# Sustainable Design And Aesthetics In The Soft Science Age

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## ABSTRACT

The research analyses the new aesthetic sensibility that arises with sustainable project, in order to answer more specifically the following questions: what influence does the culture of sustainability have on the aesthetics of contemporary design? What are the future directions of the design project in relation to the possible declinations of the relationship between ecology/aesthetics/technology?
The post-Darwinian idea of evolutionary pluralism influences sustainable design, with significant implications in our times from the point of view of the variety of methods, technologies and aesthetic parameters (Ceruti, 1986). The idea of a one-best-way project is extraneous to the logic of design for sustainability. Eco-sustainable design is expressed above all as a variety of strategies, an open codification of ways to travel and experiment through the project. The contribution investigates the relationship between sustainable design, aesthetics and technological imagery, to arrive at a critical analysis of a series of design aesthetics in a context such as Anthropocene.

Key words: Aesthetic; Sustainability; Contemporary Design; Anthropocene.

## 1. A LIGHTER WORLD, WITH A DEEPER MATERIALITY

The "product in its environment" is the study unit of sustainable design, an articulated and changing scenario according to the point of view we take and that makes impossible any monological approach to the aesthetic dimension, implying a plurality of paradigms. The general question we can ask ourselves is: what awareness of the reality of nature is now widespread among designers and in society? At the same time, which imaginary of nature, explicitly or partially unconsciously, leads the work of a designer?
Sustainable design is based on a culture, both technical and humanistic, that refers to specific imaginaries linked to the artificial and to nature. This reserve of imaginaries, partly explicit and partly accumulated in a subliminal dimension, triggers its inventive energy starting from the emerging conditions of our post-industrial age. An age strongly characterized by the emergence of two "sweet sciences", the living sciences and the information and telecommunication sciences (Serres, 2016), which influence our perception of the future in a positive way.
The alliance and conjugation of these two different sciences brings with it the double promise of a lighter world on the one hand, and a world with a deeper materiality on the other. We are able to demonstrate and explain this affirmation by observing concretely in the field what the world of contemporary design is doing.
In the industrialised West, Nature is increasingly being proposed as a "commodity" to be purchased, in some cases at a high price and to be used in special privileged places. Any experience, any item can find its own form in a heteronomic way, in other words if it is considered and sold as a commodity. The beach, the trees, the healthy food, the clean air - Nature in different shapes and packaging - is now offered to us, in the version of "product" or "experience" to buy: the access to natural "oases"; the travel and the stay; the guided tours; the organic food; the ecological products for personal care or home. Nature becomes a "surplus" that the object or experience can contain.
The adherence to this model supposes that we perceive our environment as contaminated, and we are constantly looking for ideals "natural islands" that remove us from this condition. In fact, the most compelling attempt is to transform ourselves, our own body in the first place - and the surrounding environment immediately afterwards - into an "island", a reality as uncontaminated as possible. But this happens in an age like ours, called from a geological point of view Anthropocene and that reveals an over-exploited planet where there are no paradisiacal islands or unpolluted places because they are subtracted from the human alteration.
At the same time, nature should not be seen as a playground for the weekend, a guided educational trail, a place to organize safe and sterilized visits, a corner increasingly narrow and remote to be searched when possible, as if it were, paradoxically, yet another artificial spectacle. Nature is not ahead or around us, but simply we are the Nature: it is the only reality we have and of which we are constitutively part. (Henderson, 2018). On the basis of what has been illustrated, we understand the cultural value of the eco-sustainable project, the scientific breakthrough of which it is the result and its essential contribution to the construction of the future. Introducing the concept of the product life cycle analysis (LCA), which seems more like a technical methodology, the time-dimension of the project comes into play. (Vezzoli 2016). At the roots of the method there is a slow maturation of the culture of design, which has adopted the principles of the sciences of complexity (Morin 1987, Bocchi & Ceruti, 1985). The product is interpreted as a system that exchanges matter and energy with the environment at every stage, in every moment. We can do no other than prefigure the ways in which this reciprocal transformation object/environment takes place in a context of "compatibility of transformations". In other words, our project should encourage the liveability and the coevolution between natural and artificial systems. *F.L.R.*

## 2. CONFLICTING VISIONS

To understand our idea of nature, it is useful to confront ourselves with significant cultural moments to highlight, for example, some conflicting visions with which Modernity has thought of nature and technology. Henri David Thoreau (1817-1862) hated gardens. In the forests of Maine he saw a remote virgin nature. The view of the top of Mount Ktaadn inspired him to write in *The Maine Woods*: "This was that hearth of which we have heard, made out of Chaos and Old Night. Here was no man's garden, but the unhandseled globe. It was not lawn, nor pasture, nor mead, no woodland, nor lea, nor arable, nor waste-land. It was the fresh and the natural surface of the planet Earth, as it was made for ever and ever." (cit in Weiss, 1998, p. 85). As writes Allen S. Weiss, "The geometric garden was in particular anathema for him, as he explains in his essay *Walking* (originally entitled 'The wild')" in according with New England Trascendentalism, Thoreau believed that there exists a metaphysical need for communion with nature, a need in opposition to the nascent commercialism of American culture and social conformity (Weiss, 1998).
A direct access to truth and beauty, with the experience of the nature: it's important to highlight the emergence of the myth of untouched nature which arises at the moment of its decline. A holistic vision man-nature never considered in terms of picturesque, aestheticized scenery. It arises precisely when the fracture caused by the advent of industrial society technology is exacerbated. On the contrary, the movement that will most decisively declare war

on the "moonlight", on the "flowers", on the beauty and poetry of nature, i.e. Futurism, is emblematic. As Fedele Azari writes in 1924, "Flowers in general represent a stonework in our mechanical and synthesized modernity". An ideology which, by encouraging a break with the past and the nature, sees the human body tending to integrate itself with the technology and the machine.
These visions of nature represent opposite poles around which the relationship between design, nature and technology, dense of unresolved points, will be articulated throughout the twentieth century and up to nowadays. The nostalgia for a primordial nature on the one hand, and the break with the natural element and the exaltation of the machinic world on the other: two visions that only a cultural development that sees together the ecological turn and the technological transition of the post-industrial can overcome. Beyond specific interpretations and trends, a world of objects emerges today which is the result of a deep analysis and vision. An experimentation with a clear sense of a sustainable use of natural resources and technologies and that is able to freely combine the ecological paradigm with an advanced scientific imagination. We can understand the variety of aesthetics of contemporary design in their relationship between ecology/technology/nature by looking at them in that vast territory that concretely exists between the Thoreau's vision and the futurist vision. What is this territory made of?
Today, we are witnessing a new technical revolution that breaks away from hard sciences and technologies destructive for the environment; a technical revolution that arrives at the life and earth sciences and at the information sciences, playing a decisive role (Serres, 2016). The culture of the project, heavily invested by these changes, interprets and relaunches from its point of view the themes and future prospects, opening up day by day. Technologies are an extension of the human being, they can be light and impalpable toward the hi-tech. Materials, too, are sometimes increasingly impalpable and thin or, on the contrary, they can sometimes be "dirty" or "waste". They are invented starting from new logics, not necessarily of perfection, but of real sustainability.
The nostalgia for an uncontaminated world and the unconditional trust in technology as a synonym for progress are temporally distant from us, we clearly perceive them in their extremism with no way out. But if instead we read them together and not as antithetical, there are no strangers in their underlying utopia. We have many more ways today to imagine new conjugations and balances between technology and nature, to propose non-destructive relationships. Above all, we have solid scientific bases that allow us to experiment in a concrete way a coevolution between the artificial and the nature. This basic paradigm is intercepted now by the contemporary design through a plurality of research and aesthetics. *F.L.R.*

## 3. LIVING IN THE ANTHROPOCENE

The Anthropocene, whose neologism derives from the union between "anthropos" and "holocene", concerns the geological era in which we are now immersed. It is a term coined in the 1980s by biologist Eugene Stoermer and later adopted by Nobel Prize winner for chemistry Paul Crutzen in his book *Welcome to the Anthropocene* and indicates a period where the invasive impact of human civilization on the planet is such as to cause irreversible transformations. The atmosphere is overheating, the glaciers are melting, the waters of the sea are rising, many animal and plant species are beginning to disappear or to be at risk of extinction: the effect of human industrialization has reached such a magnitude as to change the balance of nature. The changes in the chemical-physical characteristics of the earth, generated by this impact, are leading to a different ecosystem, semi-artificial, because built and remodeled by nature and man together. As it has always done, nature responds to external attacks by defending itself, and through this act of protection and survival, it evolves.
Far from being considered only a theory, Anthropocene is now configured from a scientific point of view in a precise way, through the structure of a biosystem given by the coexistence of nature and artifice. As described by the philosopher Donna Haraway in her essay *Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin*, we are now in a completely atypical situation: "The Anthropocene marks severe discontinuities; what comes after will not be like what came before. (…) Right now, the earth is full of refugees, human and not, without refuge. So, I think a big new name, actually more than one name, is warranted. Thus, Anthropocene, Plantationocene, and Capitalocene. (…) We need stories (and theories) that are just big enough to gather up the complexities and keep the edges open and greedy for surprising new and old connections." (Haraway, 2015).
The pervasive impact of human activities is intertwined with the industriousness of nature, creating, layer by layer, a series of substances and minerals, unknown before. In an article in the *Mineralogical Journal*, Robert Hazen, Edward Grew and other geologists describe the spontaneous creation of new minerals, including simonkolleite, andersonite, tinnunculite, all substances defined as anthropogenic. From a geological point of view, the study states that the generation of these 208 new minerals is mainly due to three stratigraphic markers: the presence of chemical compounds in the rock; the transformation of the rock surface based on mining activity; the redistribution of natural minerals by humans.
This discovery, together with others similar studies, has revolutionized the way of thinking and reworking the new

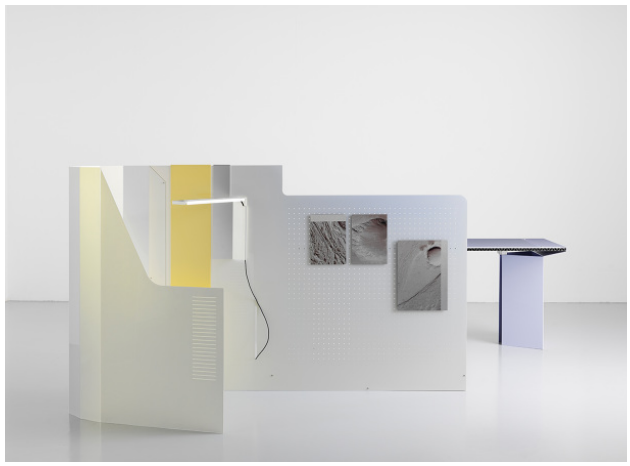
materials and it is configured as one of the most current aesthetic and conceptual research. On the other hand, the aesthetics of neomaterialism, and of a materiality that is no longer shiny and perfect from a formal point of view, is in line with current research in the field of the most speculative design.
Among the ongoing projects, *Craft in the Anthropocene* by Yesenia Thibault-Picazo represents an important case study for having been able to mix a material research, a deep study of future scenarios, the photography and an audio-visual storytelling. The project is based on the creation and visualization of minerals derived from the accumulation of common materials of our time, such as plastic, aluminum, steel, concrete, glass, textiles, bones. The materials created thus become the starting point for reflection for an imaginary future of artificial substances, extractable from the subsoil and potentially intended as new resources. Among the objects created, a pestle, a mortar and a vase become the design devices around which Anthropocene manifests itself, since the materials used really derive from the action of this new era. The materials chosen correspond to a bone marble resulting from the 2001 disaster in Cumbria in north-west England, a PPC (Pacific Plastic Crust) - a particular type of polymer originating from pollution of the Pacific Ocean [Figure 1] -, and an aluminum resulting from the ecological disaster of a factory on the Thames in London. In this perspective, reversed to the common approach to an environmental disaster, one of the possible directions concerns the adoption of the changes taking place in the environment, as they are, without having to restore nature to an original degree. Along this perspective, Shahar Livne reworks polymeric waste, reformulating it into a new clay compound. Plastic, from an iconic element of the disposable civilization, turns into something precious and rare, adequate to reshape unique and collectible objects, through the invention of a new material - *Lithoplast* - that look at the primordial while being technological, and that, through a techno-philosophical contamination, invite to a critical thought on the interaction between man and nature.
Our identities, which derive from the landscape, change in the precise moment in which the landscape is transformed. What happens inside the man with the disappearance of seas, soils, animals and plants? How can the designer intervene in preserving this memory and in keeping constant the remembrance of a natural territory that has now vanished? Through a series of maps, 3D scansions, photographs and 3D models of various kinds of glaciers and landscapes, now extinct, Xandra van der Eijk's research moves on the borderline between design, art and political denunciation. The *Retreat* project, like the other works of the Dutch designer, challenges the concept of time that passes, transforms and modifies, through the study and the creation of a series of objects that clearly reveal what climate change is causing. [Figure 2]
A design for sustainability that uses nature itself as a reflective mirror to denounce its state of criticality and courageously reveals the most worrying issues. Another example is represented by the exhibition *Post Fossil. Excavating 21st Century Creation*, by Lidewij Edelkoort (2011, Design Museum Holon) that describes apocalyptic scenarios, through fake paleontological findings. The matter of the fossil becomes the expedient from which everything starts up again, re-imagining new worlds. The raw material is re-processed, fire becomes an instrument to construct objects as in the past: there is a return to natural imperfection, to the roughness of surfaces and substances used. *C.S.*

*[Figure 1-2] Yesenia Thibault-Picazo, Craft in the Anthropocene, 2013. | Xandra van der Eijk, Retreat, 2018.*

## 4. BIOLOGICAL AND E-WASTE: APPROACHES TO THE SUSTAINABLE PROJECT

The gap between nature and technique is dissolving in the current state of techno-biological convergence. In the book *Biophilia + Technophilia*, Jon Bailey - on a time line that goes from 1600 until reaching a future projection to 2050 - places biology and technology on a parallel track. It emerges that from 2000 onwards, these two fields began to cross and evolve together. "We are currently at a time where our technology is increasingly becoming more biological

(…) the revolution created by computational processing has given us insight into the creation of artificial life, biological system, neural networks, and explanations into the biological world which remained unknown to mankind until now. As technology catches up with biological and technological aspirations, this merger will likely increase in momentum arriving at a synthesis within the foreseeable future." (Bailey, 2010).
In relation to sustainability themes, technology now collaborates with nature in an integrated way, through a manufacturing modality corresponding to the logics of the natural world. Towards a shared horizon between biological and digital, in the designer's laboratory organic materials, experimental prototypes, texts, digital tools and images coexist, in a logic of transparent syncretism that dialogues with nature and interprets sustainability from a point of view of a living organism.
The particular mixture between the worlds of design and natural sciences is also due to a tangible increase in the practices of *Do It Yourself Biology* and the interest in a series of experiments in the fields of synthetic biology and future bio-materiality. The process of democratization of science has found its natural driving force in numerous laboratories and bio-based fablab that, joined by the network in a viral process, share knowledge about tools and protocols related to the bio-design practices. Beyond this expanding network, a series of research and exhibition centers emerges, including the *Laboral* in Portugal, the *Science Gallery* in Scotland, *Symbiotica* in Australia, the Kapelica Gallery in Poland, as well as different collectives that pursue the same objectives.
Concepts of the nature such as self-assembly and self-organizing propose new visions and aesthetic scenarios. They lead to conceive the product as able to regenerate and modify itself autonomously toward a new sense of materiality, new hybrid technologies and unprecedented living forms. Among the possible interests, the skin, intended as a receptive and reactive membrane, is one of the most interesting themes for the relationships between man and the artificial environment, through the creation of fabrics, connected devices, clothes. Among the designers working in this direction, there are Catts & Zurr, Officina Corpuscoli, Eric Klarenbeek, Mike Thompson and Steve Pike.
With *the Victimless Project*, as instance, Oron Catts & Ionat Zurr envisage the cultivation of artificial leathers from the replication of animal cells and tissues, in order to denounce and pose a political reflection on the exploitation of animals and the toxic production of leather. Again, refering to the creation of a new textile material for the fashion and furniture industry, Naja Ryde Ankarfeldt and Suzanne Lee work with a particular type of microbial cellulose, a biological substance derived from the cultivation of bacteria and capable of growing autonomously. Through a special treatment of production, drying and cleaning, Lee adopts microbial cellulose as her stylistic signature, creating a real company called *Biocouture*, while Ankarfeldt has developed and built a machine, *Microbial Skin*, for a hypothetical self-production in large quantities and in leveled layers. Focused on a new vision of organic fashion, "Biocouture is the world's first biocreative design consultancy. We work in the now, near and far future to help brands to imagine their biodesigned future. From microorganisms like bacteria, fungi and algae to cellulose, chitin and protein fibers like silk, we're exploring Nature's sustainable materials for future consumer products." (Lee, 2012) [Figure 3]



*[Figure 3] Suzanne Lee, BioCouture, 2010. | [Figure 4] FormaFantasma, Ore Streams, 2015.*

Materials with organic aesthetics, sophisticated and transmedial narratives: the designer's work embraces several expressive fields, collaborating with figures belonging to very different areas of the project. However, each foray into the biological world is never completely separated from the digital world.
In parallel with bio-design practices, a series of researches are being carried out concerning the recovery of digital waste and its re-elaboration in the form of new objects or materials. Design builds an anthropic landscape that is increasingly integrated with the digital world, through body extensions, prothesis, electronic devices and post digital objects. In the project *Ore Streams*, commissioned by the NGV Triennal of the National Gallery of Victoria in

Melbourne, Formafantasma design a collection made from the scraps of the digital industry, where computer plates, emptied cases and molten metals are converted and reassembled into tables, desks and office furniture. The project is thought towards a future where the metallurgy industry has changed, adopting as its raw material the waste resulting from its own programmed obsolescence. [Figure 4] The theme of e-waste and the reuse of materials for the transmission of digital bits is currently one of less explored but most promising areas for contemporary design. The possibility to treat metals and electronic components for their material importance, not technological, restores the value to the material and, trying to reprocess it, it brings it back to the zero degree of its genesis. *C.S.*

## 5. SUSTAINABLE DESIGN AND NEW AESTHETICS TRENDS

It seems utopian to think that the project can, by itself, take on the restoration of a natural ecosystem. Rather, it can intervene in an incisive way through a divergent thought capable of rethinking the world of production in a new vision that is totally integrated with nature. Thanks to its ability to illustrate complex problems in a tangible way, not only through the production of objects, but also through an activity of visualization and narration of topics, the discipline of the project can be the most suitable tool for a collective awareness. The idea of placing the Anthropocene as a catalyst concept of a design practice, unfolds today both in an intellectual research and in a very concrete one. In this perspective, the alliance of life and earth sciences with digital and computer sciences can be decisive for a transition to a sustainable development, with the aim of strengthening a relationship between man, nature and technology based on livability and co-evolution. The research trends and the aesthetics identified are different traces that together, however, build an already clear path.

The strategies of eco-sustainability are just as plural as are the aesthetics that now affect the design project. As we have seen through the design examples, today very different aesthetic visions coexist and inform experimentation: the logic of biomimicry draws from nature schemes in which form and technique find new identifications; an inspiration to the sensory dimension of nature signals our deep sense of belonging to it; in the staging through the design of an ancient nature, an imaginative paleontology puts us before our eyes our deepest history; the very strength of the language of design becomes a crucial tool to give strength to social denunciation; an aesthetic of technology that, far from the machinic world, finds on the one hand in the languages of biotechnology expressive forms, on the other hand in the languages of digital a sweet version of the technical power; the research on materials, which re-examines and redesigns them with the eye of the scientist but also of the designer, able to give value to the most humble as to the most sophisticated; the acceptance of waste, the broken, the dirt and residue as a concrete and scientific starting point for the project, the basis for an aesthetic conception far from the aseptic nature of the rationalist object.

It is no coincidence that the exhibition *Broken Nature* - inaugurated on March 1, 2019 at the Triennale Design Museum in Milan - is based on this complex and moving scenario. A scenario where the differences in scale of the project, from that of the object to the planetary scale, lose importance compared to the fundamental dimensions of the sciences of biology and communication: time and information. *F.L.R.*

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