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Ecological inequalities: how to link unequal access to the environment with theories of justice?

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Inégalités écologiques : Accès inégal à l'environnement et théories de la justice

Résumé

Dans un contexte d'épuisement des ressources environnementales, de pollutions de nature globale et de dommages causés aux écosystèmes, on assiste à l'émergence de nouvelles questions de justice. A partir de ce constat, différentes conceptions des inégalités écologiques sont présentées et discutées. L'objectif de cette contribution vise à proposer une analyse normative des inégalités écologiques basée sur les apports des théories de la justice, en identifiant des objectifs de justice écologique utiles pour les économistes. Finalement, une application de ces approches est envisagée à travers un exemple théorique relatif aux effets du changement climatique dans un monde à deux îles.

Mots-clés : inégalité écologique, justice, changement climatique, durabilité.

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Abstract

Within the context of the large depletion of environmental resources, global pollution and damage to the ecosystem, new questions of justice have arisen. Based on this assessment, we present and discuss the usefulness of various conceptions of ecological inequalities. We adapt various theories of justice in order to define ecological inequalities normatively, identifying certain social objectives of ecological justice for the use of economists. We then apply those approaches to the case of a theoretical example based on island submersion in the context of climate change.

Keywords: Ecological inequality, justice, climate change, sustainability.

JEL: Q56, D63

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1. Introduction

In the twentieth century, humanity has had to familiarize itself with a number of natural limits such as the large depletion of environmental resources, global pollution and damage to the ecosystem. Within such a context, new questions of justice have arisen: What sort of destiny is there for future generations? (Jonas, 1990); What sort of environmental quality will there be for the present generations, especially for marginalised people (poor people, ethnic minorities)? These new issues of justice can be usefully understood via the concept of ecological inequalities (Salverda *et al.*, 2009). This concept enables us to integrate elements of nature into intragenerational and intergenerational conceptions of human justice.

We argue that economists need to improve their definition of ecological inequalities. In social science literature, most definitions of that term are unclear and lack solid theoretical foundations and, in particular they have no normative basis (Flipo, 2009, Emelianoff, 2006). IFEN and INSEE studies show that inequalities are not considered as an ecological issue for French people (Dielbolt *et al.*, 2005). In contrast, Engelbrecht (2009) demonstrates that “natural capital is highly correlated with subjective well-being”. A clarification of the definition of ecological inequalities could help in the recognition of inequalities as regards the environment. It would also be useful to establish a coherent measurement of ecological inequalities from a normative point of view, in order to avoid what Kölm (2006) affirms: “given any two distributions, I can practically always prove that one is more unequal than the other, or the converse, with reasons that will all be convincing in themselves. This means that such comparisons [comparisons of inequality in distributions] are absurd as long as one has not sufficiently specified which kind or properties of inequalities one is talking about.”

The aim of this paper is to characterise and analyse questions of equity in terms of three aspects: current generations, future generations and nature (amenities, environmental resources, pollution...). We therefore emphasise the social consequences of environmental distributions and the need to design new public policies focusing on those inequalities. In Section 2, we present and discuss various definitions of ecological inequalities in the economic literature, and then we try to suggest a more unified framework for this concept.

In Section 3, we adapt several theories: those of justice (Rawls, 2009; Sen 2000), of environmental justice and intergenerational ethics (Jonas, 1990). In so doing, we seek to provide an operational perspective for the concept of ecological inequalities for economists. We also analyse the impacts of this new kind of inequality at different levels: that of the relation between justice and sustainability, or between intragenerational and intergenerational justice (Baumgärtner and Glotzbach, 2012), and that concerning the definition of individual welfare. Finally, in Section 4, we illustrate briefly those conclusions by taking a theoretical example based on island submersion in the context of climate change.

2. The concept of ecological and environmental inequalities in social sciences literature

In this section, we introduce the concepts of environmental and ecological inequalities¹. In order to do so, we start by drawing up a historical perspective of the interrelatedness of environment

¹ In this paper, we use indifferently the concepts of ecological and environmental inequalities because there is no real need for us to use different words. There is, nevertheless, debate about the use of those terms

and inequalities in modern societies and then focusing on the definition of this concept in the literature.

2.1 Historical emergence of environmental concerns in the study of inequalities

The hygienist movement in the nineteenth century was the first to underline the problem of the bad quality of the environment in poor urban neighbourhoods. That movement stressed the link between poverty and morbidity or mortality due to environmental conditions (Cornut *et al.*, 2007). The hygienists, however, were more interested in health inequalities than in environmental inequalities. Even though that movement was a major one, we have chosen to focus our investigation here on four more recent movements stressing environmental inequalities. Those four movements are concerned with current problems concerning the distribution of the environment.

The theme of the unequal distribution of the environment first appeared in the United States in the early eighties. In that country, awareness of environmental inequalities was spurred on by a militant movement against environmental racism. The Protestant church and, more particularly, Pastor Benjamin Charles Jr., presented those problems for the first time in a report, first published in 1987: *Toxic waste and race in the United States*. That theme was then developed in subsequent American academic literature, which tried to establish strong links between environmental degradation and the presence of disempowered people, especially ethnic minorities (Bullard, 1990; Hamilton, 1995; Weinberg, 1998). Certain of those studies, which also try to understand the dynamics of the problem (Baden and Coursey, 2002), examine the causality between the presence of black populations and toxic waste sites. Generally, those studies were conducted by sociologists, but sometimes by certain economists.

The expression 'environmental justice' was widely used in those works, while the reference to 'environmental inequalities' is generally given in the subtext. Certain major lawsuits, like the one concerning the town of Winkley, and certain new elements in the law², have reinforced the need to develop a better understanding of environmental inequalities in the USA. The reestablishment of justice has been based on compensatory justice, i.e. the compensation of pollution victims by the pollutant firms. The industries are condemned because their pollution has an impact on health – not because they pollute more than other industries, i.e. they are condemned for the consequences of pollution and not directly for the fact of polluting. In the case of environmental justice, the links between environmental degradation and health inequalities are very strong. All the decisions of justice have been taken on grounds of health, which brings us back to the early goals of hygienism.

When this issue came to Europe, it underwent major modifications (Laurent, 2011; Pye *et al.*, 2008). In England, where the American movement was very influential, the groups of interest shifted from ethnic minorities to poor people. In France (Laigle and Tual, 2007; Laurian, 2008; Viel *et al.* 2011), the studies also switched, as in England, from ethnic discrimination to economic discrimination as regards the environment. The dominant approach is based on the corrective public action of access to the environment, i.e. a better distribution of the environment. In that case, each social group has to suffer from the same or somewhat similar exposition to environmental hazards, which can be corrected by social institutions. Whereas environmental justice in the U.S.A. is used in lawsuits to obtain monetary compensation in lawsuits, in Europe it is used to set up public policies: "public intervention is more to be found in redistributive and corrective thinking than in the

(Chaumel *et al.* 2008, Emelianoff, 2006). Section 2.2 shows that it is possible to avoid those problems of definition.

² Executive order 12898 of February 11, 1994 on environmental justice.

restorative thinking of considered inequitable situations”³ (Laigle and Tual, 2007). Generally, the main topic dealt with is pollution, even if certain publications have studied the distribution of amenities.

Two other forms of inequality as regards the environment are present in the literature: these are based on two specific concepts: ‘ecological debt’ and ‘intergenerational justice’.

Political ecologists such as Martinez-Allier were to raise some new questions about the distribution of the environment on an international scale. The author argued for the consideration of ecological debt due by the North to the South: that particular debt could be set off against financial debt. Ecologically, unequal exchange is defined as “the fact of exporting products from poor regions and countries, at prices which do not take into account the local externalities caused by these exports or the exhaustion of natural resources, in exchange for goods and services from richer regions” (Martinez-Alier, 2002). Ecological debt is based on the procedural justice of international trade. As is the case for environmental justice in Europe and United States, political ecologists focus their work on the lack of political power for a part of a population, and its consequences on environmental distribution.

The distribution of the environment is also essential when focusing on distributive justice between generations. That theme, which appeared in the literature with the international negotiations on climate change, has since been popularized by the Brundtland report (1987). In that report, the concept of sustainable development was presented as the development that “meets the needs of the present without compromising the ability of future generations to meet their own needs”. From an economic point of view, as the solidarity between generations is supported by the respect of others or by a certain form of altruism, this implies dependency on nature (the anthropocentric dimension) and the necessity to preserve the environment. Here, the welfare of the present generations cannot be separated from that of future generations (in a long-term perspective) whether we consider climate change, access to environmental resources (ecological services provided by ecosystems, water, biodiversity...) or the production of irreversible waste. According to Brundtland's definition of sustainability, intergenerational equity (fairness) is essentially based on the satisfaction of basic needs for all generations.

The last two approaches are described in the paper of Laigle and Tual (2007) as “equity compensating the degradation of the environment and the resulting impacts on certain territories and populations”⁴.

With all that historical perspective, the problem of trying to unify the concept of environmental inequalities can be seen. Table 1 sums up the main characteristics of the different ways of analysing the distribution of the environment.

³ Authors' translation

⁴ Authors' translation

	Environmental justice	Ecological debt	Environmental inequalities in Europe	Sustainability
Spatial scale	Local	International (North/South)	Local	All the scales
What kind of environment is concerned?	Environmental risks	Environment impacted by international trade	Natural environment	Natural capital or total capital depending on the substitutability hypothesis chosen
Temporal scale	Static or dynamic, one generation max.	Long term	Static or dynamic, one generation max.	Intergenerational
Who is concerned?	Ethnic minority	Inhabitants from countries of the South	Poor and powerless people	Future generations
What is the criterion to be compared?	Compensation for environmental risks	Fairness of international trade Equivalence financial /ecological debt	Fair distribution of environmental goods	Sustainability and intergenerational justice

Table 1: Characterization of the different movements concerned with environmental inequalities

In this part, we do not emphasize environmental ethics, which is concerned by nature *per se*, but not by the distribution of natural attributes between humans. The distribution of the environment between humans concerns environmental ethics only indirectly. In fact, a better distribution of the environment can avoid the degradation of the environment *per se*.

2.2 How can ecological inequalities be defined?

We have previously shown that there are several different ways of understanding what is meant by the distribution of the environment. What is at issue now is to understand how that such a heterogeneous approach can be embodied in the concept of ecological inequalities. Although Anglo-American literature was the first to use the concept of environmental inequalities, it generally employs the concept of environmental justice (Emelianoff, 2006).

Very different definitions of ecological inequalities can be found in the literature. The heterogeneity of the concept stems mainly from the interdisciplinary use of the concept, and also from specific authors' understanding of the links between humanity and nature.

In order to comprehend the heterogeneity of the approach, an overall definition of the concept contained in most of the existing definitions can be enounced: *inequalities between entities as regards the elements of its environment*. The main differences between authors lie in the meaning of: "entities", "as regards" and "elements of its environment", which are analysed below:

'Entities'

First of all, the entities which are compared are human entities. Thus, some authors speak of "social inequalities as regards the environment" (Theys, 2005). Consequently, we can define the word 'entity' as a human group; we then need to indicate which scale is involved: households,

individuals, nations... Territories (regions, countries) can also be compared but as regards their inhabitants.

Some authors, however, do not consider all the individuals in the same way. For example, Flipo (2009) considers a particular group of individuals: the poorest. In fact, inequality can be used bilaterally: if A has more of the environment than B, B is the victim of an ecological inequality and if B has more, then A is the victim of such inequality. However, some authors consider inequalities in a unilateral sense. In fact, it is only if A has more of the environment than B (for example) that an inequality exists.

Two reasons can be enounced to justify the unilateral use of the concept of ecological inequalities:

- The main reason is that we consider a normative perception of inequality. In that case, we have inequality only when there is the coincidence of more than one criterion. For example, we consider that we have ecological inequality only if the one who is the poorest has fewer environmental goods than the other.

- The other reason could be that one of the two senses of the inequality (B has more environment than A, for example) is highly improbable, so we exclude that possibility in the definition.

By focusing on humans, we exclude a biocentric view of ecology. The concept of poverty seems to be more appropriate in a biocentric paradigm. In that case, we can speak of ecological poverty, but not of ecological inequalities.

'Elements of the environment'

The second unclear term in the definition is the environment. The aim of part 1.2 is to define environmental or ecological inequalities, but in the literature the subject of those inequalities is very disparate. In some disciplines, such as epidemiology, all the elements which are not a part of the individual constitute his environment. For example, somebody who attacks you in the street can be considered as part of your environment. Therefore, a city which has a greater percentage of physical attacks than another could be considered as a city in which individuals are the victims of environmental inequalities.

That is a particularly narrow vision of the environment, but in practice two main paradigms seem to be used in the literature:

- The built environment: urban nuisance, unequal access to urbanity (Laigle and Oehler, 2004)
- The natural environment (Environmental primary goods (Chaumel and La Branche, 2008), sea and soil use, natural hazards (Bellan *et al.*, 2007))

Another very important consideration concerns the modifications of the environment by humans only and the possibility of influencing those modifications (power inequality in the case of environmental politics); or also it concerns the natural modifications of the environment such as purely natural hazards. This gives rise to the question: do we have to introduce the reasons of the disparity in order to justify the existence of inequalities? As an answer to that requires the use of philosophical concepts, this will be developed in more detail in the next part.

‘as regards the’

The last term that we have to define is ‘as regards the’. Although this might seem a trivial term to define, the particular way we define it is of great import for our study. In fact, we can take into account the elements of the environment in three different ways: when they are emitted, subjected or debited. Certain authors differentiate two concepts: ecological and environmental inequalities depending on what they take into account. That differentiation is unnecessary for our study, however, because we want to determine which ecological inequalities are the most appropriate when considering the environment in terms of justice.

2.3 Conclusion

In the present article, environmental concern has been put on a back-burner as regards social concern. Environmental inequalities are not based on ecological wealth or poverty *per se* but on individuals’ relative access to the environment. What is significant here is the perpetual oscillation between positive and normative recognition of environmental inequalities. Equally, certain definitions of environmental inequalities tend to resemble definitions of environmental justice. For example, the definition of environmental justice employed by Pearce (2006) is very close to certain definitions of environmental inequalities: “The hypotheses to be tested are (a) that existing distribution of environmental ‘bads’ is regressive across income groups (a note exists in the group on racial groups) and (b) that environmental policy is distributionally biased against low-income groups. Hypothesis (a) probably more fairly describes the concerns of the EJ movement, but some of the literature is also concerned with hypothesis (b)”. Moreover, there are some difficulties in clearly defining inequality because we are in a perpetual no man’s land between dispersion and injustice. As Kölm (2006) said: “...in fact, one never speaks of inequality, but rather, of dispersion or of injustice”.

To improve our definition of ‘environmental inequalities’, we have first to define what constitutes a fair treatment of individuals as regards the environment. Thus, we need a normative definition of environmental inequalities. That definition and the fair distribution of the environment between humans, have both to be built on ethical grounds. That is why, in the second part, we investigate the literature on theories of justice.

3. What rules for the fair distribution of the environment?

The next goal is to determine the philosophical foundations required for the study of ecological inequalities and their use in justifying public policies. In the light of various different theories of justice, we try to justify coherent scales (temporal, spatial...) for the study of ecological inequalities.

In the literature on theories of justice, however, only a few references to the environment are made explicit. By contrast, such references are to be found in the literature on the intergenerational distribution of capital, particularly that of natural capital.

First of all, it is important to note that, in line with Sen (2000), any theory of justice is, to be socially acceptable, based in one sense on the equality of a ‘focal variable’ (opportunities, resources, primary goods, freedom...). It is also important to point out that competition between the different kinds of inequality probably exists. It seems incoherent to equalize the environmental variable exclusively, even if some theories of justice do mention equalization of the appropriation of initial resources, equalization which is translated by an equal share of land income (Vallentyne, 1998). However, the environmental variable can be a part of the variable to be equalized, even if we do not focus on the possibility of considering that variable as the unique one.

3.1 What good is the environment?

We now focus our discussion exclusively on the natural environment. If we were to incorporate the built environment, that might well be too all-inclusive. Equally, the specificity of the natural environment is, for us, of particular interest.

The environment cannot be considered as a homogeneous good. Indeed, in environmental economics, we identify three different elements constituting the environment which interact with people: emission of pollutants, use of stock, and access to amenities. We can also identify in the resources that people use certain necessary environmental goods (drinking water, food, breathable air...) and some non-necessary environmental goods (particular quality of water, a forest near one's home...).

Moreover, in the case of intergenerational problems, the construction of preferences (Roemer, 2009) and, more especially, that of expensive preferences could be fundamental depending on the particular 'focal variable' selected. For example, mineral water is a luxury environmental good (one thousand times more expensive than tap water). However, there is no real reason for the price difference, and that is a preference which has been constructed over the years (Marty, 2008). That good is a luxury one but, if some generations really desire it, would we have to take that preference into account when defining justice?

Furthermore, the difference of paradigm between strong and weak sustainability is fundamental for the question of environmental inequalities between generations (Neumayer, 2010). If we are in a paradigm of weak sustainability, in which the substitution between natural capital and man-made capital is possible, it would be incoherent to focus exclusively on the environment ; we would, instead, have to take into account what a generation with a poor environment has in exchange for that poor environment. The problem seems to be the same in an intragenerational framework; we have to know whether economic compensation is possible.

Ever since Rawls, "...subjective satisfaction is a welfare indicator that seems too correlated to elements of individual responsibility to be underwritten by the society"⁵ (Fleurbaey, 2001). First, we have to be aware that all the ways in which we choose to measure inequality are subjective. Nevertheless, we do have to choose in the case of environmental inequalities if we are to take into account a physical, reference-based or perceived indicator. We now begin to investigate several of those theories of justice and try to determine how exactly the environment can best be integrated.

3.2 A rule for the distribution of environment between humans of a same generation: "Who should have what?"

In this part, we present several theories concerning the fair distribution of environment within one generation. Even if sustainability seems today to emphasise the distribution of the environment for intergenerational stakes, a fair distribution of the environment in one generation is nonetheless present in the economic literature, as shown in Section 1.

A market-based inequality?

"Higher levels of pollution may be connected with associated benefits – for example, lower property prices – that compensate those groups for higher environmental risk" (Pearce, 2006). Imagine a case in which the quality of the environment is knowingly chosen by all the individuals

⁵ Authors' translation

from an extensive basket of goods, and that the distribution of each individual's income is considered as socially fair. In that case, there would be no reason to speak about inequality as regards the environment, because each individual could choose the amount and kind of the environment he wants to obtain in return for a percentage of his fair income.

However, empirical data show that the quality of their environment does not exactly represent a individuals' choice. For example, the fact that in some American cities, black people has more waste sites in their neighbourhood than white people with the same wage, which shows that the environment cannot be explained only by income. Otherwise, we would have to concede that black people want less environmental quality, a hypothesis that we think is completely unacceptable.

However, we might wonder whether some minimal access to the environment has to be ensured for everybody. Is it fair to share the environment on the basis of the portion of income that everybody wants to devote to it?

The environment as a fact for everybody:

For David W. Pearce, we have two moral judgements as regards the environment:

- Zero environmental risk is fair: however that very strong moral judgment is empirically impossible to attain.

- 'Acceptable' risk should be envisaged: this is a weaker more realistic position which considers that different income groups should be exposed to the same or similar non-zero level of risk, so that the risk is, in some sense, 'acceptable'

The inequality problem appears in this framework on the words 'same' and 'similar'. The exposition to environmental risk should be the same for everyone. This is unlike what was previously mentioned as regards "market-based inequality", Pearce argues that the very possibility of buying a better environment is unfair. He went on to defined a threshold below which environmental risk is unfair. However, that part of his argument is based on absolute poverty, and not on the question of inequality.

Rawlsian egalitarianism

First let us say that the unequal distribution of the environment between individuals can affect the three principles of justice of Rawls: that of equal liberty, of the equality of opportunities and that of difference.

For the third principle, that of difference, the interest of Rawls is on primary goods and not on utility or welfare. The question then arises: even if the notion of environment is not a part of Rawls' theory of justice, can we use that theory to speak about the distribution of environmental goods, i.e. can the environment be considered as a social primary good, and, if so what are the consequences?

For Rawls, for example, health is not a social good but a natural good: "...health and vigour, intelligence and imagination, are natural goods; although their possession is influenced by the basic structure, they are not so directly under its control" (Rawls, 2009). If the environment can be included in within social primary goods, ecological inequality can only be accepted if it is favourable to those who are worst-off. But one major question remains: do pure natural hazards have to be included in environmental inequalities if they are to be used here? If we include the environment under the heading of social primary goods we can only take into account those elements which totally depend on human institutions; in that case pollution or resource depletion could be taken into account.

For elements that cannot be directly considered as social primary goods, the distribution of the environment should respect the fair equality of opportunity as Daniels (1985) first proposed for health care. Moreover, Rawls (2009) with his first principle of justice would probably be opposed to any form of environmental dictatorship.

Capabilities approach: Sen (2000) and Nussbaum (2001)

For Sen (2000), three different elements can justify inequality: the “wrong scale” argument, the “incentive” argument, the “operational asymmetry” argument.

In the case of environmental inequality, we might think that most of the time the wrong scale is employed. Environmental inequality can be justified by the fact that it is not the right ‘focal variable’. In that case, we could justify the inequality of environmental access because of the will to have equality in other spaces.

The “incentive” and “operational asymmetry” arguments are justifications of inequality in order to obtain efficiency in the space considered. Incitation is the fact that inequality can encourage individuals to work, to invest... Operational asymmetry is the fact that some people should have more because they will act efficiently, so that in turn everybody also has more.

According to Sen (2000), “the plausibility of the evaluation of equality in terms of capabilities is, in itself, a good reason to be opposed to any unconditional claim to have equality in other spaces”⁶. The main question is then: can the environment be considered as a capability, and can it be, in a sense, equalized?

Whatever the case, Sen and Foster (1997) think that it is meaningful to consider the environment in the study of inequalities: “Much of this annexe has been concerned with inequality of incomes, but income is only one factor among many that influence the real opportunities people enjoy. For example, person A may be richer than person B in terms of income, and yet be more “hard up” than B if a big part of her income has to go for medical attention she needs because of some chronic illness. The real opportunities that different persons enjoy are very substantially influenced by variations of individual circumstances (e.g. age, disability, proneness to illness, special talents, gender, maternity) and also by disparities in the natural and social environment (e.g., epidemiological conditions, extent of pollutions, prevalence of local crime). Under these circumstances, an exclusive concentration on inequalities in income distribution cannot be adequate for an understanding of income inequality”.

Equally, the set of capabilities, which represent the freedom to choose between different ways of life, would be larger if the environment were in a better state. However, Sen does not accept the possibility of establishing a master list of the valuable objects in his theory. The possibility to breathe air, or to drink water would be probably considered as primary capabilities by Sen and be a valuable object. Would that be the case, however, for the possibility to see a tiger or going for a walk in a forest?

To find a list of central capabilities, we have to turn to another author: Martha Nussbaum (2001). Martha Nussbaum is interested in the central capabilities and in a working out a threshold of those central capabilities to “the level at which a person’s capability becomes what Marx called “truly human”, that is, *worthy* of a human being”. The author says that below a determined threshold of capabilities there is no place for a really human life. She also considers that it is essential to have an individual-level study of inequality because of the importance of the differences between men and

⁶ Authors’ translation

women in the suffering of inequalities. She gives a list of central capabilities and tries to establish broad cross-cultural capabilities. Certain central capabilities seem to include environmental aspects. For example, the first element of the list is: 'have the means to live until the end a normal length' life. This heading is quite wide-sweeping, but we could certainly consider that certain environmental conditions have to be fulfilled in order to respect that first capability. She also evokes questions of health. Coming back to the environment, the eight capability indicated in the list is 'the possibility to live with other animal species'.

To conclude, these four theories of justice, all founded on different conceptions, give very different visions of the importance of having a fair distribution of the environment. Nevertheless, it seems that some essential or primary environmental goods have to be integrated, in some way or other, into justice analysis. As for secondary goods, our conclusions are less clear-cut, since construction preferences and monetary compensation have also to be taken into account.

3.3 A bad distribution of nature between generations: how to link intergenerational justice to the environment?

Because there are irreversible economic phenomena and many uncertainties about the effects of climate change for present and future generations, it is necessary to envisage sustainability and environmental ethics within a time path longer than the one usually used in economic decision-making.

If we suppose that mankind has to be maintained, and if we consider that present generations could threaten that postulate because of the power of modern technology, then "long-range responsibility" of Jonas' environmental ethics has to be introduced into our analysis. His ethics is an ethics of the future because the source of the responsibility he invokes is located in the future: the set of the present actions is considered as a potential threat for life. So, in order to avoid the effects of our irreversible choices today (consequences of the climate change or nuclear waste, for instance), the Responsible principle could be used: "Act so that the effects of your action are compatible with the permanence of genuine human life". That principle is a voluntary one, an *ex ante* restriction to human action which implies that the use of environmental resources should be have certain upper limits.

Such a principle is associated with an asymmetrical position in time for all generations concerning their rights and duties and has one major consequence: no intergenerational compensation is possible. In addition, as his ethics is non-anthropocentric and is open to non-human species, this includes the interdependencies between different species which are relevant for preserving human life in general, and the non-use values associated with environmental components.

Jonas' ethics can easily be related to the strong sustainability paradigm in which the maintenance of a non-decreasing level of economic output on the long run is mainly driven by the absolute necessity to hold constant (at least) the level of natural capital, as well as to simultaneously ensure the preservation of its components when they have no substitute. So, the sustainability issue implies that non-decreasing well-being has, in the long run, to be achieved by a simultaneous decrease in consumption for the favoured generations, e.g. the present generations.

Less consumption for present generations may allow both:

- Intragenerational ethics: larger access to basic needs for non-favoured generations living in developing countries (here, transfers are possible);

- Intergenerational ethics: the possibility for future generations not to have fewer means to meet their needs than is the case for the present generations. This means that no transfer is possible. A protected nature has to be transmitted to future generations in accordance with the Responsible principle.

The achievement of the responsibility principle involves two conditions: a form of self-restriction, which is really essential together with a critical review of our materialistic preferences in a world subject to ecological crises.

Whereas Jonas assigned a major place to environmental ethics in a long-run perspective, Rawls accords only a limited place to justice as regards the environment. Nevertheless, Rawls is one of the first philosophers to have devoted an entire chapter to future generations (Gosseries, 2009), albeit in one specific sense: only the next few generations are considered.

In Rawls' theory of justice, the span of accumulation is defined by the choice of the disfavoured generations behind the veil of ignorance (e.g. the original position) and is supported by the favoured generations. At the intergenerational level, a just savings principle allows each generation to receive from its predecessors and to give to its descendants. According to Rawls, "The process of accumulation, once it is begun, and carried through, is to the good of all subsequent generations. Each passes on to the next a fair equivalent in real capital as defined by a just savings principle". At the intragenerational level, the difference principle prevails. But, whatever the level under consideration, an unequal distribution of resources between generations would be fair if there is distributive justice in favour of disadvantaged persons.

To conclude, these two approaches may be connected with the sustainability question in two distinct ways. The first one is based on Jonas' green and non-anthropocentric dimension, which can be supported by the following proposal: use the earth's resources in so as to diminish them as little as possible. The second approach, introduced by Rawls, is mainly anthropocentric and more human-species oriented: use the earth's resources so as to engender a path of equal welfare for all generations.

3.4 What are the possible links between intergenerational and intragenerational concerns?

In the two preceding sections, we presented six different principles of justice, four intragenerational and two intergenerational. All those principles have ethical foundations, but the choice of an intergenerational and an intragenerational principle is not sufficient to assess a global transgenerational analysis of ecological inequalities. In fact, as Baumgartner and Glotzbach (2012) show, those objectives are not necessarily independent: there can be facilitation and rivalry between those objectives. In the case of facilitation, as the two objectives can be fulfilled, there is no problem. In the other case when the hypothesis of rivalry between objectives is present, a trade-off has to take place between those objectives. Besides a form of "efficiency" in the analysis of that trade-off, i.e. no waste in the allocation of scarce resources (Baumgartner and Quaas, 2010), two different visions can be proposed. First, J.P. Dupuy (2009) defined an intragenerational minimum to be fulfilled before thinking of intergenerational stakes. Nothing was worse for him than: "survival at any price, in particular at the price of renouncing such fundamental values as that of moral autonomy"⁷. Jonas, however, considered that "the permanence of genuine human life" is the most important objective. The choice between these two possibilities can perhaps be avoided. But, where that is not the case, the choice between those two possibilities would be a normative one.

⁷ Authors' translation

An application to climate change: island submersion in a two-island world

We want to illustrate Section 3 using a theoretical example. This example is based on the situation of islands for which the risks of submersion (partial or total) are possible due to climate change. This problem is very important for jurists (Cournil, 2011). Those submersions could create some new stateless people, with the ensuing high costs of migration to be considered and share. Small islands are often presented as ecosystems very vulnerable to climate change. For example, the IPCC presents a whole chapter on the problem of small islands and argues that “small islands, whether located in the tropics or higher latitudes, have characteristics which make them especially vulnerable to the effects of climate change, sea-level rise, and extreme events (very high confidence)” (Mimura et al., 2007).

Let us suppose a two-island world, I_1 and I_2 . We consider the two islands as regards their inhabitants, and do not focus on the problems of nationality and stateless people. To simplify we do not consider intra-island inequity. We focus on a two-time case t_1 and t_2 , with each period corresponding to a different generation. Between those two times, we suppose an anthropogenic climate change with an increase in sea level.

In this example, we use the different principles of justice described above, and analyse which conditions are important in order to have an ecological inequality or a distributive injustice.

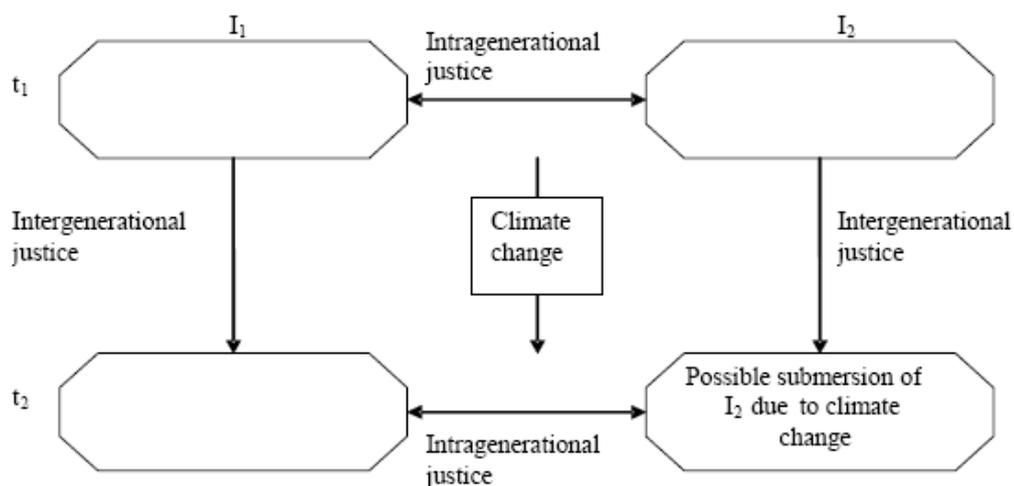


Figure 1 Island submersion and climate change

4.1 What should be considered in the decision of justice?

In the decision of justice, we have obviously to take into account the environmental conditions of the two islands at time t_1 and t_2 , focusing, in particular, on the decent situation of humans. Moreover, economic and other forms of access to social primary goods need to be considered, as the responsibility in the situation t_2 . In this paper, although, we have chosen not to present theories based on responsibility in an intragenerational perspective, opportunities of having access to

environmental quality that are dependent on individual environmental responsibility could have been studied.

4.2 When do we have unfair ecological inequalities?

First of all, we have three different problems of justice to study in Figure 1. In t_1 , we have a first situation of intragenerational justice. However, as we do not consider any inequality in the distribution of environmental goods between individuals in t_1 , since we do not consider the *ex ante* situation of environmental inequality, there is no reason here to focus on t_1 .

The second question of justice concerns the passage from t_1 to t_2 . In that passage, intergenerational justice can help us to identify ecological inequalities between generations. In fact, if there is submersion (partial or total) of I_2 between the two periods, the Rawlsian theory of justice only admits inequity if there is human responsibility involved in that submersion. According to that theory, some compensation between natural capital (I_2) and manufactured or human capital can take place in the vector of social primary goods. The production of knowledge or of man-made goods can compensate for the disappearance of I_2 . This is in accordance with the weak sustainability vision. As Jonas put it, "Act so that the effects of your action are compatible with the permanence of genuine human life". According to his principle, we cannot have a bad situation in t_2 for I_2 (submersion due to climate change). Self-restriction has to be applied to favoured generations in t_1 in order to avoid certain irreversible impacts on nature in t_2 , provided that humankind has to be preserved. From an environmental point of view, there cannot be any substitution between the essential components of natural capital and other types of capital. Intergenerational ethics implies preserving nature for future generations.

The last question concerns inequalities between the two islands in situation t_2 . If we consider the definition of environmental justice giving by David Pearce: "The hypotheses to be tested are (a) that existing distribution of environmental 'bads' is regressive across income groups (a note exists in the group on racial groups) and (b) that environmental policy is distributionally biased against low-income groups". Hypothesis (a) would be true if I_2 is poorer than I_1 , so that, at t_2 the situation is unfair. We also have to be sure that at t_1 no public policy causes the problem of submersion at t_2 . That approach takes into account the historical perspective of ecological inequality creation. A normative measure of ecological inequalities should also take the economic situation into account, if it is to be useful for public policies. In Section 2, we presented a first conception of ecological inequality that we called "market-based inequality". According to that conception, no inequality in t_2 can be seen, because we consider the possibility for everybody to buy a place without environmental risks. Power inequality, information asymmetry and non-monetary inequality can put all those conclusions into question. In the second approach in Section 2 that we called "environment as a fact for everybody", inequality will be present and consequently no compensation would be possible. In that case, any significant difference between individuals as regards environmental quality would be unacceptable. For Rawls, the dynamics of the inequalities at t_2 are of no importance. If the population in I_2 is the victim of partial submersion, that submersion would be acceptable if it enables them to maximize their social primary goods vector. We should also note that the fundamental freedoms of I_2 inhabitants can be endangered, in which case the first principle of justice of Rawls' theory of justice is not respected. The principle of equality of capabilities developed by Sen is harder to apply. In fact, we have to know which particular capabilities can be challenged by partial or total submersion.

In what concerns of the trade-off between intra- and inter-generational criteria, we can note that, for Jonas, there is possible sacrifice for those generations which have attained a high level of development (intragenerational level) if it is a necessary condition for non-favoured generations

living in developing countries. Dupuy considered that life in I_2 would be much worse in t_2 , and would in any case put limits on the sacrifices to be done in t_1 to protect life in t_2 .

4.3 Conclusion

In Section 4, we have indicated certain differences in the definition of ecological inequalities according to the particular theories of justice used. This section could be reinforced by mathematical formalisations of ecological inequalities. Nevertheless, although that formalisation could certainly be envisaged, that does not prevent us from presenting conclusions about the consequences of various justice objectives in terms of ecological inequalities in the context of island submersion.

5. General conclusion

In this paper, we analyzed the concept of ecological inequality and its major connections with certain theories of justice. This concept has to be understood in the context of its historical perspective if it is to be very useful. In order to do so, the paper presents various theories which have ecological inequalities as an argument. Having adapted theories of justice from intragenerational and intergenerational perspectives, we then present different ways of understanding an equitable approach to the allocation of environmental goods and services. We especially focus on eventual trade-offs between the different objectives of justice, especially between intra- and inter-generational objectives. Those different theories of justice are finally applied to the case of small islands' submersion stakes in the context of climate change.

Moreover, if we consider the context of climate change, we cannot ignore uncertainty and *ex ante* inequalities. For example, Fleurbaey (2001) enounces that the measurement of a certain equivalent of GDP makes more sense than simply measuring GDP. We conclude that environmental inequalities should be promoted when drafting socio-ecological policies that aim at taking into account considerations of social justice in environmental policies.

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