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# Science, Responsibility and Global Sustainability: Steps toward a New Ethical Paradigm?

*Ignacio Ayestaran*

## 1 Introduction: The Catastrophic Convergence and the Tropic of Chaos

Global crisis is not a technical problem, nor even an economic problem. It is, fundamentally, a cultural and political problem, where we need new epistemological and ethical tools. Climate change has arrived in a world primed for global crisis. The dislocations of unsustainable change intersect with the already-existing crisis of poverty, resources, and violence. Christian Parenti has called this collision of political, economic, and environmental disasters “the catastrophic convergence” (Parenti 2011, p. 7). By catastrophic convergence, he does not merely mean that several disasters happen simultaneously, one problem atop another. Rather, he argues that problems compound and amplify each other, one expressing itself through another. Disruptive climate change now joins these natural and social crises, acting as an accelerant, as a threat multiplier. All across the planet, extreme weather and water scarcity now inflame and escalate existing political and cultural conflicts.

Between the Tropic of Capricorn and the Tropic of Cancer lies what Parenti has called “the Tropic of Chaos” (Parenti 2011, p. 9), a belt of economically and politically battered post-colonial states girding the planet’s mid-latitudes. In this band, the societies are very vulnerable to shifts in weather patterns. In this belt, the climate crisis pushes the Third World into chaos. This chaos fuels violence and collapse in the form of the catastrophic convergence.

Western military planners and political leaders recognize the dangers in the convergence of political disorder and climate change. Instead of worrying about conventional wars, they see an emerging geography of climatologically driven civil war, refugee flows, pogroms, and social breakdowns. This is the geography of chaos and the entropy of global industrialism. The Tropic of Chaos is on the front lines of the Cold War and of neoliberal economic restructuring. As a result, in this belt we find clustered most of the failed and semifailed states of the developing world.

The multilayered crisis of the globalisation is upon us. The metabolism of the world economy is “out of sync” with that of nature – or in Hamlet’s own words, our

global time is “out of joint”. The pre-existing crises of poverty and violence, which are the legacies of Cold War militarism and neoliberal economics, converge on forms of violent adaptation in the case of anthropogenic climate change (cf. Parenti 2011, p. 225). In the Global South these take the form of: ethnic irredentism, religious fanaticism, rebellion, banditry, narcotics trafficking, and small-scale resource wars. In the Global North these take the form of the politics and ethics of the “armed lifeboat”: the preparations for open-ended counterinsurgency, militarised borders, aggressive anti-immigrant policing, and proliferation of rightwing xenophobia. The combination of these factors, their imbrications and mutual acceleration, is the new catastrophic convergence. This is not natural and inevitable. Rather, this convergence is the unsustainable history of the Global North’s use and abuse of the Global South. This is the entropy of the global chaos, the unsustainable metabolism of the global crisis, and the true cost of our oil addiction, beyond anthropogenic climate change.

If our unsustainable time is “out of joint”, if there is not a sustainable future, we have to combat the disjointed globalisation in the name of a better, a more just and sustainable world for the future generations. For this reason, we need to rethink the symptoms and challenges of the metabolism of this global change from a new ethical and scientific paradigm.

## 2 Symptoms and Indicators of Global Change

We are living in a globalising world where transnational and planetary connections have transformed our ways of living and thinking. In the early 16<sup>th</sup> century, in a feat of daring unheard of before then, Ferdinand Magellan and Juan Sebastián Elcano took three years (1519 - 1522) to circumnavigate the world. Later, a 19<sup>th</sup> century traveller, using motorways, railways, and steamboats, needed 80 days to go around the world. In the late 20<sup>th</sup> century, jets made these same round-the-world journeys by air in just 24 hours. In the early 21<sup>st</sup> century, an astronaut circles our planet in his spaceship approximately every hour and a half. To the mind of Peter Sloterdijk, this trajectory traces a pathway taken throughout Modernity, marked by a transcendental philosophical change: the job of sketching the new image of the world has shifted from the metaphysicists to the geographers, sailors, and now pilots and astronauts (cf. Sloterdijk 2005). From the 15<sup>th</sup> to 16<sup>th</sup> centuries, the confines of the Earth shifted from the metaphysicists to the sailors, cartographers, conquerors, merchants, and missionaries in a massive race to draw and depict the image of the world, which ultimately culminated in the space race of the second half of the 20<sup>th</sup> century, which lies halfway between technology and metaphysics:

The goal now is to encompass and physically go around this real Earth, like an irregularly stratified, chaotically folded body eroded by storms. For this reason, the new image of the Earth, of the globe, became a guiding icon in the modern world view. According to Sloterdijk (cf. Sloterdijk 2005, pp. 31-43), from Behaim's globe from Nuremberg in 1492 – the oldest of its kind still conserved today – to NASA's latest photograms of the Earth and the shots taken from the Mir space station, the cosmological progress of Modernity is marked by the formal changes and fine-tunings in the image of the Earth made possible by technical means. But never – not even in the age of space travel – could the boldness of visualising the Earth conceal its semi-metaphysical nature.

The technological, social, and cultural changes associated with the evolution of humanity in recent millennia or centuries are still surprising for both their boldness and their risks. When human beings invented agriculture (around 10,000 - 12,000 years ago), the world population probably hovered at between 2 and 20 million people. At that time, the population of some primates, like baboons, was higher than the human population. But with the introduction of agriculture came the first major surge in the number of human beings. The population grew much more quickly than before, probably between 10 and 1,000 times more quickly. However, its annual rise was quite slow, equivalent to tiny fractions of people (a figure equal to Indonesia or the United States today). In AD 1500, the world population had reached 400 or 500 million. Around one and a half millennia had been needed for the world population to double, and it had risen at a rate far below 0.1 percent per year. From then on, the world population kept rising steadily, reaching 700 million in around 1730. At that point, its growth started to rise sharply, triggering the prolonged expansion around one billion. In 1900 it reached 1.6 billion. And by 2000 it had reached 6 billion – we follow the historical interpretation of John R. McNeill (cf. McNeill 2000).

This process of human expansion has also come, not coincidentally, with a rise in the use of energy. Human beings' efficiency, for example, is around 18 percent. Of every 100 calories a human being consumes as food (a concentrated form of chemical energy), it only turns 18 into mechanical energy. The other calories are lost, almost always as residual heat. The advance of itinerant agriculture starting in the Neolithic probably multiplied the availability of energy to be gotten from hunting and gathering by ten; later on, stable agriculture multiplied it by ten once again.

Lately, the expansion in the energy sources handled has been an indispensable requirement in human life on a global scale. In the 19<sup>th</sup> century, the amount of energy obtained all over the world multiplied by approximately five thanks to the influence of steam and coal. In the 20<sup>th</sup> century, it multiplied by 16 with oil, natural gas (starting in 1950) and, to a lesser extent, nuclear energy. Since 1900 we have probably used more energy than all of human history before then: in the 20<sup>th</sup> century, the world consumed ten times more energy than in the thousand years prior to 1900. In the 100 centuries which range from the dawn of agriculture until 1900, humanity had consumed around

two-thirds of the energy expended in the 20<sup>th</sup> century alone. The economic and demographic growth of the past two centuries would have been utterly impossible without this silent revolution in the expansion of somatic energy. In the 1990s, one human being used an average of 20 “energy slaves”, that is, the equivalent of 20 human beings working for him 24 hours a day 365 days a year. The magnitude of the global changes in the past century is truly surprising.

It is obvious that *mondialization* and *globalization* have grown exponentially, while the *universalization* of values and rights have meandered along a slower pathway on a planet with symptoms of social and environmental unsustainability (cf. UNEP 2007): almost 60% of the services of the planet’s ecosystems are depleted, and the average temperature on Earth has risen by 0.74°C since 1906 due to greenhouse gases. Since 1987, when the concept of “sustainable development” was coined, the world population has risen from 5 billion to 6.7 billion people, and trade had tripled by 2007. Meanwhile, 2.6 billion people lack basic facilities (sewage systems and potable water supply), and one child under the age of five dies every five seconds for reasons that are fully preventable (cf. Save the Children 2008). In view of the scientific and technological knowledge of these symptoms, which signal a systemic change on a global scale, we must wonder about the scope of our responsibility – already formulated by Hans Jonas in *Das Prinzip Verantwortung* (in 1979, cf. Jonas 1984) – and above all, we must reflect on the problem and issues for managing a global world where the ethos of the triple economic, social, and ecological accounting would be borne in mind for both today’s generation and for future generations on a limited planet.

### 3 Two Different Earth Ethics: the Heidegger-Lévinas Clash

Having expanded his scope of action to the global scale, the human being is compelled to rethink the ancient ethical formulas. Among the different possibilities, two traditional forms clamour for attention as they posit the role of the human being with regard to his link to the planet Earth. I shall call these two positions or possibilities the *ethics of humus* and the *ethics of space*, respectively. The former is the position hinted at or sketched out by Martin Heidegger, and the latter is the position upheld by Emmanuel Lévinas.

The “ethics of humus” was suggested by Heidegger in several different sections (from 39 to 44) of his book *Being and Time*, in which he focuses on the analysis of care as the ontological-existential category of the *Dasein*. Specifically, in section 42 the German thinker explains one of the cases of care – *Sorge* – through the ancient fable 220 of Hyginus (cf. Heidegger 1962, p. 242), which features the mythological figure of Cura – the Latin term usually translated as *care*:

“Cura cum fluvium transiret, videt cretosum lutum  
 sustulitque cogitabunda atque coepit fingere.  
 dum deliberat quid iam fecisset, Jovis intervenit.  
 rogat eum Cura ut det illi spiritum, et facile impetrat.  
 cui cum vellet Cura nomen ex sese ipsa imponere,  
 Jovis prohibuit suumque nomen ei dandum esse dicitat.  
 dum Cura et Jovis disceptant, Tellus surrexit simul  
 suumque nomen esse volt cui corpus praebuerit suum.  
 sumpserunt Saturnum iudicem, is sic aecus iudicat:  
 ‘tu Jovis quia spiritum dedisti, in morte spiritum,  
 tuque Tellus, quia dedisti corpus, corpus recipito,  
 Cura enim quia prima finxit, teneat quamdiu vixerit.  
 sed quae nunc de nomine eius vobis controversia est,  
 homo vocetur, quia videtur esse factus ex humo’.”

In crossing a river, Cura (Care) saw some clay and began to mould it, engrossed in thought. As she was thinking about what she had already made, Jove appeared. Cura asked him to grant it *spiritus*, *breath* or *spirit*, and readily grants her request. Cura wanted to give it his name, but Jove refused and asked her to give it her own. While they were arguing, Tellus (Earth) appeared and desired that her own be conferred on the creature, because she had given it her body. They took equitable Saturn as their judge, who determined (cf. Heidegger 1962, p. 242): “Since you, Jupiter, have given its spirit, you shall receive that spirit at its death; and since you, Earth, have given its body, you shall receive its body. But since Cura [Care] first shaped this creature, she shall possess it as long as it lives. And because there is now a dispute among you as to its name, let it be called ‘homo’, for it is made out of *humus* (earth)”.

Without delving any further into Heidegger’s reinterpretation of this Latin fable, the crux of the matter is the reference to the etymological origin of humans: human beings (*homo*) get their name from *humus*, the layer of soil or earth that is generated through the decomposition of animal and plant matter and minerals. Thus, the possibility remains open of re-linking humans in their being located in a place (*Dasein*), which is none other than the very Earth that we inhabit and dwell on, to such an extent that the human comes from the *humus* itself. This kind of pre-modern and pre-technological proposition may contrast with an *ethics of space*, the kind of ethics that corresponds to an age of astronauts and technological journeys through outer space. This is the claim put forth by Emmanuel Lévinas on space journeys as the shapers of a post-Heideggerian image of the world. In his essay “Heidegger, Gagarin and Us” (in Lévinas 1990, pp. 231-234), Lévinas first summarizes Heidegger’s position on the image of the modern world in the following terms:

“I am thinking of Heidegger and Heideggerians. One would like man to rediscover the *world*. Men will lose the world. They will know only matter that stands before them, put forward in some way as an object to their freedom. They will know only *objects*.

To rediscover the world means to rediscover a childhood mysteriously snuggled inside the place, to open up to the light of great landscapes, the fascination of nature, and the delight of camping in the mountains. It means to follow a path that winds its way through fields, to feel the unity cre-

ated by the bridge that links the two river banks and by the architecture of buildings, the presence of the tree, the chiaroscuro of the forests, the mystery of things, of a jug, of the worn-down shoes of a peasant girl, the gleam from a carafe of wine sitting on a white tablecloth. The very Being of reality will reveal itself behind these privileged experiences, giving and trusting itself into man's keeping. And man, the keeper of Being, will derive from this grace his existence and his truth" (Lévinas 1990, pp. 231-232).

Given this ethics of humus, of place, of the pathways and clearings of the forest that shapes Heidegger's image of the world and the Earth, Lévinas contrasts the image of the world and the Earth provided to us by astronauts since Yuri Gagarin's first space journey:

"One's implementation in a landscape, one's attachment to *Place*, without which the universe would become insignificant and would scarcely exist, is the very splitting of humanity into natives and strangers. And in this light technology is less dangerous than the spirits [*génies*] of the *Place*.

Technology does away with the privileges of this enrootedness and the related sense of exile. It goes beyond this alternative. It is not a question of returning behind a landscape and a climate. Technology wrenches us out of the Heideggerian world and the superstitions surrounding *Place*. From this point on, an opportunity appears to us: to perceive men outside the situation in which they are placed, and let the human face shine in all its nudity. Socrates preferred the town, in which one meets people, to the countryside and trees. Judaism is the brother of the Socratic message.

What is admirable about Gagarin's feat is certainly not his magnificent performance at Luna Park which impresses the crowds; it is not the sporting achievement of having gone further than the others and broken the world records for height and speed. What counts more is the probable opening up of new forms of knowledge and new technological possibilities, Gagarin's personal courage and virtues, the science that made the feat possible, and everything which that in turn assumes, in the way of abnegation and sacrifice. But what perhaps counts most of all is that he left the *Place*. For one hour, man existed beyond any horizon – everything around him was sky or, more exactly, everything was geometrical space. A man existed in the absolute of homogeneous space" (Lévinas 1990, pp. 232f.).

In the age of globalization, from Lévinas' vantage point, the human being is no longer simple humus, because he is transhumant, he changes places and lands all over the planet, as perceived by an astronaut from a technological spaceship. Thus, we have two apparently contrasting theses: first, an ethics located in the here of the earth and forest, in the realm of the peasant provinces and native regions, which mistrusts modern science and technology, and secondly, a globalized ethics nestled in the sidereal realm, beyond all horizons and places, which does not mistrust contemporary science and technology. Both aim to think about human beings' relationship to the Earth, but one seems to drift towards the local-topographical and the other towards the global-spatial. Both point to two necessary directions in view of global change, and both surely signal contemporary applied ethics between the local and the global, or, if you will, between the global and the local, which both theses posit.

## 4 Science, Responsibility, and Global Sustainability

In the clash between the local and the global, the ethos of science has undergone a move towards responsibility, which entails a shift in its historical evolution since Modernity. As Janez Potöcnik, European Commissioner for Science and Research between 2004 and 2009, and current European Commissioner for the Environment, put it in his speech delivered at the *World Science Forum* in Budapest in November 2005, the development of modern science has altered the function of three historical values: truth, progress, and responsibility (cf. Potöcnik 2005). These three values, which have helped to construct our modern societies in both Europe and other parts of the world, have had diverse influences in three successive waves in the modern history of science:

- The age of truth: from the Renaissance to the Enlightenment, the period from the 16<sup>th</sup> to 18<sup>th</sup> centuries;
- the age of progress: the Industrial Revolution, basically the 19<sup>th</sup> century;
- the age of responsibility: the Knowledge Society (or Knowledge-Based Society), the second half of the 20<sup>th</sup> century.

From the historical experience of the 16<sup>th</sup> to 18<sup>th</sup> centuries, we have inherited the mission to discover the underlying laws of nature. Galileo Galilei and Johannes Kepler ushered in this new cognitive and methodological age based on observations and experiments. In it, the topmost value was epistemological, the quest for the truth aside from individual or particular beliefs, which should not interfere with science. This value was expressed in the fundamental principles of academic freedom, and it partly ensured the legitimization of the self-governance of the scientific community. Starting value of progress came to the fore by observing that scientific discoveries come with technological developments that positively affect our lives, just as positivists of all stripes had dreamt about. These impacts, which were initially positive, opened up new areas for economic activity and for the growth of industry or labour.

In the 20<sup>th</sup> century, scientific and technological developments retained their cognitive, emancipating promises, but since then the limits of the concepts of truth and progress have also been revealed. First, we have realized that scientific knowledge does not correspond to an absolute truth or a pre-existing reality, rather to efficient ways of representation that enable us to predict phenomena or interact with them. Likewise, the second half of the 20<sup>th</sup> century spurred new political and social concerns related to the limits of technological progress:

- abuse of technologies with the use of the atom bomb and other forms of mass destruction;
- sustainability problems with the first oil crisis, pollution, biodiversity, and climate change;



- ethical questions, chiefly but not exclusively related to biotechnology.

Thus, doubt was cast on the Baconian statement that knowledge is power, understood as control and prediction. These new fronts of political and ethical concern have led science to be acknowledged as an ambivalent activity that cannot be blindly associated with automatic progress, accepting that science is both part of the problem and part of the solution. In this way, the value of responsibility has come to be part of the evaluation of science and technology, compared to the traditional values of truth and progress. Science has become yet another issue on the political agenda, something that would have been unthinkable for our grandparents.

With the relationship between science and society transformed, part of the new ethos of responsible science entails wondering about this globalization of the planet Earth, and more specifically about the limits of some of the fundamental indicators. First, before getting on, it is worth recalling that if we distilled the history of the Earth into a three-hour film, our species would appear in the last second, and our history would only appear in the last hundredth of a second in that film. If an astronaut who had read Lévinas watched this film from space and blinked at this last instant, all the information on humanity would be lost. So having said this, in the last part of this last hundredth of a second, human beings have managed to travel to the Moon, but also to alter some of the thresholds and patterns in the dynamic of the Earth's system. In a recent study in *Nature*, Johan Rockström, Executive Director of the Resilience Centre at the University of Stockholm, and 28 other scientists from universities and institutes from Europe, North America, and Australia set forth the critical limits and thresholds of the planet that humans must respect in order to avoid destabilising the Earth's essential systems, as these violations might trigger abrupt, non-linear changes (cf. Rockström 2009, pp. 472-475). Based on their analysis, Rockström and his large team have detected nine key processes in the planetary dynamic:

- (1) climate change;
- (2) loss of biodiversity (land and sea);
- (3) interference in global nitrogen and phosphorous cycles;
- (4) destruction of the stratospheric ozone layer;
- (5) acidification of the ocean;
- (6) global consumption of fresh water;
- (7) changes in land use;
- (8) chemical pollution;
- (9) concentration of aerosols in the air.

Three of these nine limits have already been violated beyond reasonable limits: global warming, species extinction and the nitrogen cycle. Four other processes are on the verge of being violated as well: the use or consumption of fresh water, the conversion of forest into croplands, the acidification of the oceans, and the alteration of the phos-

phorous cycle. The changes to the limits of the planet due to anthropogenic activities since the late 18<sup>th</sup> century – the dawning of the Industrial Revolution – are so huge that some scientists (cf. Clark et al. 2004; Schellnhuber et al. 2005) even claim that we have altered the geological chronology of the Quaternary Period and the Holocene has shifted to a new age, the Anthropocene, an age in which humanity emerges as a global geological force capable of modifying the planet's surface and atmosphere. The major challenge facing science and technology today is to investigate and act to prevent the transformations in all these critical thresholds from becoming collapses or catastrophes (cf. Costanza et al. 2007), both globally and locally.

## 5 Mondialization, Globalization and Universalisation

The evidence that we are experiencing a global change also merits other considerations. Thus, in a global world like today's we can claim that we are living in the "network society of information and global risk" – coupling the theses of Manuel Castells (cf. Castells 2005) and Ulrich Beck (cf. Beck 1992). This social form is experiencing an unprecedented techno-economic expansion in which three superimposed but not equivalent phenomena converge: *mondialization*, *globalization* and *universalization*.

- (1) *Mondialization*: French analysts tend to talk about *mondialization*. This phenomenon is the planetarization of communications, of certain cultural connections and of the first massive migratory movements thanks to the revolution in transport and communications driven by electrical energy. In the late 19<sup>th</sup> and first half of the 20<sup>th</sup> century, railway, telegraph, the press, the telephone, the radio, television, aviation, modern marine transport, cars, lorries, film, video, and records spread far and wide. The ontology of this phenomenon: physical space and time are cut through the acceleration of speed. Its scope: the entire planet, the world.
- (2) *Globalization*: English experts talk about globalization, the creation of a spatial-temporal globality beyond *mondialization*, although it supports and is based on the latter: without the *mondialization* of electrical energy and transports, globalization would not be as effective as it is. The key to this globalization lies in technology: satellite, electronic money, computers, the Internet, remote networks, faxes, digital technologies, artificial intelligence, virtual reality, bio-computing, MP4, CD-ROMs, DVDs. Part of the ontology of globalization is physical (the entire underlying foundation of *mondialization*), but another large part is virtual: a new space and time in the convergence of cyberspace and cybertime. Cyberspace is no longer physical space: I can chat with a person from Argentina and another one from Australia at the same time. And when we chat we are in neither Argentina nor Australia, nor even at the desk where I'm hooked up. Rather, we are in a new

space, tantamount to a cyber-omnipresence. Cybertime also verges on cyber-simultaneity or instantaneousness: I can send a message via email to 300 recipients in mere tenths of a second. Stock markets and financial markets, too, can earn money or crash in the space of a few minutes. This ontology is unheard of; it does not come from the physical world.

- (3) *Universalization* of values and rights: Rights are proclaimed to be universal: the rights of human beings, of children, of women, of the elderly; the right to a home, to work, to freedom of expression. They are timeless and cross-cultural because any human being deserves them. However, even though they are atemporal (or timeless), universal rights have been claimed and established throughout history. They received a huge impetus in the late 18<sup>th</sup> century (the United States' Declaration of Independence and the Declaration of the Rights of Man and of the Citizen in the French Revolution, which opposes the remnants of feudalism and monarchical authoritarianism), although they were definitively consolidated in the second half of the 19<sup>th</sup> century (to offset savage industrial capitalism), and especially throughout the 20<sup>th</sup> century and in what has elapsed so far of the 21<sup>st</sup> century (to combat colonialism, totalitarianism, racism, militarism, misogyny, economic and ecological exploitation, homophobia,...).

It remains to be seen whether the old processes of *mondialization* (electricity, transportation, and massive migratory movements), the current processes of *globalization* (mainly remote technologies) and the well-founded desire for *universalization* (first, second, and third generation human rights) converge in the 21st century into a responsible, sustainable planetary management, or whether to the contrary, they lead to a situation of maximal risk, enmeshed in a financial, ecological, and social crisis.

## 6 The Principle of Responsibility and the Culture of Sustainability

To conclude, we must point out that all these global changes require us to reconsider some longstanding ethical formulation. Thus, for example, the Kantian categorical imperative, formulated in the context of the 18<sup>th</sup> century, needs to be revamped and updated to fit the needs of the 21<sup>st</sup> century. From its anthropocentrism, the Kantian imperative does not outline the ethical relationship with non-humans, with the terrestrial environment, with the other species on the planet, with the future we will bequeath to the forthcoming generations on the planet Earth. For this reason, Jonas suggests revamping the human ethics of the present that Immanuel Kant proposed with a planetary ethics of the future which anticipates the principle of precaution and sustainable development based on responsibility (cf. Jonas 1984, p. 11). Its ecological

imperative would be: “Act so that the effects of your action are compatible with the permanence of genuine human life”. Or, to express it negatively: “Act so that the effects of your action are not destructive of the future possibility of such life”. Or simply: “Do not compromise the conditions for an infinite continuation of humanity on Earth”. Or, again turned positive: “In your present choices, include the future wholeness of mankind among the objects of your will”.

More recently, Leonardo Boff distilled Jonas’ imperative into the following ethical-ecological precept: “Act in such a way that your acts do not contribute to destroying the Shared Home, the Earth, and everything that lives and coexists on it with us”. Or alternatively: “Use and consume responsibly what you need so that things can still exist and meet our needs, the needs of the future generations, and the needs of all other living beings, who along with us also have the right to consume and live”. Or: “Solicitously care for everything because care means that everything lasts much longer, protects and provides security” (cf. Boff 2002).

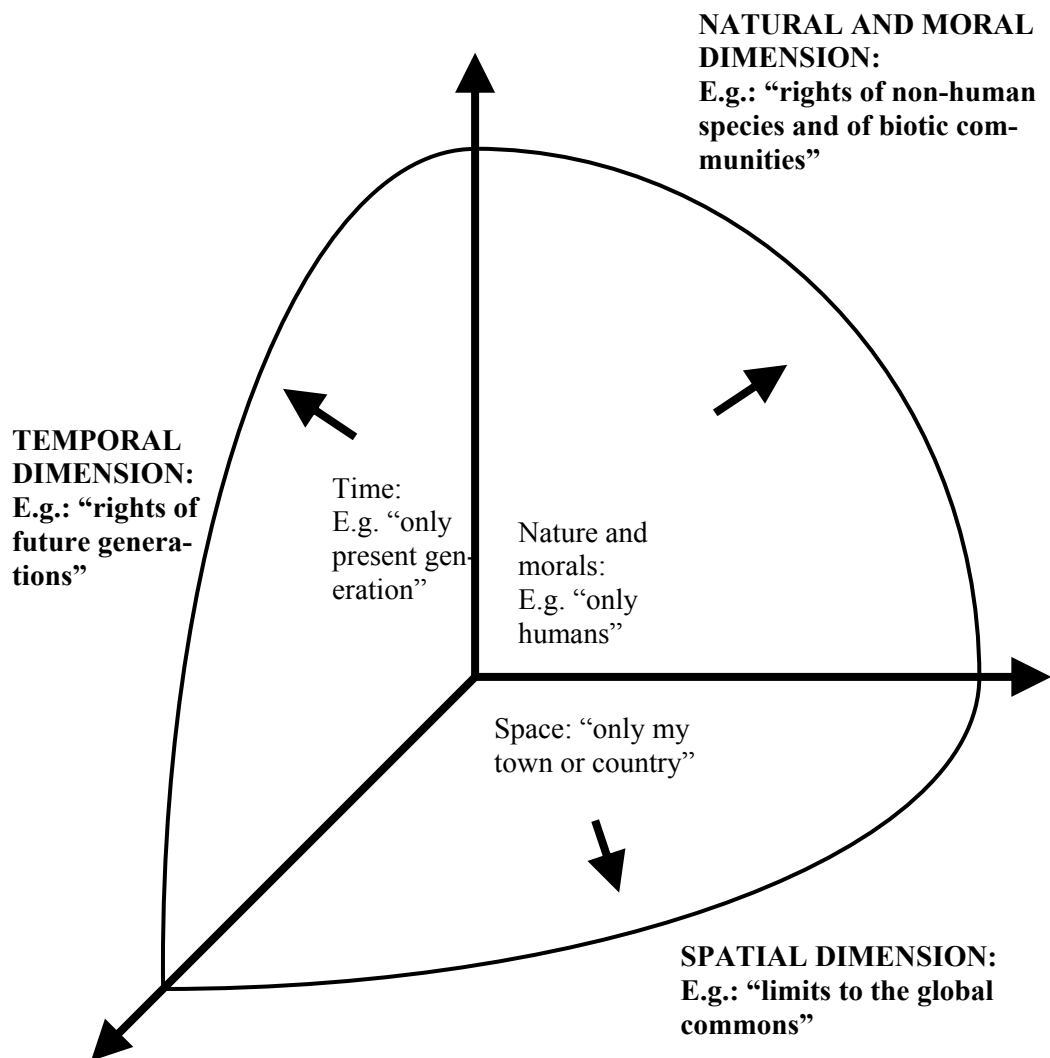
In any event, regardless of the formula adopted, what is expressed in the pathway embarked upon by both Jonas and Boff is a new relationship between human beings and the rest of the planet, including the forthcoming generations. The extension of responsibility towards other communities, both present and future, both human and non-human, both local and global, once again poses the challenge of devising a philosophy of balance between the *ethics of humus* and that *ethics of space*. This can only be accomplished if we realize that our culture has changed, and along with it our capacity for ethical and political agency has, too. This is what David Tàbara has precisely called the *culture of sustainability* (cf. Tàbara 2002, pp. 63-85). In this new culture of sustainability, our spatial, temporal, and natural dimension has grown. In the past, our agency or capacity for action had a specific spatial boundary (usually a city, a region or, more recently, a country), a limited time span (only the current generation) and a way of dealing with problems that was directly related to human beings. Today, whether we like it or not, we have extended the systemic boundaries of our moral agency. We have expanded the spatial dimension, as it no longer encompasses a city or a country but also communal or global, cross-border goods. Likewise, we have expanded the time dimension, which includes both today’s generation and future generations. Last but not least, we have also raised the number of legal, ethical, and political considerations, which no longer solely include human beings but also the rights of non-human species and even some biotic communities.

To summarise and conclude, we can state the following points (see Figure 1):

- (1) A globalising world presents several superimposed but not equivalent phenomena: (*mondialisation*, *globalisation* and *universalisation*), which offer different cultural aspects and methodological issues;

- (2) in this globalising world we have political, ethical and epistemological problems related to the global sustainability and the metabolism of chaos;
- (3) an emerging sustainability culture is needed, but ethical debates and conflicts proliferate between the local and the global, between the present and the future, between the Global South and the Global North; and
- (4) the ethos of science is extended to the realm of responsibility beyond Modernity. Finally, one question: will we be able to take the next step toward global sustainability? We cannot afford another misstep.

Figure 1: Expanded Paradigm of Sustainable Responsibility, Knowledge, and Ethics



Source: Tàbara 2002, p. 74

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