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Abstract:

This article highlights the challenge of environmental inequality in France within the framework of social-ecology, an approach relating ecological crises to social issues, especially inequality. It starts by defining the notions of environmental inequality and environmental justice within the framework of the 'capability approach' and then reviews recent empirical studies that show how air pollution, chemical and noise pollutions, access to environmental resources and exposure to social-ecological disasters are socially differentiated in France and can be understood, under the definition adopted in this article, as a form of injustice. It concludes by reviewing issues raised by environmental inequality in France and exploring policy solutions able to address this challenge.

1. Introduction: A Social-ecological Approach to French Inequalities

In its most common sense, sustainable development is defined as the simultaneous concern given to economic, social and environmental issues. In this perspective, three links respectively determine the three domains of sustainability: the 'economy-ecology' relationship, the 'economy-social' relationship and the 'social-ecology' relationship. This article builds on a striking paradox regarding this widely used framework: even though it was at the heart of the Brundtland Report (1987), the 'social-ecology' relationship is, almost three decades after the publication of this landmark study, the poor relation of sustainability science to the point where it can be said to be the 'missing link' of sustainable development.

The social-ecological approach (Laurent 2011a; 2011b; 2012; 2014) is aimed at addressing this knowledge gap by considering the reciprocal relationship between social and environmental issues, demonstrating how social logics determine environmental damage and crises and exploring the reciprocal relation i.e. the consequences of these damages on social inequality.¹ Environmental risk is

¹ The first arrow of causality, that runs from inequality to environmental degradation, can be labelled 'integrative social-ecology', as it shows that the gap between the rich and the poor and the interaction of the two groups leads to the worsening of environmental degradations and ecological crises that affect every member of a given community (the scale of the community can vary from local to global). The reciprocal arrow of causality that goes from ecological crises to social injustice can be labelled 'differential social-ecology', as it shows that the social

certainly a collective and global horizon but it is socially differentiated. Who is responsible for what and with what consequences for whom? Such is the social-ecological question.

The present article is focused on the arrow that goes from ecological crises to their social consequence, highlighting the magnitude of environmental inequalities in France. One might think that this is a political issue of the first importance for the country since the French are said to dislike inequality more than most other people.

The ‘Stratégie Nationale de Santé’ (‘National Health Strategy’) unveiled in the fall of 2013² highlights a useful starting point for our reflection: the health of French people is very good on average, when assessed on a historical or international basis with standards indicators; but it is characterized by strong and growing inequality among the French, inequality that cannot be explained by individual factors alone. According to public authorities, the key to these French health inequalities is rather to be sought at the social and territorial level:

“Social and environmental factors (financial problems, employment status, working conditions, number of persons per room, safety of habitat, etc.) could count for as much as 80% in the formation of health inequalities, either directly or indirectly through their influence on behavioral factors.” (Ministère des affaires sociales et de la santé 2013, 1)

What is precisely the role of environmental factors in those health inequalities? While the importance of the question cannot be underestimated, one immediately perceives the complexity of the answer: environmental factors (in the sense of the physical, chemical and biological conditions of the environment where humans live) are caught in a web of causal health determinants that are difficult to disentangle and measure. Difficult but not impossible.

Three successive steps are required to highlight the importance of on environmental inequalities in France: the first should assess the scientific robustness of the health-environment relation; the second should demonstrate the ethical necessity of environmental justice; and the third finally show empirically that environmental inequality exists in France.

2. The Environment, between Science and Justice

The World Health Organization (WHO) put forward the concept of ‘environmental health’ exactly twenty years ago and in 1999 recognized that the improvement of environmental conditions was ‘the key’ to a better health. WHO has accompanied this conceptual recognition by a methodological innovation that has involved designing and popularizing an empirical method able to isolate the environmental burden of disease (according to this methodology, environmental

impact of ecological crises is not the same for different individuals and groups, given their socio-economic status.

² Ministère des affaires sociales et de la santé 2013.

risk factors contribute to 24% of the global burden of disease from all causes in disability-adjusted life years and to 23% of all deaths).³

The public debate in France has followed in these international footsteps but at a slow pace. The first National Environmental Health Plan was published in 2004, in the wake of the heat wave of summer 2003 (that resulted in close to 15 000 deaths in France (Laurent 2011a). The 2004 Report offered the first detailed assessment of environmental health in France and made numerous policy recommendations. But it contains only two occurrences of the word ‘inequality’ and leaves completely aside the question of social differentiation of environmental health. It was accompanied by the adoption of the ‘Charter for the Environment’ in 2004 that inscribed environmental goals in the Constitution and more precisely stated in its first article that “all citizens have the right to live in a balanced environment that is favorable to good health”.

The second National Environmental Health Plan (PNSE2 2009) and third National Environmental Health Plan (PNSE3, to be released in 2015) have tried to refine the health-environment scientific diagnosis (on which the WHO has made significant progress in recent years),⁴ but French public authorities themselves acknowledge that public policy has lagged behind.

From the proven importance of environmental factors in the health of citizens naturally arises the ethical and political question concerning the socially differentiated exposure and vulnerability of individuals and groups. This challenge for French public health policy is potentially important since the strong French health inequalities could in principle be addressed by reducing environmental inequalities.

One may show how such inequalities may be unjust (the normative view) and then show how real they are (positive analysis).

To understand why environmental inequalities may be unjust, one must adopt a definition grounded in an explicit theory of justice. One possibility is to base environmental inequalities on the capability-building and human development framework developed by the philosopher and economist Amartya Sen (2011).

Sen is interested in concrete situations of inequality, and not in abstract features of just institutions. His capability approach recognizes as an object of justice not just material conditions (such as income), but also the real possibilities given to individuals to leave the life they have reasons to value (the concept of human development is one possible application of the capability approach).⁵ The capability approach, in other words, is not just concerned with

³ See WHO, Quantifying environmental health impacts http://www.who.int/quantifying_ehimpacts/en/.

⁴ See among other references, WHO 2012.

⁵ In the words of Mahbub ul Haq, founder of the Human Development Report, “The objective of development is to create an enabling environment for people to enjoy long, healthy and creative live. [...] The basic purpose of development is to enlarge people’s choices. In principle, these choices can be infinite and can change over time. People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more secure livelihoods, security against crime and physical violence, satisfying leisure hours, political and cultural freedoms and sense of participation in community activities.” (Human Development Report Office, <http://hdr.undp.org/en/humandev>) Amartya Sen defines human development, as “ad-

what a person eventually achieves, but cares about the set of substantial freedoms she actually has access to. The capability approach thus recommends that well-being be assessed beyond material conditions and reflects also the quality of life of a given person. Among the determinants of quality of life, environmental conditions appear of great importance.

Based on this analytical framework, we can now define environmental inequality. An environmental inequality, which may be the simple empirical observation of a difference or disparity, results in an injustice or is unjust if the well-being and capabilities of a particular population are disproportionately affected by its environmental conditions of existence. The environmental conditions of existence consist of, negatively, exposure to pollution and risks, and, positively, access to amenities and natural resources. The particular character of the population in question can be defined according to different criteria: social, demographic, territorial, etc.⁶

Environmental justice therefore can be said to aim at identifying, measuring and correcting environmental inequalities that result in social injustice. It implies the adoption of an effective arsenal of public policies grounded on scientific research. Yet, one should be clear that environmental justice does not imply that environmental conditions must be equal for all citizens or groups, but that they should not disproportionately affect their well-being and capabilities with respect to the rest of the population.

The operationalization of the public concern for environmental justice is twenty years old in the United States: on February 11 2014 was celebrated the twentieth anniversary of the Executive Order 12898 of the Clinton administration ('Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations') requiring federal agencies to promote environmental justice for the benefit of ethnic minorities and low-income populations. In comparison, the issue of environmental health, only a decade old in France, has not yet led to a systematic analysis of environmental inequalities (like in the UK, see Walker 2012), let alone a deep reform of public policy to reduce them.

The rest of this article intends to advance on both fronts, by reviewing the remarkable results of recent empirical studies on the topic in France, before suggesting lines of action for policy reform.

3. Air Pollution

Studies on the health effects of outdoor air pollution, especially particulate matter, pollution, nitrogen dioxide and ozone, have made important progress in recent years. The WHO has presented at the end of 2013 a comprehensive report concluding that outdoor air pollution should be classified as 'carcinogenic

vancing the richness of human life, rather than the richness of the economy in which human beings live, which is only a part of it".

⁶ This approach à la Sen to environmental justice has been used by others, for instance David Schlosberg 2007.

to humans'.⁷ In early 2014, the organization doubled the figure previously admitted for the number of premature deaths linked to this kind of pollution (to 7 million deaths for 2012, or one in eight of total global deaths). The conclusion of the experts of WHO is unequivocal: "Few risks have a greater impact on global health today than air pollution."

A major European study⁸ recently evaluated the health impact of particulate matters pollution in France. The results, on average, reflect the extent of the health problem: if the WHO standards were met, life expectancy at age 30 could increase by 3.6 to 7.5 months depending on the French city studied.

But the study also reveals territorial inequality attached to this exposure: the health impact varies considerably across urban areas (by a factor 2 between Toulouse, the least polluted city studied and Marseille, the most polluted one) and within urban areas themselves. Living close to road traffic significantly increases morbidity due to air pollution (near roads carrying heavy car traffic, the study found an increase of 15–30% of new cases of asthma in children and chronic respiratory and cardiovascular pathologies prevalent among adults aged 65).

From the overall impact of the environment on health, one can work down to territorial inequality and finally to the impact on the most vulnerable social groups living in urban areas. At the bottom of this chain, injustice is compounded as air pollution can have long lasting effects on children's capabilities throughout their life. It is not an exaggeration to speak in this respect of 'injustice of destiny' since the most advanced research highlights the impact of adverse environmental exposure on the education and social development of a child (this is the focus of seminal papers by Janet Currie (Currie 2011)). Similarly, modern research in toxicology emphasizes the impact of prenatal and perinatal environment on the biological and social development of children.

Some studies on France have assessed this inequality issue systematically, like the Equit' Area project⁹ which carefully measures the differential exposure to air pollution of socially disadvantaged people in French cities. The results are particularly conclusive for exposure to nitrogen dioxide in the city of Lille and Marseille. In practical terms, a child born today in a district of Marseille in close proximity to a transportation corridor is the victim of unjust environmental inequality (in the sense of our definition above) due to particulate matters that can affect her health, development and status throughout her life.

The health impact of indoor air pollution (in homes and workplaces) is also a concern in France. A recent study¹⁰ shows that radon, the second leading cause of lung cancer after smoking, causes each year between 1200 and 3000 deaths (23,000 years of life lost) while nearly 300 deaths and 6,000 illnesses are related to carbon monoxide poisoning (total indoor air pollution is responsible for 20,000

⁷ "IARC: Outdoor air pollution a leading environmental cause of cancer deaths", WHO Press Release, 17 October 2013, Geneva.

⁸ Aphekom (Improving Knowledge and communication for Decision Making on Air Pollution and Health in Europe), <http://www.aphekom.org/web/aphekom.org/home;jsessionid=F44B9D746ECDEBF7B13238282241EDB4>.

⁹ For results, maps and papers, see <http://www.equitarea.org/index.php/fr/>.

¹⁰ Anses/ABM/CSTB 2014.

deaths per year). Location and quality of housing (including height, insulation and ventilation of rooms), determined by income level and socio-economic status, strongly influences the quality of indoor air, making it a social injustice as much as an environmental one.

4. Risk, Noise and Chemical Pollution

With regard to chemical pollution of the environment, a first issue is the fairness of the distribution of hazardous or toxic sites in the country. Again, recent studies show that environmental exposure is far from being socially homogenous in France. An initial 2008 study (Laurian 2008) showed that French towns are not equally affected by the risks inherent to storage sites of hazardous waste, the cities whose inhabitants have the lowest incomes and who display the highest proportion of immigrants (both foreign and nationals of foreign origin) are much more likely than other municipalities to bear this risk.

A more recent study (Laurian/Funderburg 2014) reinforces these first results: not only is the presence of incinerators positively correlated with the presence of low-income people and immigrants but authors are able to prove that incinerators have been constructed near to vulnerable groups rather than vulnerable groups having moved near to the incinerators after they have been sited. This question of chronological precedence is the topic of an essential debate in the American literature on environmental justice: it is indeed always possible to claim that disadvantaged and vulnerable populations may have settled near to toxic sites for financial reasons. In the French case, this study shows that an increase of one percent in foreign-born population leads to an increase by almost 30% of the probability of having an incinerator installed in the corresponding municipality.

Noise, considered by French experts to be the second biggest environmental risk behind air pollution in terms of its health impact (measured in lost years of disability-adjusted life) must also be treated as a form of environmental pollution. The relationship between social inequalities and exposure to noise was highlighted by a study published in early 2013 by the Regional Health Agency of the Ile-de-France region on the Paris major airport hubs (Bruiparif 2013). The results reveal that the share of population exposed increases with the level of socioeconomic disadvantage and that districts where there is a significant proportion of those exposed are those of the most disadvantaged. Other studies on noise, conducted for example in the Marseille region, arrive at less clear-cut conclusions (see Bruiparif 2013) and show in particular that it is rather the intermediate social groups that are most vulnerable to noise.

Chemical pollutions are also unevenly distributed across the country as a growing body of research in France has shown in recent years. The PLAIN model built by INERIS allows, for example, mapping of the presence of nickel, cadmium, chromium and lead in certain parts of the country (Caudeville 2013 and INERIS 2014). The results of the mapping of cadmium pollution for the Nord-Pas-de-Calais region show that two areas are overexposed (Metaleurop and

the periphery of the Lille metropolitan area). This issue of chemical pollution and overexposure of certain populations is related to the proliferation of ‘environmental cancer’ that is to say cancers attributable to environmental factors, which are now estimated at around 10% of all cancers in France.¹¹

The occupational dimension of environmental inequalities is also becoming more and more transparent. For the first time in 2011, the number of deaths from occupational diseases exceeded the number of deaths by workplace accidents in France. Suffice it to recall in this regard the considerable difference in life expectancy between occupational groups (7 years between managers and unskilled blue-collars and 6 years between managers and employees), with a gap that increases rather than shrinks in the last thirty years.

At a more detailed level, exposure to endocrine disruptors (chemicals that may interfere with the body’s hormonal system) is not homogeneous among industrial sectors: industry, agriculture, cleaning and plastic sectors exhibit the greatest degree of exposure. As in the case of particulate matters pollution, prenatal and perinatal exposure to such pollutants may have lasting adverse consequences. For instance, some studies link exposure to arsenic in utero and increased infant mortality, low birth weight and reduced resistance to childhood infections. It is this type of study that led to the ban of bisphenol A in France, but much remains to be done on the many other endocrine disruptors.

5. Access to Natural Resources (Food, Energy, Water)

Another facet of environmental inequality is the unequal access to environmental amenities among which natural resources instrumental in daily well-being such as (good) food, water and energy.

On the topic of unequal access to food understood as an environmental amenity, determinants related to behaviors and the environment understood broadly are often mixed (see last section), but a recent study in France reveals that social differences determined by a factor 2 to 3 health conditions related to nutrition, particularly obesity and diabetes. Access to water is also very uneven across French regions and urban areas due to its differential cost to the consumer. Two independent studies have showed that the price of water in France varies from one to four between regions (Confédération Générale du Logement 2013) and from one to seven within regions.¹²

Finally, energy inequality related to housing and mobility, both in absolute terms (energy or fuel poverty, which affects 8 million people in France) and relative terms (the energy expenditure gap has increased sharply between households of different income levels and places of residence in the last two decades), are well documented in France (see Laurent/Hallegatte 2013 and ONPE 2014).

¹¹ For more on this see <http://www.cancer-environnement.fr/>.

¹² 60 millions de consommateurs, http://www.france-libertes.org/IMG/pdf/60millions-dossier_eau_2012.pdf.

6. Impact of Social-ecological Disasters

Exposure to so-called ‘natural’ hazards constitutes a major source of social inequality that is expected to worsen over the coming decades as ecological crises such as climate change become more severe. To put it in the phraseology of the United Nations (Disaster Risk Reduction or DRR), “There is no such thing as a ‘natural’ disaster, only natural hazards: the impact of a given disaster depends on the choices we make for our lives and our environment. Every decision and every action makes us more vulnerable or more resilient.”¹³

There are two possible ways to look at natural risks. The first hypothesizes that ‘natural’ disasters occur randomly and that humans can hardly do anything about them (that is the etymology of the word ‘dis-aster’ which essentially points to bad luck or adverse fate). The second way is to think that human responsibility lies at the heart of these events, which rather deserve the name of ‘catastrophes’ which etymologically orients towards the idea of a happy or unhappy ending depending on human behavior. Those two worldviews have been respectively defended by French philosophers Voltaire and Rousseau during the controversy on the causes of the Lisbon earthquake in 1755 (for a detailed discussion, see Laurent 2014).

Existing empirical studies clearly show that major contemporary ecological crises (climate change, destruction of biodiversity, degradation of ecosystems) reveal social inequalities (that was the case when hurricane Katrina hit the city of New Orleans in 2005, hardly affecting high-ground rich districts) and worsen them (many African-Americans were not able to recover from the disaster and had to leave the city).¹⁴ The role of social capital for instance is crucial in social-ecological disasters. The defining event in this respect for France remains the 2003 heat wave, of which 90% of the 14 000 victims were over 65 years old and whose death was linked to social causes such as isolation and poverty (see Laurent 2011b).

7. Environmental Justice, the French Way: A Key Priority and Three Challenges

It would be wrong to say that the French government is completely disarmed in the face of serious and growing environmental inequalities. As noted, an environmental health policy informed by the social question is making its way into the future National Health and Environment Plan (PNSE 3), in which priority will be to mitigate environmental and territorial inequalities.

It remains however that the issue of environmental health is still given too little consideration in the existing health strategies, as evidenced by the cancer plan released in February 2014. But more so, social aspects of environmental issues are at an embryonic stage in public policy design and implementation

¹³ UNISDR: <http://www.unisdr.org/who-we-are/what-is-drr>.

¹⁴ On those two points, see Pastor et al. 2006.

(except for the issue of fuel poverty, which has found an important echo in the public debate without yet receiving an adequate priority treatment).

It is therefore useful to consider what is missing in France to make the prism of environmental inequalities operative in public policies. A key priority should be the creation of a transversal institution bridging the gap between health institutions on the one hand and environmental and territorial policy on the other and whose primary mission would be a state of the art review of environmental inequalities in France, a basis for action that is still missing at the moment.

An effort could begin by creating a ‘Center for analysis and prevention of environmental inequalities’, pooling skills and knowledge to put them at the service of citizens and local jurisdictions (the local dimension should be a priority of this institution). Such an institution could bring together epidemiological studies showing the health effects of environmental factors and work on environmental justice linking social and environmental inequalities (the first line of research being much more developed in France than the second). But the challenges are many and must be made explicit. We can see at least three of them, which will form our conclusion.

7.1 The Unavailability and Complexity of Data

Many data are not easily accessible, including social and environmental data at the finest local level, where they are most needed. One of the priority tasks of the Center for Analysis and Prevention of environmental inequalities consists precisely to unlock data. Such data have been gradually gathered and published in the UK by the Environment Agency and groups of academic researchers (Walker 2012), there is no good reason not to engage in the same effort in France.

But even if we could have the data, their analysis is particularly complex: the impact of environmental factors may be immediate or medium to long term and people are often exposed to complex combinations of risks that have an even more dynamic dimension. The analysis of cause and effect is especially complicated. Public action under uncertainty is a well-known problem, but should not prevent action, as recalled in the precautionary principle. It should however socially inform the precautionary principle, and evolve towards a ‘social precautionary principle’ by incorporating the issue of environmental inequalities into the issue of uncertainty.

7.2 The Intertwining of Social and Environmental Inequalities

The complexity of environmental impacts is compounded by the intertwining of environmental and social inequalities, which can be combined without any possibility to disentangle between factors, making it particularly difficult to design a sound public policy. The key here is to expand the concept of environment to include family life, work, etc.

Another challenge lies in the direction of the observed relationship between environmental burden and social status: some studies on noise pollution reveal that favored individuals or groups may experience the strongest environmental

pollution. This reflects the need for broad enough indicators of well-being: the social dimension must be expanded to include the various determinants of well-being. If older people are disproportionately affected by the impact of a heat wave, the fact that they may have a higher income on average than the rest of the population does not do away with the injustice they suffer.

It may be useful here to accompany metrics of exposure inequality measures with metrics of vulnerability and resilience inequality, including for example the issue of inequalities in the access to health. In other words, it is important to weigh social inequalities of exposure by using inequalities of vulnerability and resilience.

For example, exposure to traffic in the Paris conurbation, which is a territorial environmental inequality related to the proximity of traffic, becomes a social injustice when one considers the socially differentiated vulnerability and resilience of the individuals and groups at risk.

The criteria will of course vary depending on the problem in question: in each case, it is important to define the vulnerable public that's is disproportionately effected. Environmental inequalities are inherently plural: there are many other inequalities than social inequality understood in the narrow sense of inequalities related to the economic structure (one can think of all possible well-being inequalities and of other types of environmental inequalities not addressed in this article, such as inequalities in representation and recognition, or cultural and gender inequalities).

7.3 Disentangling Behavior and Environment

The difference between situations of inequality that could be said to be chosen (because they are the result of preferences, such as residential choice) and situations suffered (because they are dependent on the resources of individuals) is at the heart of contemporary debates about social justice, in the complex interaction between individual responsibility and social context.

But this distinction does not exhaust the issue of justice attached to environmental inequalities. How to interpret the residential choice strictly in terms of preferences, while they result from a complex mixture of chosen constraints and constrained choice? And even if market forces lead to environmental inequalities a posteriori, public authorities cannot just ignore them: a resident who would see her cancer risk or that of her children increase exponentially near a toxic plant near which she would have moved voluntarily for budgetary reasons must still be considered in a situation of injustice (and, for that reason, the government might want to subsidize her health care if she cannot be relocated).

Even if one 'chooses' to live near a dangerous site because the land or housing is cheaper there, it is still unfair that this person incurs higher health risk. The issue of flood zones obeys a similar logic: even if individuals have chosen to live in the bed of a river, it is the responsibility of the government to declare the site a non-buildable area, if only for reasons of efficiency given the economic cost to the community of such a risk (mobilization of emergency services, insurance, etc.).

Moreover, it may be difficult to draw a sharp distinction between behavior and environment: a person who chooses to eat only in fast food for financial reasons would almost certainly develop serious diseases and the government should consider the situation unfair. If behaviors were to completely trump environmental conditions, it would be impossible to recognize occupational diseases.

The difference between subjective and objective inequality is part of the same logic: because some environmental inequalities are perceived as the result of choice, individuals may not regard them as unfair. This is a well-known bias of well-being surveys that do not detract from the relevance of public policy (Indian women, for cultural reasons, declare themselves happier than men even if the opposite is true).¹⁵ Similarly, the fact that these inequalities are perceived as stigma and therefore often minimized by respondents involves not inaction but methodological subtleness: it is crucial to combine objective measures and subjective measures to identify unfair situations.

Whatever the challenges, the importance of environmental inequality for French public policy cannot be underestimated: how useful would a welfare state completely blind to a major factor of health inequality be? Growing structural damage to the environment, the severity of ecological crises and the increase of social inequality in France (as in the rest of world) fully justify that France adopts (and adapts) the prism of environmental justice.

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¹⁵ Sen 1985 notes in this respect: “a person who is ill-fed, undernourished, unsheltered, and ill can still be high up in the scale of happiness or desire fulfillment if he or she has learned to have ‘realistic’ desires and to take pleasures in small mercies.”

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