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Introducing Environmental Ethics into Economic Analysis: Some insights from Hans Jonas' Responsibility Principle

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Ethique environnementale et analyse économique :
quelques enseignements issus du Principe Responsabilité de Hans Jonas

Résumé

Ce papier étudie comment l'éthique environnementale peut être intégrée à l'analyse économique et plus particulièrement la manière dont le principe de responsabilité de H. Jonas peut fournir des indications utiles dans l'analyse des questions de durabilité. Les défis de la durabilité environnementale et sociale en termes de justice intergénérationnelle sont analysés et impliquent un devoir moral applicable à la gouvernance économique. Le papier examine également dans quelle mesure la responsabilité, en tant qu'alternative à l'utilitarisme et en tant que principe facilitant la coordination des agents impliqués, peut constituer un premier pas vers une préservation durable et à long terme de la Nature.

Mots-clés: éthique environnementale, équité intergénérationnelle, principe responsabilité, comportement auto-limitatif, durabilité.

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Abstract

This paper addresses how environmental ethics could be incorporated in economic analysis and more particularly how the Responsibility Principle of H. Jonas can provide useful insights into the analysis of sustainability issues. The challenges of environmental and social sustainability in terms of intergenerational fairness are analysed and involve a moral duty applicable to economic governance. The paper also explores to what extent responsibility, as an alternative to utilitarianism and as a principle facilitating the coordination of the agents involved, can be a first step towards the long-term and sustainable conservation of Nature.

Keywords: Environmental ethics, intergenerational fairness, responsibility principle, self-binding behaviour, sustainability.

JEL: Q010, Q200, Q320, Q570.

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1. Introduction

Nowadays it seems impossible to avoid considering environmental ethics when attempting to understand many topics in economics if they are in any way related to the biosphere, have irreversible environmental impacts, or if their scientific basis is subject to uncertainty. Humanity has become a strong force in the workings of ecological and geological processes, the main actor of a new epoch called the Anthropocene (Crutzen, 2002). In the current global situation, society has a large influence on Earth System functioning and brings many disruptions regarding biogeochemical cycles, biodiversity loss and global changes in general. Environmental damages have specific features such as being irreversible, involving long-term and cumulative phenomena, and high uncertainty about the future (Bourg, 2007). In such a context, backstop technologies do not seem to match the scope of the environmental challenge. Indeed, what is now at stake is no longer how to manage natural resources, but the very conservation of Nature itself. If we are to believe Jonas (Jonas, 1974: 95), economics intrinsically carries a value which orients it in favour of responsibility for life in the future, and consequently economics cannot be a neutral observer of the exchanges of natural resources, but must 'Act so that the effects of your action are compatible with the permanence of an economic order'[1]. Environmental ethics is therefore linked to economics in some way, but how this happens may not be obvious at first, and this is why we are proposing some thoughts about this.

First of all, the focus of environmental ethics is mainly the analysis of the relationships between humans and the other living species and nonliving components of the biosphere. It focuses onissues about how resources and access to them are distributed are inseparable from those about the environmental impacts associated with certain forms of excessive use (overexploitation, degradation) of these resources over a prolonged period. The ability or inability to access certain resources determines the dynamics of development, and thus affects the level of wellbeing of the present generation. In this regard, it is becoming increasingly obvious that the distribution of wealth within society can strongly influence the conservation of environmental resources (Mikkelson et *al*., 2007; Gagnon et *al*., 2008).

Next, linking environmental ethics to economics makes it possible to take into account the disparities in terms of capability between rich and poor countries when common concerns arise (1992 Rio

[1] Jonas uses two similar phrases a few lines further on in which he expresses this in negative terms: 'Act so that the effects of your action are not destructive of the possibility of economic life in the future' or 'Do not compromise the conditions for an indefinite continuation of some viable economy' (its negative equivalent).

Conference). More fundamentally, economics can provide a consequential and universal system for preserving Nature. To be able to do this, it is imperative to establish a link between economics and ethics. Jonas (1974) makes this link by pointing out that economics must recognize the finalised nature of Man[2]. The link then becomes obvious: the economy, as a human institution, must construct itself by satisfying the needs of human beings in society. According to Jonas, the interaction between environmental and economic ethics occurs through futurology in the sense that people who are currently alive and concerned about the future can organise a stock-based management system, which will provide future generations with food and other goods and services. This involves the management of goods, which is the essence of 'economics' (from the Greek *oikos*, house and *nomos*, to manage or administer). The imperative of responsibility arises from concern for the wellbeing of descendants. It has become an economics that is concerned about the future (the *sine qua non* for managing flows in the future) and it includes a truly ethical dimension. Eric Pommier (Pommier, 2011: 197) adds 'it is because the biological facts mentioned are immediately given value (…) that economics carries within itself an axiological dimension'.

In this context, environmental ethics can help both to ensure that natural resources are conserved and to contribute to the fair distribution of these resources between successive generations. We want to outline the beginnings of a response based on an analysis of sustainable development because this concept has introduced the necessity of considering development and the environment as linked from the perspective of a long view. To do this, we have adopted the philosophical approach of Hans Jonas and applied it to investigating environmental problems in the sense that it introduces a new ethics that fits the lengthy time-scale of the biosphere.

First the paper analyses the challenges of environmental and social sustainability in terms of intergenerational fairness, which leads on to a moral duty applicable to economics. Second, it will look at how, and to what extent, responsibility, as an alternative to utilitarianism and as a principle facilitating the coordination of the agents involved, can be a first step towards the long-term and sustainable conservation of Nature.

[2] See: 'Socio-Economic Knowledge and Ignorance of Goals", chap.4, pp.105-131.

2. Sustainability, Ethics, and Justice within the Distribution of Nature

2.1. Justice and future generations

Through the concept of sustainable development as described in the Brundtland report[3] (Brundtland, 1987: 51), the question of intergenerational justice has become a necessity in any long-term view. By defining sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs', preservation of the environment is seen to be intrinsically linked to the dynamics of the development of societies. By extension, we also think that the term 'socially sustainable development' is more appropriate than that of 'sustainable development'[4]. We think that this semantic detail reflects a profoundly modern economic and social situation because inter- and intra- generational problems (cf. capabilities *vs.* inequalities of the most deprived) are clearly correlated with this phenomenon (the Stern Review 2006, for example). Applied to development, sustainability corresponds to the need to ensure that the wellbeing of successive generations does not deteriorate over time. Wellbeing, which is perceived through the prism of needs, must be defined here. The interpretation of the definition of sustainable development in the Brundtland report leads to a minimalist approach to both the concept of need as a basic necessity and of intergenerational fairness (Dasgupta, 2008; Gosseries, 2008). The requirement for sustainability that emerges from this report is based on intergenerational fairness, but with a restricted scope, e.g. which only binds the present generation vis-à-vis future generations with regard to ensuring that their basic needs are met with the aim of maintaining a level of wellbeing that does not deteriorate over time, but nothing more than that. In this context, the economic problem that has to be dealt with is the intertemporal distribution of the rights to use environmental resources (via the stocks and services provided by various different functions of the biosphere and ecosystems) with the requirement to satisfy the basic needs of succeeding generations, at a time when some resources become scarce and/or deteriorate (World Resources Institute, 2000). Following Nussbaum (1999), there are ten basic needs: 1. Life, 2. Bodily health, 3. Bodily integrity, 4. Senses, imagination, thought, 5. Emotions, 6. Practical

[3] See the 'Our Common Future', the WCED report better known as the *Brundtland report* (from the name of the Norwegian Prime Minister who coordinated the project). To see how the movement arose, see the concept of e*codevelopment*. Also see the first five articles of Agenda 21 of the Rio de Janero summit (1992), article 130 R of the Maastricht Treaty (1992), which also occurs in article 174 of the Amsterdam Treaty, and in the European Commission's Green Book (1994). It should be noted that even though this definition is fairly wide, as Appel (1993) and Sen (1992) justifiably point out, it does leave many of the questions raised by the unequal distribution of wealth between nations in the shadows.

[4] For a detailed distinction between sustainable development and socially sustainable development, see: Ballet et al. (2010).

reasons, 7. Affiliation, 8. Other species, 9. Play, 10. Control over one's environment: (A) Political and (B) Material.[5]

This dynamic perspective emphasises the obviously normative duality of sustainable development, which combines two inseparable aspects, economic efficiency and intergenerational fairness. Even though the conservation of the quality of certain resources and the absence of waste can be ensured by choosing an optimum intertemporal consumption pathway[6], the question of intergenerational fairness remains to be resolved (Page, 1977).

Another question to be considered is what it is that must be handed on to future generations. Two distinct approaches can be adopted to the sustainability of development. The first, known as the 'weak' approach, highlights the role played by technological progress and by possible substitutions between the various different categories of natural, technical and human resources in the long-term maintenance of the level of the capital stock. The preservation of the stock of capital over time constitutes the necessary condition for weak sustainability. In contrast, the other approach, described as 'strong' sustainability, holds that substitutions between the different capital categories and the implications of technical progress are limited, so that the sustainability rule is reflected by the continuity over time of non-decreasing stocks of natural capital. Natural capital consists of a set of things with mainly complementary functions: alongside natural resources, these include the environmental services provided by the biosphere and the ecosystems through various different functions, such as the screening from ultraviolet light provided by the ozone layer, the self-cleansing and recycling capacities of ecosystems, the pollination of crops… It is essential to preserve the quality of these services since they amount to the necessary condition for life on Earth. The item that constitute the natural capital for which there are no substitutes and the degradation of which can be irreversible, is defined as the critical natural capital for which particular safely regulations should be established.

Concern about the environment, as it appears in the definition of sustainable development (Brundtland, 1987), sheds an unambiguous light on the minimalist bases of the environmental ethics adopted: Nature

[5] For further details, see: Nussbaum (1999, pp.41-42).

[6] This is confirmed if the items considered are correctly evaluated by the markets, which is not always the case in the context of externalities and/or market failures. The question of how the environmental services provided by ecosystems and the biosphere are to be assessed is a tricky one, notably with regard to the methods used to reveal the preferences of economic agents. In particular, the involvement of environmental ethics makes it impossible for the methods of evaluation to take into account the changes in the social values accorded to the various different uses (direct or indirect) of an environmental resource: at an advanced stage of development, both society and individuals can award 'common heritage' status from both a cultural and a natural standpoint simultaneously, whereas previously, the resource was mainly in demand for its ability to provide eonomic services. For more about this, the reader should refer to (Azqueta and Delacàmara, 2006).

is rooted in an anthropocentric approach, and it is selfishly envisaged in an instrumental manner. Consequently, authors such as Birnbacher and Jonas proposed a consequentialist type of moral architecture, which is both sustainable and global. This point is fundamental if we are to grasp the implications with regard to the long-term protection of environmental resources. The ways in which these resources are protected in the long term depends on the sustainability approach adopted now. From the point of view of future generations, weak sustainability implies a specific approach of the natural capital, in which only natural resources with a market value are taken into account, and it does not imply any particular restriction with regard to their use by the present generation. Sustainable development can thus be ensured by setting up a compensation fund derived from the income earned by exploiting exhaustible resources. As a result of technological progress, future generations will be able to use this inheritance to compensate for the fact that stocks of resources have been run down as a result of what the present generation has extracted (Solow, 1986; Hartwick, 1977).

In a way this intertemporal sustainability rule deals with both the global and effective distribution of resources between successive generations and with environmental ethics *via* the procedure of discounting economic choices. The evaluation of economic decisions leads us to assign a discounting factor to various different points in time. Selecting the social discount rate is not unimportant, since the greater its value, the greater the weight given to the present relative to that given to the future. This implies an asymmetry between the treatment of successive generations: those viewed in the very long-term, greater than a few decades, will carry little weight compared to the current generation. The 'dictatorship of the present' in fact reflects the guardianship role of the present generation relative to generations yet to come: the decisions taken by the former express choices in which the argument of impatience predominates (Chichilnisky, 1996). In other words, the existence of a pure preference for the present *de facto* leads to unfair treatment of successive generations, and promotes the use of natural resources to satisfy the needs of the present moment.

In this context, fairness between the generations inevitably involves some adjustment of the discounting procedure for assessing economic choices (Almansa, Calatrava, 2007; Padilla, 2002). It becomes possible to envisage differentiating the level of social discounting on the temporal horizon, with a downward trend as we move away from the present time, in order to give greater weight to future generations. This differentiation can be based on a fall-off in the level of pure preference for the present or on a total lack of any preference for the present over the generations yet to be born (Bayer, 2003). The lack of a single social discount rate expresses concern for both intra- and inter-generational fairness, and thus determines how environmental justice can be introduced into the economic calculations of the public

decision-taker. Thus, for example, the long-term management of household waste may lead to different technologies depending on on their expected environmental impacts depending on how the discounting is implemented. In the context of projects with potential environmental impacts (various forms of pollution over time and space, the accumulation of waste, …), the different values of the level of discount, depending on whether it is associated at the intra- or intergenerational level, the time line considered (several centuries), and the role of long-term economic growth being key variables if we take intergenerational fairness into account (Ferrari and Méry, 2008).

2.2. Intergenerational fairness and Nature

From a utilitarian perspective, the existence of rights between successive generations legitimises the existence of intergenerational transfers to ensure fairness between the different generations. One instance of this is the introduction of positive ethics into economic decisions based on the co-ownership principle developed by Henry (1990). This principle stipulates that two successive generations have equal rights for the natural environment to exist: the first to arrive on earth cannot irreversibly exploit the natural resources unless it can guarantee future generations a sufficient, specific compensation. The resulting obligation constitutes the principle that binds successive generations together, and is based on institutional redistribution mechanisms. The conditions for intergenerational arbitration that determine the levels of transfer differ depending on whether the altruistic behaviour of the agents in the presence/absence of a planner is taken into consideration on the one hand, and, on the other, the equality/non-equality of the levels of consumption between children belonging to the same generation. In particular, Howarth and Norgaard (1995) show that if a constraint associated with intragenerational consumption that remains constant over time is imposed, then the intervention of a public agency is necessary even if the agents are altruistic: parents are less motivated to transfer their possessions to their children. Parents under-estimate the weight of the wellbeing of the latter, because they hope that the family of their child's spouse will be richer than they are, and so will therefore be able to transfer greater wealth to them[7]. Within the strong sustainability approach marked by the complementarity between different environmental resources, strict rules governing the use of natural resources are enforced to be able to preserve them for the long term: the rate of extraction must be lower than the renewal rate, exhaustible resources must be replaced by renewable resources, all aspects of the critical

[7] It should be noted that if altruism binds successive generations together, then the present generation can also contribute to improving the wellbeing of future generations by expenditure intended to improve the quality of the environment (Jouvet *et al.*, 1997).

natural capital for which no substitute exists must be preserved. Here, environmental fairness is expressed by adopting a criterion of the sustainability necessary to ensure a sustainable standard of living for future generations.

This approach leads to the introduction of standards and obligations into the analysis[8]. In the end, the standard corpus devised by Birnbacher (1994) has the effect of moralising action, even if it takes place in an informational asymmetry, weighted in favour of the future. What is interesting is the fact that this asymmetry of information is considered to be a type of uncertainty that could be reduced to probable risks. In contrast, if the uncertainty is incalculable, one can only opt for a strategy of which the worst consequence is the least worst of the worst outcomes of all the strategies available. More precisely, the scope of the application of the standards becomes the whole of humanity (both present and future generations). Birnbacher (Birnbacher, 1994: 88-89) wonders about knowing whether it is possible to grant rights to future individuals and concludes from a study of the four conditions[9] that the 'permission or obligation to demand that duty should be performed, whether for ones own behalf or that of others', suggests that in the future, highly-evolved living beings will be able to demand rights, standards and obligations on behalf of others, even though these others may themselves be incapable of laying claim to them. Birnbacher (1994: 90), from a strictly logical point of view (the 4 conditions) responds to the question (can we grant rights to future individuals?) by stating that 'if we accept this analysis of the assignment of moral rights, no serious logical or metaphysical reason can be opposed to also attributing to future beings moral duties towards the present generation'.

This approach provides a basis of intergenerational fairness in the allocation of rights and duties to all generations – and it is on the basis of the existence of such moral bonds that all generations are treated fairly, independently of their position in time. Consequently, sustainability cannot be disassociated from the application of rules governing use that ensure the permanence of the environmental resources over time, given that each generation accomplishes actions that are enshrined by the recognition of moral obligations.

[8] For further information, see: Birnbacher (1994). D. Birnbacher proposes a consequentialist and universalist ethical framework, ranging from metaethics to the application of ethics.

[9] According to the Author, to attribute to *A* a moral right towards *B*, four conditions must be fulfilled: 1/ *A* must exist; 2/ *A* must have interests; 3/ *B* must have a moral duty towards *A*; 4/ *A* must have the right or duty to demand that *B* fulfil his moral duty, and/or any other has the right or duty to demand that *B*, in the name of *A*, fulfill his moral duty.

An openness to the utilitarian and consequentialist approach to moral duty is also to be found in the writings of Page (1991), where the author defines sustainability on the basis of the preferences expressed by present generations, that determine the intergenerational obligations, but on the basis of a generalised interest in the intergenerational fairness ensuring that resources are conserved over the long term. Intergenerational fairness thus constitutes a criterion of sustainability. To the extent that the effective allocation of resources over time does not ensure the fair intergenerational distribution of resources[10], the criterion of sustainability enfolds that of efficiency in order to ensure acceptable standards of living for future generations. This approach considers environmental ethics as a particular expression of intergenerational fairness which is declined in environmental terms: maintaining a level of wellbeing over time implies preserving the quality of the resources and that of their endowments *in situ*. Sustainability, established without any utilitarian framework, in contrast to the situation in which obligations unite successive generations by optimising an intergenerational social wellbeing function, constitutes a preliminary condition for any fair distribution of resources between the generations against a long-term time-frame. However, beyond these different pathways likely to bring about a fair distribution of resources with an environmental ethical basis, one major difficulty would seem to persist: that concerning the choice of the duration of the time-frame. This is important if we consider that in the very long term there is a degree of uncertainty about environmental damage, and that it is therefore difficult to integrate this factor into choices made today: how can we take into account the potential damage of human activities if the time-frame extends over several centuries? An analysis of the link between the value of the discounting rate and the time frame has revealed two contradictory effects (Gollier, 2005). A 'wealth effect' associated with economic growth, which leads us to ignore generations that are remote from ourselves in the time frame, and a 'precautionary effect', which introduces uncertainty about how this growth will change in the future. The former effect urges us to select a high discounting rate for the time line, and to award a significant weight to the present generation, the second, in contrast, leads us to adopt a discount rate that declines over the very long term: 2.5 per cent to 3 per cent per year with a horizon of one century, and 1per cent to 2.5 per cent for much more remote horizons (over 500 years).

Under these conditions, protecting environmental resources and distributing them over space and time makes it difficult to refer to any time dimension other than that used in economics. The irreversible aspect of certain economic phenomena in the very long term urges us to comply with environmental

[10] For this question, see Dasgupta and Heal (1979).

ethics in making economic choices which inevitably carried remain effective over a long time, a time that exceeds that of strictly economic decisions.

3. Time, Environmental Ethics and Future-Oriented Actions

3.1. Jonas' environmental ethics: an ethics of the future

With the publication in 1979 of *Das Prinzip Verantwortung,* the foundations of a new ethics were laid. The source of responsibility now lays in the future 'for what has to be done' (Jonas, 1984: 92)[11], and no longer in past or present obligations. The origin of this shift in ethics lies in the threats arising from the power of the technology devised by Man. The limitation of human action results from the obligation that we have to the future, which obliges us to act responsibly today.

The philosopher's environmental ethics is above all else an ethics open to the biosphere and the Nature surrounding it (Jonas, 1984). From this point of view, this is a 'biocentric anthropocentrism' which is intended to preserve life in all its forms, whether human or non-human, with the ultimate goal of preserving humanity. Without Nature, humanity cannot survive. Successive generations are therefore united with each other due to their relationship with the natural elements: preserving Nature means giving ourselves the means of ensuring that the conditions required for the continuing existence of humanity, on condition that the human actions are responsible, *e.g.* that they ensure the conditions required for humanity to exist (Larrère and Larrère, 1997).

In such a context, the nature of the responsibility is directly linked to the human potential for action, which has become a danger to the human species as a result of the power of the technologies that Man has created. Man controls Nature by means of technologies that he does not control. The most striking example is that revealed by the impact of anthropogenic factors on climate, which illustrates the inability of societies to fulfil their responsibility with regard to environmental considerations (Bourg, 2003). Considering the existence of numerous uncertainties and the limits of scientific knowledge about the future effects of our acts (environmental degradation), Jonas (1984) proposes resorting to an ethical judgement backed up by a fear-based heuristic, which is an integral part of responsibility. Fear does not run counter action, on the contrary, it invites us to act.

For the philosopher, fear has a benevolent source it urges us to act. The present generation has a duty to anticipate the threats that will result from its omnipotence: the obligation arises in the future.

[11] In particular see Chapter 2 entitled: *Substantive Responsibility: The Positive Duty of Power*.

Consequently responsibility towards future generations is infinite over time: the current generation has the duty to exercise responsibility towards its descendants. This justifies the involvement of ethics: it this responsibility that controls the ability of individuals to act as beings responsible for their actions: 'Act so that the effects of your action are not destructive of the future possibility of such life' (Jonas, 1984: 11).

A first obligation results from the imperative of responsibility. It is exercised towards individuals, and involves both the present generation and future generations in a specific relationship. More exactly, there is a temporal mismatch between the intergenerational rights and obligations that form the basis of an asymmetrical intergenerational justice. The present generation has both rights and obligations towards future generations, because it is aware of the effect of its actions on the future, but future generations can neither lay claim to rights nor exercise self-restraint with regard to the present generation. Consequently there is a disruption of the usual reciprocity between rights and obligations. The main consequence of this obligation lies in the impossibility of envisaging intergenerational justice based on redistributive justice between the generations: any environmental resource that is irreversibly damaged or destroyed as the result of the actions of current human beings can no longer be the object of an intergenerational exchange. It is only by resorting to the imperative of Jonas that we can prevent actions from hindering the future possibilities for human life on earth: ethics limits *ex ante* any major and irreversible degradation of Nature (Ballet and Mahieu, 2003).

A second indirect obligation is expressed towards Nature and underpins environmental justice for Jonas. The elements that make up Nature are objects of an obligation for human societies because they contribute to the preservation of the conditions required for the existence of humanity and because they have an intrinsic value, which is independent of any usefulness. Implicitly, environmental resources have non-usage values, such as those of option value or bequest and existence values. It is important to note that all the values associated with the elements of Nature must be preserved for all generations. The wellbeing of unborn generations depends explicitly on the quality of the natural environment [...] 'the common destiny of man and Nature, newly discovered in the face of common danger, leads us to rediscover Nature's own dignity and commands us to care for her integrity over and above the utilitarian aspect' (Jonas, 1984: 137).

Finally, there is a harmony between living beings, both human and non-human, which must not be threatened because it is the guarantee of the survival of species in general and that of the human species in particular. Nature as the object of human responsibility enters directly into the field of ethics. The ethical dimension of the natural environment is based on the existence of intergenerational solidarity, which for philosophers is carried by the imperative of responsibility.

Responsibility is of global ethical scope since it encompasses the interdependences that exist between the human species and natural systems over a long time scale.

Environmental ethics is thus far from being just theoretical and is truly applicable through major economic policies (Stern Review, 2006). Indeed, renowned economists such as Nicholas Stern defend just such a vision with regard to the challenge of climate. The approach adopted by Jonas is very illuminating with regard to the present climate situation. The highly controversial Stern Review justifies taking seriously the worst-possible scenario. This predicts that economic development will lead to major disruptions. More precisely, expressed in terms of a constant annual rate, climate constraints must be estimated to be between 5 and 20 per cent of the gross global product. Above 5 per cent, production will be affected. Above 20 per cent, an irreversible loss in terms of capabilities will make itself felt in Africa, the Middle-East, India, and South-East Asia. This catastrophic scenario is not however irreversible because, for a fairly moderate cost, humanity already has the means available to find an escape by triggering early efforts to ensure intense decarbonisation so as to stabilize the atmospheric level of the greenhouse gases at 550 ppm. If a loss of consumption per head is not accepted and not implemented by the public authorities, starting now and continuing henceforth, a temperature increase of between 2 and 5 degrees Celsius will have the direct consequence of increasing the physical and ecological damage caused. More indirectly, harmful effects will make themselves felt on the productive capital, indicating a downward effect on economic growth as a whole. It is probable that the physical laws governing Nature will amplify this loop of consequences on physical and environmental damage. The potential long-term damage is very considerable and lasting. A. Sen (2013), R. Solow (1986, 1992) and J. Stiglitz (1974) all share this point of view. However, although this apocalyptic view has to be taken seriously, it is not accepted throughout the academic world with regard to the economic sciences. Criticisms of this approach have been raised by economists such as Nordhaus (1992) and Tol (2009). This divergence arises from a criticism of the level of discounting, from how uncertainty is treated, and from how future generations will respond to new climate challenges. The novelty of the Stern Review [12] is that it discusses the economics of risk. The problem no longer solely concerns a standardised reading of mathematical forecasts of damage, but proposes a vision of its possible extent by taking into consideration risks that are indeed likely but also very extreme. Furthermore, an ethical preference of a utilitarian type is proposed for use to treat future generations, because the implicit postulate is that all generations should receive equal treatment. This is what explains and justifies a very low discounting level of the order of 1.4 per cent (1.3 per cent being attributed to the long-term growth in consumption and 0.1 per cent to a

[12] For a discussion and prospects, see Howarth (2008).

possible disappearance of the human race, which justifies the preference for the present). Lastly, the effects induced by unfair distribution are minimised by giving to the elasticity of the marginal utility of consumption a value equals to one.

For economists, it is urgent to take up a position with regard to the ethical debate, and to go beyond the strictly limited confines of preventing environmental damage, on the pretext that future generations will be richer that the present generation, and that ideally an annual economic growth rate of 1.3 per cent in global consumption is required. However, no prediction of probability can incorporate the meanders and other historical uncertainties. In fact, the Stern Review, despite its methodological originality, demands that a basic ethical question be posed about how the remote future can be taken into account by an altruistic dynamism. Concretely, this can lead to a North-South financial transfer. This sacrificial approach, which arises from a moral asymmetry, can only be understood if the present generation harms future generations. If we are to accept this hypothesis, it is imperative to recognise that future generations do have rights. Although Birnbacher (1994) conceptually defended this thesis, it remains true that there are no institutions in the world that formally represent future generations. Economists can only conjecture that there may be possible difference in utility, which in itself does not in any way correspond to harm. So, is there some principle of justice that would allow future generations to reproach the present generation about irreversible decisions taken? Since Parfit (1984), a problem of 'non-identity' has been actively annihilating any possible reproach, and consequently prohibiting any possible compensation. The very simple idea underpinning this existential paradox springs from the factthat future generations are intrinsically incapable of complaining, because anything they might have to say is subject to logical inconsistency. It is therefore rationally conceivable that an alternative to formalised utilitarianism can be subsumed into an economy of the environment through an 'imperative of humanity' (Jonas 1984). We take the liberty of transforming this maxim into an 'imperative of transmission', which gives pride of place to the desire of human beings to transmit the Earth as they have inherited it to those who come after them. To do this, we have to accept that life is of primary importance. And indeed Jonas recognises that life has a finality in itself and that, consequently, everything that lives is useful not only to serve the ends of the human race, but also for the sole finality of living[13]. By situating himself on a very long-term time line, with a horizon on the time scale of the biosphere, Jonas proposes an environmental ethics that challenges economic activities: ranging from far-reaching changes in the economic sphere to the level of the modes of production and of consumption,

[13] See Micoud (Micoud, 1994: 17 who adopts an unuual standpoint by considering life as a *personified entity*.

are necessary to allow the preservation of environmental resources in their entirety (in both their temporal and spatial dimensions).

3.2. An ethical approach that complies with sustainability: self-binding behaviour

The question here is how the various time scales involved (e.g. the economic time scale and that of the biosphere) can be combined with regard to a universal ethics of responsibility that inhabits the very long term, and to determine its scale and its limitations in terms of compensation (e.g. distributive justice).

First of all, for Jonas there is an asymmetry that leads to favouring future generations, which raises the question of the 'sacrifice' of the present generation in favour of those that are to follow (Bazin, 2007; Thévoz, 1993). One possible justification could be based in temporality. The solidarity between generations carried by the responsibility imperative leads Jonas to accept the intrinsic inequality that links successive generations: their belonging to distinct and irreversible moments of time gives them unequal positions in terms of rights and duties.

Jonas' maxim refers to the obligation to maintain an 'authentically human life on earth'. It looks as though this obligation will be difficult to fulfil if the lifestyle of the developed countries continues and is exported to the less developed countries. The finite nature of the planet, and the ecological threat materialised by the vulnerability of Nature seem, from this point of view, to constitute two absolute constraints, even if we appeal to the boldness of technological progress[14]. Public policies must promote changes that lead to a contraction of the consumer lifestyle in Western countries. Jonas is explicit on this point: 'This amounts to accepting severe restrictive measures with regard to our habits of unbridled consumption – in order to lower the 'western' standard of living of recent times […] the voracity of which – and the resulting excretions - appear to be particularly to blame for the global threats to the environment. […], because of the quite simple truth that the earth, which has a limited surface area, is not compatible with unlimited growth, and which wants the earth to have the last word.' (Jonas, 1998: 107). The rejection of growth from this perspective, is envisaged in a logic of self-limitation considered as the preface to a distribution of resources between successive generations.

According to Birnbacher (2009), the motivation of a self-limitation combined with a long-term perspective can provide an appropriate foundation for human action. This does indeed make it possible to take future generations into account, notably by considering the difficulties posed by various

[14] Technological progress is often proposed as holding the solution to many of the problems afflicting humanity. It was suggested recently that technologies intended to control the climate by limiting solar irradiation could be a way to combat climate change. On this point, see Barrett (2008).

elements of a psychological nature, such as the preference for the present or the duration of the intergenerational horizon. Some self-binding mechanisms can be envisaged, notably the intervention of an independent and external institution to ensure that long-term options are taken into account by the decision-makers.

Thus, a self-binding perspective could result in a 'sacrifice' in terms of reducing consumption today by the present privileged generation. At the same time, this implies having to revise our interpretation of the sustainability of development: it means in fact considering that there can be simultaneously non-growth of well-being and a decrease in consumption for the most prosperous among the present generations. In fact, if the consumption of basic goods does not decrease over time, the consumption of other goods will decline: self-limitation – the physical expression of the 'sacrifice' of the present generation living in the developed countries and bound by a moral principle – allows the present generation living in developing countries and all future generations to achieve a level of well-being at least equal to the level at which essential needs are met[15]. This attempt makes it possible to glimpse solidarity both within the present generation and between successive generations through their dependence on Nature. Such a proposal could comply with the maintain of both intragenerational justice and intergenerational fairness which are two relevant dimensions of sustainability (Baumgärtner et al. 2012).

The main change is this: it is the obligation to the future ('ethics of the future' that will decide whether any compensation is due from the most privileged members of the present generation to the least favored, and will also determine the effort to be made in terms of reducing the consumption of the most privileged members of the present generation (self-limitation). In this way the field of present actions is clearly demarcated and transcends any conflict between intragenerational and intergenerational fairness.

Subsequently, implementing an ethics of the preservation of the aspects of Nature that have the characteristic of public goods is inevitably the task of public authorities and not of indididuals. The ethical content of the choices rests on the legitimacy of the obligations, which implies that the whole of society accepts certain standards and rules. The rationality of the decision-maker's choice becomes a 'collective' rationality, in the sense that the acceptance by society of the imperative of responsibility depends above all on its social recognition. 'Knowledge, will and power are collective, and their control must be so also: only the public authorities can exercise them, and in the end this calls for their general acceptance at the ground roots level' (Jonas, 1998: 105).

[15] One could, for example, refer to primary goods in Rawls (1971).

The application of a self-binding rule can be considered at two different but overlapping levels: a redistribution (transfer) between generations both present within a short space of time, and the heritage of a Nature that has been preserved over a long period of time as a result of self-limitation of present actions *via* the imperative of responsibility has been introduced into the sphere of human activities. It is at this price that it is possible to respect the integrity of the elements of Nature, and hope to promote the survival of humanity.

A first attempt to apply an ethical approach combined with some fairness issue can be found with the fair-sharing principle at the intergenerational scale proposed by Howarth (2007). This principle is based on the idea that solidarity exists between all generations with regard to appropriating natural resources and that the preservation of the environment must be guaranteed over time. Compensatory redistributions between generations can be envisaged under certain conditions, but remain limited to financing substitution technologies targeting renewable energies, and to maintaining permanent institutions on a very long-term horizon that could ensure that Nature is shared equally by different generations.

In this context, sustainability implies that the management of environmental resources includes the rights of future generations so that '... [their] life opportunities are at least as good as those enjoyed today' (Howarth, 2007, p. 661). From this point of view, the moral obligation no longer concerns the transmission of a preserved environment (only some types of environmental resources are the shared property of present and future generations), but that of undiminished life opportunities available to members of future generations. The idea of opportunities is closely connected with the concept of capabilities developed by Sen (1992). In addition, the fair-sharing principle could be compatible with the environmental ethics of Jonas as long as it preserves an authentically human life on earth through the preservation of life opportunities for all generations. This point is valid given that the Jonas approach is holist and allows not only the satisfaction of basic needs but also the non-decrease of the set of opportunities for each member of the society in the long run. Then, the self-binding principle (implied by the imperative of responsibility) can be combined with the fair-sharing principle. Life opportunities are not declining and all generations can access to an authentic state of Nature.

4. Conclusion

Sustainability challenges are becoming increasingly pressing, . In this context,introducing environmental ethics could help economists to find better solutions to care societies living in a closed world within planetary boundaries (Steffen *et al.*, 2015). The Responbilitity Principle could be the first step to open a

new age combining both human lifes and preservation of the biosphere for sustaining the wellbeing of all generations. Thus, the sustainability issue could be achieved by some constraints on the use of Nature and at the same time a decrease of the consumption levels for the favoured present generations -self-restriction-. A kind of 'sacrifice' for generations which have succeeded a high level of development could allow a non-decreasing well-being on the long run for all generations. While transferts are possible between present generations - intragenerational ethics -, the Responsibility Principle will ask us to preserve Nature in order to preserve life on the planet - intergenerational ethics- without any possibility of transfert. A review of our 'materialistic preferences' seems to be a necessary condition for accepting the principle as a guild in our decisions and finally maintains an 'authentically human life on earth'.

Furthermore, the Responsibility principle is closely related to a heuristic of fear which has an altruistic origin. It is essential for human to be able to imagine the long-term impacts of their actions and to believe in what it is unthinkable today. There is a strong cognitive challenge to deal with!

We can note that is the self-binding principle can be combined with the fair-sharing principle, this perspective does not tell us how all generations can cooperate with each other while a contract is not more possible if we suppose the Jonas' approach to be applied here. The question is related to the way intra and intergenerational justices are linked together.

Finally, environmental ethics brings a relevant question: does a voluntary restraint justice be possible at a global level, a level which could comply with wellbeing of all generations and allow sustainability to stay within planetary boundaries?

We may conclude here by the necessity to continue our investigatations in the following directions. For an environmental ethics matching sustainability in the long run, an analysis of the qualitative change of the economic system due to the possibility of new behaviors according to the Responsibility Principle have to be conducted. At the same time, we need to know the major role played by the resilience capacity of Nature through the analysis of the dynamics of ecosystem services in relation with their non-declining production (evidence of thresholds for some actual major changes - climate change, biodiversity erosion, fisheries…).

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