- Science uses concepts, equations, rules and metaphors. Science dealing with environmental sustainability (which are grouped under the holistic approach of environmental studies) are specially rich with metaphors. At the beginning of a well written book, Brendon Larson who has been trained in evolutionary ecology, sets a long list of scientific terms, which are also common placed words and are more looking like metaphors than like proper scientific concepts.

What is an “invasive” specie? An “alien” specie? An “exotic” specie? A “native” one? “food chain” as well as “food web” are metaphors. “Source sink dynamics”, “genetic drift”, or “biodiversity hot spots” are also metaphors which mix geological knowledge with biological issues.

The weight of metaphors in science has to be addressed for several different reasons. The main one is that any metaphor is always suspect of including some polysemy and may not be as exact as what is expected from science. Scientific knowledge should not be ambiguous. Another reason is that metaphors have a feed back effect.

Feed back metaphor is a neologism for scientific metaphors that harbor social values and circulate back into society to bolster those very values (p. 22).

According to Brendon Larson scientific terms such as “circular”, “global”, “horizontal”, “universal” have their own way of codifying political values: they have been used in science because the political idea for a common world was first of all, common placed. They have been made scientifically meaningful because globalization was accepted as a fact by the scientists. Therefore, a wide new linguistic field opened in which scientists could pick up words, terms, expressions which could easily “resonate with widely held cultural values” (p. 23). That is to say: science speaks the language of the dominant cultural sphere and this language is used in science as a metaphor for something else which is not a word but a set of statistics, a set of equations, a model… or even a theory. The important point is that, as they are used by science, these metaphors gather respectability and have the power to strengthen the political values they initially came from.

The aim of the author is to study the role of metaphors within the present environmental sciences in North America. This leaves aside the use of metaphors in other contexts such as environmental literature, films or TV sitcoms. The first chapter states clearly that the author will not only study scientific environmental metaphors *per se* but will bring his own part to the creation of a sustainable world. He defines it as “a more encompassing environmental

ethic" that would lead to a greater "harmony between human enterprises and nature", thereby "lessening our impact on the environment" (p. 62 and 63). To fulfil this aims he has to check if the metaphors are as "*green*" as they should be. If they first appear in the common world as face value items, and are turned into performative notions because of the way scientists use them, they may not be as sustainability – correct as we would hope. Maybe we should forget some of them and create new ones which are more efficient for building a sustainable world.

The second chapter deals with the metaphor of progress. Does progress have a meaning in environmental science? The author goes for an internet-based survey among scientists and people interested in environmental science. He finds out that among the "evolutionary biologists" the word progress applies to science and not to evolution. On the other hand "evolutionaries" believe that progress applies to evolution and not to science. The first group of people is comprised of scientists who actively investigate the changes between one fossil and another and they see no progress between one form of life and the following one. They see an "increasing complexity". What these scientists consider as a progress is a better understanding of the biological evolution on one hand and of the various types of models science progressively builds. The second group of people is mainly a gathering of non professional scientists. They are interested by evolution theories because they see them as a logical explanation of life on earth. The fact that life started from a small amount of cells and evolved to present mankind is seen as a progress. Science itself is not a process of progress as science is truth and truth is just true and absolute. The discovery of a new scientific "truth" is not a progress as the new "truth" is not "truer" than the previous one.

The third chapter is concerned with "competitive facts" and their relations with capitalist values. The first basic assumption of the author is that a sustainable future will be "more difficult to achieve if we consider ourselves to be fundamentally competitive" beings. The second is that there is no value – free science. All scientific metaphors entangle facts and values so that "what seems simply a scientific fact may actually carry an implicit ought". A survey, similar to the previous one but aimed at a wider audience (including various American associations of biology teachers) shows that about 70% of them believe that evolution is characterized by a "struggle for survival". When they are asked a second question which is "Do you believe that struggle for survival would be beneficial if applied to society'" most of them disagree. There is a clear refusal to translate scientific facts into social values. Interestingly, when another set of questions is proposed the result is different. The first question asks if your scientific works show that cooperation "typifies the interaction between animals", and the second asks if this would be beneficial if applied to society. Most of the people disagree with the first statement and agree with the second.

According to Brendon Larson these surveys (there are more of them in the chapter) show that the link between scientific assessments and social values is ambiguous. In science there are “constitutive values” which are based on mere facts and in the social world there are “contextual values” which are depending on the religious, political, social context. Therefore he argues that the simple feed back system described at the beginning has to be made more complex. When the “value” (i.e. competition) leaves the social world and invades the scientific language (under the disguise of “struggle for life”) it doesn’t keep exactly its previous meaning. And when it goes back to the social world (as some aspects of the social Darwinism) it encompasses a new modification of its meaning. In the end there is no reason to simply equate capitalistic competition with social Darwinism. The survey “respondents were quite able to detect and evaluate” the normative dimension of a metaphor.

The next chapter is a discussion about the “environmentally adequate” metaphor. What should it be? Brendon Larson addresses first the fact that from one language to another signification and meaning may be very different and he sees these differences as a wealth. Hopelessly the language of science is almost exclusively English. Hopefully most of the scientific words derive from Greek words: ecology comes from “household” and leads to consider the planet as something we should manage as our home. So it appears that the main difficulty is not in the multitude of languages but to understand if

the metaphors we adopt in the environmental science tend to reinforce a problematic dichotomy between nature and culture. This dichotomy reflects those between science and society and between facts and values (p. 113).

Brendon Larson explains that the English language over valuates oppositions (between mind and body, man and woman, nature and culture…) whereas many indigenous language do not make any opposition between social world and natural world, nor between dreams and reality. From that starting point he argues that we should create new metaphors which are not embedded in the English language but that are able to relate different languages and to imbricate nature and men. Chapter 5, which examines very precisely the DNA barcoding metaphor, is a convincing case study: consumerism is mixed with bio diversity and technological innovation. Small computers will able any one to discover the barcode of his own DNA… Biodiversity will be easier to analyse as each animal or plant may be identified with this technique. But, says Larson, how does this technique helps in protecting endangered species? What about comparing a living organism with a pack of food in a super market? DNA barcoding is a metaphor, which draws on the most commercial dimensions of the western culture and cannot help to build a common understanding of the observed bio

diversity among western and indigenous people.

Chapter 6 is even more critical as it faces the problem of invasive species. The word "invasion" equates spread and impact: a wide spread "new" specie may have less impact than an uncommon "new" one. In northwestern Europe the pheasant is a widespread invasive specie, which has almost no impact whereas the Threkiornuis aethiopicus is a very local invasive specie, which has a deep impact. In America the horse is an invasive specie, in Europe the potatoe is invasive. Brendon Larson analyses the importance of military terms in ecology (population bomb, invasion meltdown, evolutionary trap) and suggests that we simply forget them.

The last two chapters are the ones every reader awaits: what are going to be these new metaphors we so intensively need ? The answer is deceptive. Brendon Larson doesn't dare to propose any new metaphor, he just gives some clues about what we should do before we accept a metaphor. One interesting idea is that peer review journals should widely enlarge their referee panel when they have to asses a paper which proposes a new metaphor. The DNA barcode metaphor was first used in a paper in 2003 and was so successful that the article was quoted over a thousand times in a few months. The referees who looked at the article should have understood that this was a potential "hit" and might have asked some political responsible, some journalists, some leader of scientific societies… about the possible effect of comparing DNA with a barcode in a supermarket. Brendon Larson even suggests that the referees should "learn from marketing firms that provide information". These firms are used to test ideas before they launch them, they have an expertise in bringing new slogans to life. They have

a variety of methods […] ranging from more qualitative focus groups to more quantitative survey methods and even psychological testing (p. 205).

This book is definitively bringing ideas for a new debate: are assessment processes, in science, able to address the main issue, which is to know how a new idea will be understood in society ? What Brendon Larson says it that scientific expertise should include, right from the start of the assessment process, an interrogation about the social and cultural impact of a scientific publication. This impact is not limited to the scientific libraries and universities but to the society as a whole. It is not depending on the exact scientific meanings of the paper but to the metaphorical ways these meanings can travel into society (feedback effect). This epistemic position is original because it puts some intellectual responsibility on the scientist himself and not only on the referees. Each scientist should think at the way his

writing might be (mis)understood and give way to metaphors. In a way each scientist, even in hard science should become a social scientist.

Of course there are some weak points to the book. The first is about metaphors themselves. Are they that important? Is it more important to discuss “global warming” vs. “climate change” or to decide of a carbon tax? Is it important to differentiate “alien species” from “invasive species” or to decide if we accept it or not? Political decisions are not only depending on metaphors. The second weak point is about English language. Though Brendon Larson acknowledges the domination of English in scientific literature he just forgets that metaphors are translated into each local language. “Sustainable” in English is not “durable” in French. No marketing company would use the same advertising campaigns in France, Canada, England, Brazil, China… It is totally irrelevant to imagine that a scientific metaphor may have the same cultural impact in so many different countries. Brendon Larson’s questions are good questions but there is no universal answer to them. Sloterdijk (and many with him) has clearly shown the decay of any idea of a global rationality (see for instance the Espacestemps traverse, or Sloterdjik, [2008], 2010). In Canada, Heather Macdougal has explained that an English speaking policeman working with a French speaking one on the same affair do not understand things the same way, even if they understand perfectly well their differences. There is nothing like a global scale metaphor, which would be equally understandable for all humans. So it seems hopeless to search for a metaphor of a global climate… Anyhow one very interesting idea remains: what about the cultural impacts of the scientific meta narratives ? If only for having addressed this issue, this book must be read by all scientists.

Brendon Larson, *Metaphors for Environmental Sustainibility, Redefining our Relationship with Nature*, New Haven, Yale University Press, 2011.