

Summary
of
SurEnvironnement et paradigme écosystémique

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The practical as well as philosophical challenges, concerning the questions about the 'environment', could be summed up by the following interrogation: is it only possible to associate the concept of 'environment' with the old human preoccupations or must we admit that this is a new issue induced by the recent evolution of our modern societies ?

The answer offered in 'SurEnvironnement et paradigme écosystémique' is that the use of such words as environment, ecology, sustainable development or ecomanagement, ecodesign and so forth expresses an aim to modify our social and cognitive practices. Both natural philosophy – what can I know ? -, and moral philosophy – what can I do ? -, are disturbed by the ecological (or environmental) crisis. Despite many signs of it, the acknowledgment is what Catherine Larrère said: 'what was obvious once is no more so now !'

This ecological crisis is also the consequence of the discovery of the finitude of the ecosphere, on the one hand, and the realization that the ecosphere is supporting exponential evolutions, on the other hand; economic in the North, demographic in the South and both in several countries like China or India.

Despite different reactions to this crisis, it's possible to create two categories to formalise them. The first aggregates contesters who think that our social model is not sustainable and hold up other social organisations. One of the most important events of this line of thought is a publication 'The limits to growth'¹ in 1972. For this first category, the aim was to begin a demographic and an economic decrease. Among them, the most radicals agreed with the deep ecology philosophy. This ecological pessimism was very strong at the end of the sixties, seventies and now too, but has since been thwarted by ecological optimism.

This optimism aggregates those who refuse to change our social model believing that it could resolve the ecological crisis. Kuznet's curve is one of the tools they use to support their position. This tendency was very strong during the eighties. The concept of sustainable development that appeared during the nineties tries to make a synthesis between these two main trends, but this opposition is again revealed by the antagonism between the holders of strong sustainable development and those who are supporting the mild version.

¹"The Limits to Growth" A Report to The Club of Rome (1972), by Donella H. Meadows, Dennis I. Meadows, Jorgen Randers, William W. Behrens III

The ones and the others build their reflections on the usual schemes of thinking. But now, we must imagine new ones to organise the concept of 'environment' on a stronger basis. Indeed, one of the most difficult things for environmentalists is the weakness of the words they use. So, French lawmakers have tried to create an environmental Code since the beginning of the seventies, but they had to work for thirty years before publishing the first part in 2000. They were the butt of heavy criticism. They would have forgotten to include wealth or territory aspects, for example.

Furthermore, the word 'environment' hasn't always been perceived as a gentle term. In 1985, the French version of the Encyclopaedia britannica wrote: "'Environment' - this is now a very fashionable word. We use 'Environment' as we use 'Structure', but without knowing what it means. And if 'Structure' can be associated with a philosophical doctrine: structuralism, 'environment' is looking today for a civil status".

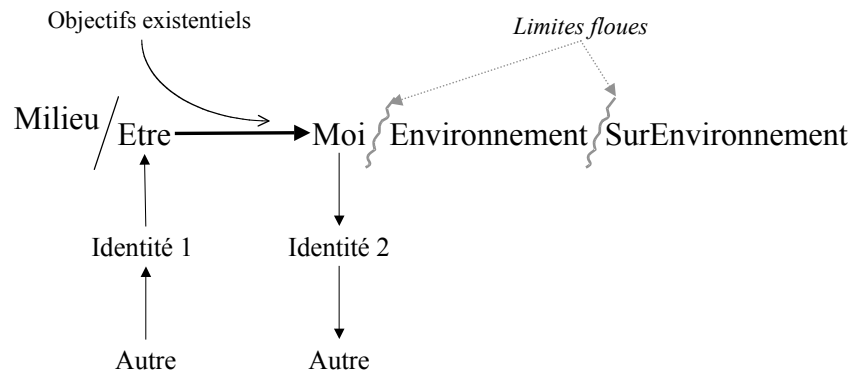
All these interrogations force us to admit that 'environment' is subsuming the major paradigms which build and determine some scientific presuppositions and social uses. Therefore, the main thesis of this essay is that 'environment' today is not identifiable to the management of a territory, hygienic attitudes and nature conservation policies, which were ancestral solutions for resolving the environmental problematics. Their usefulness is unquestionable, but, during the seventies a new conception of these problematics appeared. It lies on the notion of the impact of a system on its surroundings. This conception induced some new environmental policies. The main aspect of them is a treatment of pollution before evacuating wastes in the surroundings. It was necessary to do this because the biochemical natural cycles couldn't destroy large quantities of waste and new molecules due to the increase of economic activities during the second half of the XXth century. Earlier, it was possible. Nevertheless, it was not enough to do it, because these approaches themselves have been limited. Therefore, we must characterise this new approach to the environmental problematics using the new concept 'SurEnvironnement'.

Two approaches are used for qualifying the contemporary environmental problematics. The first is based on the preservation of the surroundings. It was called 'depollution approach'. The aim of the second one is not to use the surroundings to treat residual pollution. We call it 'ecological approach'. It characterises the last view on environmental problematics. Thus, we must admit these two approaches to conceptualise the contemporary environmental challenges. This text is constructed around them.

Otherwise, the book is conceived around the idea that the history of philosophy of Modernity, which is dominating on our time, is achieved in the end of the eighteenth century by the elaboration of the classical paradigm. It was developed against the scholastic paradigm and religious attitudes which dominated European civilisation from the beginning of Christianity. The English revolution (1689), the creation of the United States of America (1783) and above all, the French revolution (1789) install a political model of our time, which is assimilated to Modernity. But since this period of triumph, the classical paradigm has been attacked by several philosophies. So, now, we must admit that another paradigm emerges, often qualified as 'ecosystemic paradigm'. The aim of the second part of the book is to expound the circumstances of its emergence and its main axes.

Le SurEnvironnement

Among several approaches for grading the ambivalent concept of ‘environment’, the aim of this book is, firstly, to distinguish the challenges conceptualised by the dualism Etre/Milieu and those based on the relationships between Moi/Environnement/SurEnvironnement². These concepts are associated in the following figure, which was published for the first time in 1996 in ‘Symphonie n°6 – Impressions sur le concept ‘Environnement’



It's a prerogative of scientific attitudes to focus the relationships between Etre and Milieu. A contrario, those concerning Moi/Environnement/SurEnvironnement permit to create new frames to understand the contemporary environmental challenges. But, before, we have to define them.

- 1) L'Autre throughout an Identity1 produces some knowledge from l'Etre living in a Milieu. So, Etre and Milieu are objects for l'Autre. The latter tries to access to their 'reality' throughout the Identity1. His capacity to survive depends on the exactitude of the schemes he creates. For example, for a biologist conceived as Autre, a bacteria he's studying is l'Etre. It's evolving in its Milieu.
- 2) L'Etre, when he or she or it is a living organism endowed with a capacity to choose, determines some Objectifs existentiels. The embedment of Objectifs existentiels and Etre produces one Moi. He is the expression of l'Etre realising his or her or its Objectifs existentiels. The first aim of any living organism is to... live.
- 3) Le Moi tries to be recognised by l'Autre throughout an Identity2. This last one is created by le Moi, but it is not similar to the Identity1. The image we think we give is not the same as the image our entourage sees.
- 4) The Identity2, which le Moi wants to give, is different from the Identity1 perceived on l'Etre by l'Autre.
- 5) The achievement of le Moi's Objectifs existentiels needs an Environnement which has a noo-spatial-temporal space of finite size, structured and ordered to achieve them. So, Environnement is necessary for the fulfilment of le Moi. Then he builds, maintains and protects it. To do this, he must find resources able to support it, but also evacuate wastes from its Environnement to preserve the couple Moi/Environnement.

² As I use to explain it with French words, I've chosen not to translate them, because I don't know their exact meanings in English.

Every living system is characterised by permanent exchanges with its exterior. In the case of the dualism Moi/Environnement, this exterior is le SurEnvironnement that is not le Milieu, because this last one is associated with an Etre and it cannot be moved. So le SurEnvironnement, contrary to l'Environnement, is usable without moral and physical brakes. It doesn't exist for le Moi, because it's out of the boundaries of l'Environnement and hasn't boundaries itself. But the ecological crisis has shown that it is necessary, because this is in the SurEnvironnement, where le Moi puts his wastes and gets the resources for him and his management of l'Environnement.

This one is between le Moi and le SurEnvironnement. It's built to achieve the Objectifs existentiels carried by le Moi. This structure is more or less complex according to the level of the Objectifs existentiels. The Environnement necessary to travel to the moon is not the same as the one that is necessary to gather strawberries.

6) As the articulation between Moi/Environnement and SurEnvironnement cannot be seen with the same schemes that we use for the couple Etre/Milieu, we must introduce a notion of Limites floues (hazy boundaries). The state of Moi/Environnement/SurEnvironnement is moving constantly. That's why it's not possible to think that the Limites are fixed for a long time. The pressures coming from the Milieu and supported by the Etre are in perpetual evolution. Anyway, l'Etre changes his Objectifs existentiels and so the couple Moi/Environnement too. Limits exist, but they always move. The only truth we have is that the Environnement has a finite size, however the SurEnvironnement is seen as endless. Thus, the Moi preserves his Environnement and not the SurEnvironnement, which has been created by exclusion of the rest of the noo-spatial-temporal space chosen for building his Environnement. Without it, the Moi couldn't exist for the Autre. Destroying the Environnement of a Moi is the same action as destroying the Moi, because he cannot exist without it and is not able to realise the Objectifs existentiels chosen by the Etre. As to the SurEnvironnement, it's hardly important...

There is an important difference between the Milieu and the Environnement, the former imposes itself on the Etre whereas the Environnement is created by the Moi. It's why today we must organize a conceptualisation of the environmental issue on two axes:

- the first aggregates those which concern the degradation of a Milieu, affecting the life of an Etre;
- the second is more subtle and concerns a conflict between two Moi, where the same noo-spatial-temporal space is an Environnement for the one and SurEnvironnement for the other.

As has been exposed above, the problematics concerning the relationships Etre/Milieu are qualified like Milieu approaches or Milieu problematics, and those about Moi / Environnement / SurEnvironnement are called now Environmental approaches or Environmental problematics. Before introducing these new concepts we have named these approaches at the beginning of this text, respectively, 'depollutional approach' and 'ecological approach'.

Thus, a problematic of Milieu is the awareness that the Autre has about an Etre. A modification of the Milieu can transform the Etre and sometimes destroy him. But the Autre alone has a faculty to see it. So, any modifications of dualism Etre/Milieu are, in fact, the modifications seen and conceived by the Autre's conscience. That's why the approaches and studies of this kind about the relationships between Etre and Milieu are different of those concerning Moi/Environnement and SurEnvironnement. While the Milieu dominates the Etre, Moi creates his Environnement.

So, when we deal with an Environmental issue, we abandon the space of objects to go into the space of subjects. An Environmental problematic is bearing when the noo-spatio-temporal space built as an Environnement by one Moi, is conceived as a SurEnvironnement by another Moi, who puts his wastes into it³.

We can't elude this conflict because one of the two Moi is considering the other Moi's Environment as his own SurEnvironnement. It's not nice to see one's garden used as a rubbish dump by one's neighbour...That's because the Moi cannot realise his Objectifs existentiels and exist for the Autre, then a conflict appears with the other Moi who is disturbing his Environment.

One of the main criticisms against these schemes of environmental problematics, is that they have an intemporal aspect and so they cannot characterize the contemporary challenges. Always Etre -men or the most developed animals- are doing some choices to create some Environnement and by exclusion, a SurEnvironnement. Moreover each Etre lives in a Milieu. So there would be nothing new now. But one of the main transformations we have been experiencing since the Second World War is the discovery of the finitude of the ecosphere. We know that, now, we are living in a finite sized planet, however, our civilisation has been built on the concept of infinitude. The majority of the philosophical systems of Modernity were developed upon the existence of infinitude. Anyway, the most important opposition between philosophers -pessimists and optimists- in front of the ecological crisis says that there's no infinite now or to affirm it. For example, the economists think that the increase of economic activities and populations are compensated by the increase of technological capital and knowledge, which are not limited. So, Malthus' theory is false. Who is right? Anyway, we can affirm that the main aspect of the current ecological crisis is the depletion of SurEnvironnement. This is one of the consequences of globalisation and the emergence of a global ethics moving the ancestral schemes based on SurEnvironnement. As an example among others, we could evoke one of the most important principles in waste treatment -the proximity principle-. It expresses that we must treat wastes where they were produced and must not put them away as far as possible. Before, that's what we did.

The increase of artificialisation of the ecosphere because of the continuing of demographic and economic growth confronts this artificialisation with the ecosystemic planet's limits. The challenge of the environmentalists, under the light of the concepts expounded above, was firstly to protect the milieu. That's why the majority of developed countries adopted specific legislations. This was a period of depollution in the seventies. But because populations and economics continued to increase, this approach to environmental problematics was not sufficient. The quantity of wastes was too important to be absorbed by the natural biogeochemical cycles. They were saturated by the quantity of wastes and couldn't treat several molecules such as plastic for example. More and more people didn't want any environmental troubles around their homes. This attitude was the source of the NIMBY⁴ effect. Nowadays, the aim is not to use the milieu, the environment, the surrounding. To target it, a model of ecological cycles is transferred into anthropological activities, such as ecodesign, industrial ecology and so on, which come above the traditional environmental tools created before, for example the depollution legislation or environmental norms such as ISO 14000. Cycling the flux of matter or energy will be the core of the future environmental legislations.

³ Reporting to the concepts of thermodynamics, it's possible to use the term 'entropy' and the other thermodynamical state variables to describe it.

⁴ Not in my back yard

The current challenges caused by the ecological crisis are summarized by our capacity to integrate the SurEnvironnement into our social uses and cognitive schemes. Thus, we have to test a new paradigm. That is necessary because, now, the dominating paradigm, coming from Judeo-Christian religion and Greek philosophy, both bases of our civilisation, is built upon the idea of infinite. The normal -or classical- science is one of these views. But this frame is accused of being not able to resolve the problems it has created. Also it is accused by the most radical ecologists of having broken the ancient alliance between Man and Nature. Nature has become an object and, even worse, a nonproprietary good (*res nullius*), as substratum of our civilization model, which is based on a materialistic ethics. The core of this conception is the creation of a SurEnvironnement. It's in the SurEnvironnement where wastes are thrown.

Nowadays there is no possibility to have enough SurEnvironnement. That is the epicentre of the ecological crisis. This reality is harder in the countries with old civilizations, such as Western Europe or the Far East Asia, which have chosen an industrial model. So, the aim now, is not to use an infinite to solve our management of entropy.

Many evolutions permit to illustrate this fact. In France, for example, a law of 1992 about wastes aimed avoiding using rubbish dumps. This is the same policy everywhere in the European Union. It's not easy to do and this in France is lost.

The obstacles met by insurers to integrate the purely ecological damages give us another illustration. At the beginning of the nineties, this problem wasn't crucial. When the insurers discovered it, they decided to exclude this kind of damages of their liability covers. They precised there an essential difference between '*res propriae*', which are concerned by insurance and '*res nullius*', which are out of it. Now, this *res nullius* is Nature in a phenomenological sense. They must change their attitude because the Directive 2004/35/CE of the European Parliament and the council of 21 april 2004 on environmental liability with regard to the prevention and remedying of environmental damage imposes to indemnify the purely ecological damages concerning *res nullius*. Now, earlier, this juridical category was neither objects nor subjects. It didn't exist before.... the beginning of Modernity that appeared with the tree revolutions we mentioned above. The *res nullius*, Nature as a juridical concept, is the main SurEnvironnement that exists or existed till today. We shall see...

The Ecosystemic Paradigm

In spite of this juridical-philosophical clarification, the insurers cannot do what the European lawmakers want because their activity is consubstantial to Modernity, whose consequence is our social model. Thus many environmentalists argue that it's necessary to change our paradigm, because it holds up Modernity and, so, it cannot give tools for integrating the SurEnvironnement. The difference between the 'ecological economists' and the 'neoclassical environmental economists' is one of the manifestations of a rift between the upholders of the ecosystemic paradigm, on the one hand, and the classical paradigm, on the other hand.

So, after the first part of the book has been built around the concept of SurEnvironnement permitting to characterise the current challenges of environmental policies, the second part revolves around the antagonism between these two paradigms: the classical paradigm and the ecosystemic paradigm.

As an extension of the reflexions of several authors, such as Jean Piaget, Thomas Kuhn and others, we'll qualify a paradigm as: «a group of assertions that are irreducible, non demonstrable and admitted as true, which permit to build some knowledge, for a positivist, or discourses, for a constructivist, and to develop some practices».

Nowadays the epistemological choices which structure our social uses and cognitive schemes come from the Celestial mechanics and mathematical analysis: physical mathematics. The consequence of practical achievements of this science, such as, for example, predicting tides, is the emergence, then, the dominance of a paradigm, which is named classical, mechanist, Newtonian or Laplacian paradigm - a fundamental source of all we do and think, and vice versa, in our modern societies. But, after its triumph during the end of the nineteenth century, the evolution of mathematics and physics fragilised the epistemological postulates of the classical paradigm. This tendency is continuing today. Among these new disciplines: logic, mathematics of complexity, quanta physics and non-equilibrium thermodynamics. The knowledge resulting from these disciplines subsumes the classical paradigm and is building the ecosystemic paradigm. Also, many authors now are talking about Postnormal science in coherence with the concept of Postmodern society.

Throughout the last developments of thermodynamics, notably those concerning the dissipative structures, but also from the interrogations of many mathematicians about the efficient space of their discipline, it's possible to identify several fields of the ecosystemic paradigm's components, which are antagonistic to the classical paradigm. For example: the status of disorder, the intelligibility of phenomena, the social function of knowledges, the conception of time and others.

The introduction of a disorder consubstantial with the matter, with the concepts of entropy and marginal state of the physics of dissipative phenomena, forces us to abandon our hope of an ontological Knowledge, the most important postulate of the classical paradigm. To understand what it means, we must go into the history of thermodynamics and identify its main contributions, admitting that non-equilibrium thermodynamics raised real epistemological issues. But it's not the only discipline contributing to fragilise classical science.

As Jean-Paul Delahaye wrote : « the science of the twentieth century is fascinating. It has discovered its limits. The famoust example is Heisenberg's principle of uncertainty in quanta mechanics, imposing some bounds to the notion of measure. More disturbing are the numerous results in mathematics since 1930, which prove the impossibility to prove in many domains. So, these results induce an idea that the human spirit meets its own limits. A new stage has been reached by Gregory Chaitin. He has built with a computer an equation that escapes from the power of mathematics”.

Gregory Chaitin wrote: « Is it possible to explain the complexity of life with software ? How is it impossible to give the impression of the increasing complexity of natural species, social organisations and also... scientific knowledge ? We must admit that the study of life strengthen an hypothesis which says that the complexity of the world is infinite. We'll never be able to understand it, fully but only partly ».

Thermodynamics and ecology have put disorder into the core of matter, while earlier, and now, mathematical physics excludes it. The latter has become the main model of modern science and has been identified to it.

But an ontological perspective based on the presence of disorder is non-determinist and integrates non-linearity, bifurcations, marginal states and other manifestations of this disorder. It forces us to question the status of mathematics in the ecosystemic paradigm, whose principal postulates are disorder and complexity of emergence.

So, we have seen the most important stages of the history of mathematics, almost based on the ontological ambition, and echoed the doubts that come from several theorems autolimiting their efficiency. This permits us to catch their actual limits in formalising these concepts.

This point of view is creating a break amidst the aim of mathematic to achieve the platonic ambition. Access to the world of Ideas, assimilated to Reality, thanks to mathematics. In this way, from Saint Augustin (354-430) to Georg Cantor (1854-1918), mathematics have been conceived as the path permitting to access God. It's because they have been mixed with Christian theology. So, the history of mathematics seems to be a rational road to gain access to a perfect nature, created by a perfect God. Today, this perspective has been qualified by several theorems, which, from those of Evariste Gallois to Gregory Chaitin, limit the ontological approach of mathematics and, by extension, of classical science as a vector of knowledge.

G. Chaitin has shown that it's impossible to prove that a theory is the simplest way. Thus, the algorithmic complexity of the world of mathematical concepts is infinite, and so, it's not comprehensible. For this author, the acknowledgment of this chaos in mathematics limits the possibilities to understand the phenomena based upon some reductionist approaches. Now, it's the principle of simplicity, which is one of the most important classical paradigm's postulates, whose aim is to reveal the simplicity and the order of the Universe through mathematical language. So, this author, among others, associates the notions of undecidability and indemonstrability with the physicians concept of entropy that conceptualises the disorder and the embedded chaotic dimension of each system.

Whereas the fundamental postulate of the classical paradigm is the exclusion of disorder as a natural phenomenon, G. Chaitin, after Gödel, Turing and others, has shown that « God plays dice », which is questioning us about our understanding of the world. These mathematicians have created a notion of indemonstrability proving the uncertain character of the bases of mathematics. The existence of these 'undecidables' or 'undemonstrables' has induced the development of a new approach of mathematics forgetting the ontological dimension of their elders. These were at the source of an attempts to apprehend complexity, which obtained with the emergence of thermodynamics concerning the far from equilibrium systems: the living systems. Nevertheless, the results of this new mathematical approach of complexity can't formalise the most important phenomena of the complexity: the emergences. It's because mathematical complexity is assimilated now with algorithmic complexity to describe certain phenomena, such as repetition, such as logics, organisation with algorithms, which were disturbed by the works of the authors cited above.

The works of Gödel, Turing and Chaitin are participating in a questioning about the intelligibility of the world and the efficiency of mathematics in this process. So there is an immense gap between the ontological ambition of mathematics and the negation of it by the results of these mathematics too. By extension, now it's possible to use these new conceptions to formalise any phenomena produced by dissipative structures. The most important concepts describing them are: disorder and complexity of emergence. Anyway, these works subsume the status of mathematics, when they concern physical non-equilibrium systems, however they have been developed after studing dynamic systems in thermodynamic equilibrium.

Here is one of the most important antagonisms between the classical paradigm and the ecosystemic paradigm. The status of disorder is in question.

Now, environmental issues always concern the management of entropy; in other word: disorder. What it is more disorderly than a dustbin ? These characteristics force us to create a specific environmental phenomenology with the postulate that it's impossible to understand everything because there's an irreducible embedded disorder in it. In continuation of the thoughts of Karl Popper about quanta mechanics, a theoretic approach to the problematics of environment forces us to postulate a metaphysical indeterminism –the base of the ecosystemic paradigm-, while the classical paradigm is based on a metaphysical determinism.

Thus, one of the most important challenges, that environmentalists have to resolve independently from their epistemological choices: -classical or ecosystemic-, is to find the new schemes concerning flux through artificial ecosystems with or without money.

The neoclassical environmental economists try to do it, but they don't abandon the principle of monetary value to estimate the services given by Nature. The neoclassical environmental economists have created the expression of internalisation of non-monetarised costs. The ecological economists, on the other hand, focus their attention also on flux of matter, energy and information, eluding the flux of money.

But neither can give a frame good that is good for everybody. On the one hand because the methods developed by neoclassic environmental economists use the choices of consumers to assess the non-monetarised objects, but they can't be satisfying when there's no consumer and, therefore, the value of nature is null. On the other hand, the institutions which used to explain their transactions in money, like tribunals for example, do not recognize the approaches developed by ecological economists. A great problem for the insurers is to integrate purely ecological damages as a base for indemnities.

The next essay will propose the concept of 'ecosystemic value' based on the relative complexity of an ecosystem. It is deduced from the ecological goal functions or ecosystem working principles conceived into the ecosystemic paradigm, where an ecosystem is assimilated to a dissipative structure. This new sort of value completes the labour value, the utility value and the exchange value conceived in the classical paradigm.

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