, as is assumed, indicators can 'account for the real', they are thereby a powerful support in legitimizing the work (and very existence) of technicians. And this purpose, though merely secondary in appearance, may well prove to be primary.

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