



Water, Sustainability and Poetics in the Works of the cAt Group

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ABSTRACT

The article discusses art-technology productions related to concepts such as the Anthropocene, Chthulucene and Plantationocene. More specifically, it regards artworks related to sustainability, the use of water and alternative energy. In this sense some artworks from a number of artists are analyzed in the text, discussing the presence of water as a poetic element in the History of Art, to then think about water in the context of sustainability. More importantly, the paper talks about the cAt (science, Art, technology) group working with water in its solid, liquid and gaseous states as poetic forms, respectively, in each of the group's artworks presented below. The pieces "Sopro", "Toque" and "Gesto" were idealized as minimalist ways with which the public can interact using common abilities of the human body to generate electric energy. These artworks' systems are simple, displayed inside transparent structures and do not require computers or electric energy delivered from regular and commercial sources.

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ARTECH '21, October 13–15, 2021, Aveiro, Portugal

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ACM ISBN 978-1-4503-8420-9/21/10...\$15.00
<https://doi.org/10.1145/3483529.3483708>

CCS CONCEPTS

• Applied computing → Fine arts.

KEYWORDS

Sustainability, Water, cAt group, Art-Technology.

ACM Reference Format:

cAt ciência/ARTE/tecnologia, Milton Terumitsu Sogabe, Fernando Fogliano, Hermes Renato Hildebrand, Fabio Oliveira Nunes, Tiago Rubini, Soraya Braz, Rodrigo Dorta Marques, Mirian Steinberg, Roberta Carvalho, Danilo Crispim, Daniel Malva, Caio Netto dos Santos, Cleber Gazana, and Bárbara Jacqueline Milano. 2021. Water, Sustainability and Poetics in the Works of the cAt Group. In *ARTECH '21: Hybrid Praxis – Art, Sustainability I& Technology, October 13–15, 2021, Braga, Portugal*. ACM, New York, NY, USA, 7 pages. <https://doi.org/10.1145/3483529.3483708>

1 INTRODUCTION

Since 2015, the cAt (science, Art, technology) research group from the Arts Institute of UNESP (São Paulo State University) has reflected upon Art-technology productions, that raise concerns about sustainability related to energy sources and alternative possibilities for energy generation without the direct use of computers and complex technology apparatus, while maintaining relevant aspects of the digital interactive works, such as the use of technology, interaction with the audience and a systemic view.

These concerns were initially introduced in the production of the work "Sopro" ("Blow"), started in 2015, which is an interactive work

powered by the audience participation through the strength of a wind blow on a pinwheel. This work is based on the use of a simple technological system, seeking the poetic dimension of the act of blowing and primary scientific principles. Upon the development of this work, the group sought the possibility of creating a series of works focused on concerns about sustainability with original interaction dynamics, thus creating new systems and works in which the body of the audience becomes the power source. In this context, not only the resulting works are important, but especially the creative process, in which artists focus their concerns and researches on socio-environmental issues, thus assuming a new view of the world, seeking new attitudes, new relationships with individuals and communities involved within this process, transforming their ways of life and materializing that into Art.

This paper also presents the artistic production of the cAt Research Group, emphasizing the aspect of the way the water element is present in their works.

2 WATER AND ANTHROPOCENE

The idea of the Anthropocene was first proposed by Eugene Stoermer and Paul J. Crutzen in the early 2000s. It suggests that a new geological era began with the Industrial Revolution in the 18th century, triggered by humankind's *faustic* action on natural resources, changing the functioning of crucial processes to life on Earth. Paul J. Crutzen was a Nobel Prize winner in Chemistry in 1995 and published an acclaimed paper about atmospheric changes that could be triggered by nuclear events [5], and Eugene Stoermer was a biologist who specialized in the functioning of aquatic organisms. It is not surprising, therefore, that the concept of the Anthropocene underscores the gravity and urgency of the problems that fossil fuel burning and toxic gas emissions can bring.

The moment, in fact, is *anthropogenic* - phenomena linked to industrial pollution such as coral bleaching in the oceans, for instance, are part of a chain of dramatic global effects. In any case, authors like Donna Haraway criticize Crutzen and Stoermer's view, putting the exploitation systems that preceded the Industrial Revolution to blame for the destruction of the planet. For Haraway, it is interesting that we think that processes and developments of specific technologies for resource extraction and abusive uses of labor, misallocation and exploitation of profits and benefits have been underway longer than the 18th century.

Haraway (2016) [11] says that although humanity has interfered in the world to the point of changing life on the planet, it is not pertinent that the moment we live in be named the Anthropocene. She suggests, then, that we give visibility to processes overshadowed by the actions of a certain exploitative, colonizing project with the privilege of signification, which roughly can be seen as the subject of capitalism. She proposes the idea of Chthulucene, which refers to Medusa, the Greek mythological figure whose gaze has the power to petrify. The term also refers to tentacular and chthonic beings, with the image of octopuses as a strong representation.

Such chthonic beings, from the depths, in this case, also refer to those whose stories are not always heard. In this sense, Haraway [10] draws inspiration from an essay by science fiction writer Ursula LeGuin to urge us to pay attention to narratives less related to anthropos, which she metaphorizes in the image of the hunter or

prehistoric hero. In *The Carrier Bag Theory of Fiction*, LeGuin (1996)[13] proposes that the hunter, rather than with the hunted, arrives with many stories to tell, often overshadowing narratives, for example, of farmers, healers, children, etc., whose roles were fundamental to the survival of sedentary humans (who were not nomadic).

Another epistemic collaboration to the idea of Anthropocene is proposed by the idea of Plantationocene, which refers to the way plantations alter the landscape and the way of life of the populations around their area of implication. The term also arises in the need to understand that the Anthropocene does not refer to the human as a species, but to the historical subject, who from certain eras produced violence and destruction against the Earth with the exploitation of the land and consequently exploited not only the territory but also the animal, human and non-human populations, vegetation and natural resources.

When referring to the Plantationocene the focal point of the discussion is the structure resulting from plantations in the New World [12] that constantly reflect on the regime of fear through a gradual transformation of a form of production into an economic, disciplinary and penal institution [14] that ushers in the age of capital. This way of understanding a plantation implies a regime that avails itself of the activity of selecting those who can continue its paths (and its generations) and those who cannot, whether human or non-human.

The Plantationocene is being articulated precisely to think about the multidimensional violence [8] that is applied on the world's resources and throughout the history of the massive food productions, considered from the exploitation of these same resources, of human and non-human, natural and non-natural forces. Therefore, it doesn't reinforce an imaginary of non-Western civilizations in order to create gods and myths of an inaccessible time from before the exploitation of these resources, but to understand in the contemporary in which ways and possibilities water management can be executed for a healthy relationship of human life on the planet, or even how water can be understood as a social subject or agent of a cosmopolitical system, constantly threatened by other production structures that are also power structures.

3 WATER AS AN ART ELEMENT

Art is the field in which creativity is taken to its limits. Creativity is a quality that helps the human being solve mundane problems as well as his own existence throughout the most unusual moments in history. Both Art and science apply creativity in their production processes in face of reality. However, while one operates with subjectivity, presenting the most varied possibilities before a fact, the other has objectivity as reference, seeking a unique truth before reality. Both areas have dialogued during their coexistence, but since the mid of the previous century, the relationship between Art and Science, along with Technology, has become a modality in the Art field, which gets richer from scientific theories, applying technology possibilities.

In the sustainability context, water is one of the main concerns for our future. It has always been present in Art history, in the most varied forms, always drawing artists to observe and use this essential element of nature.

Bill Viola is an artist who uses water with constant presence and video technology to perform many of his works. Water is present along other essential elements such as in the work “Martyrs (Earth, Air, Fire, Water)”, from 2014 (Figure 1), in the human experience context, with life, death and time.



Figure 1: Martyrs (Earth, Air, Fire, Water) at the exhibition at Sesc Paulista Avenue, Brasil, 2014. Photo: Ricardo Amado [16]

One of the first works produced by Viola entitled “He Weeps for You”, from 1976, presents a refined and detailed observation of a simple and small drop of water. This work presents complexity and greatness related to eastern philosophies, and its reference source is presented through audiovisual technology. The perception of an optical phenomenon on a rainy day, in which each water drop observed on his eyeglasses reflected his entire surroundings originated the project of this work. The relationship of the microcosm with the macrocosm is present in this work, the image of the entire setting on a single drop of water. The sound of the water drop falling on a tambourine is amplified, achieving a new dimension of the sound in the environment. Water is present in other works such as “Return” (2007), “The Trial” (2015), “Tristan’s Ascension” (2005) and “Fire Woman” (2005).

Viola’s art expresses the body experience in its physical and emotional aspects, which denotes the body’s temperature control and adaptation to different climate situations, as well as to the production process of sweat, tear and excrements, which are part of the physiological responses of the body. Since the uterine phase, the fetus receives the sound waves that vibrate the amniotic liquid and recognizes the sounds from the vibration of uterine fluids.

This relationship (water-body-planet) leads to a homeostasis perspective, denoting certain elements of balance and unbalance, which may be explored in the different types of artistic production.

For example, in the installation of the artist Jane Quon [15] entitled “We engage with Invisible Tides” (2005), there was an artistic practice of juxtaposition of artificial elements drowned into water to seek a phenomenological and sensorial study in the homeostatic relationship between these drowned objects and the cycle of ocean tides, with the exposition of these elements to natural and artificial light, and with the climatic possibilities that water may bring within this space.

Due to its fluidic nature, water has indomitable behaviors: it leaks, spills, and spreads, many times obeying its own course instead of

the route we had destined it to take. The physical characteristics of this element may lead one to believe that it is a matter of hard-to-conform plasticity. “Fluids do not keep to any shape for long and are constantly ready (and prone) to change it”, states the philosopher Zygmunt Bauman in his famous book *Liquid Modernity* [2], in which he addresses a modernity that is increasingly lighter and more dynamic. Therefore, it is challenging to find Art works in which its poetics involve the control of this behavior.

The 3D installation entitled “Water Matrix” (figure 2) by Shiro Takatani is an Art- technology work in which the fluidic dynamics of water is controlled by a computerized system. It is a water source capable of reproducing parametric shapes, having this fluid as support. The idea of the artist was to develop a platform that could reproduce shapes with the highest accuracy possible for this form, such as seen on screens of devices.

In order to control the water behavior, Takatani places it in the condition of a pixel at a tridimensional space that exists while the water fills it, controlled by an accurate hydraulic system connected to a computer. It should be noted that the pixel would be the “last constituent of the image” [3], product of a historical human search for “increasingly automatizing the processes of image creation and reproduction” [3]. The encounter of technology with the 3D liquid “Water Matrix” do not cancel each other out, but on the contrary: the sophistication of the pixel is a stronger evidence of the fluidic nature of this primary element of the planet.



Figure 2: ‘ST|LL’ by shiro takatani for the 3D water matrix.[18]

4 ART, WATER AND SUSTAINABILITY

Aesthetic manifestations are always related to the problems of each era. By the second half of the 20th century, the conscience of the human activity that was drastically affecting the environment became a concern of humanity and then of Art. However, throughout the history of Art, it is possible to verify that works of art are always a reflection about human being and environment. As the debate progressed, and upon the predominance of a systemic view that emerged in the same period, the issue stopped being only environmental and became socio-environmental, involving ethical and moral issues in the relationship of man with other elements of nature, and among other human beings.

Arts may shape environmental behavior through three paths; “to communicate information in an engaging fashion; to create empathy with the natural environment; to incorporate Arts in the environmentally sustainable development” [4] (p.1). These authors have verified the way human behavior is affected by environmental awareness “Arts are a powerful way of transmitting ideas, and thus influencing attitudes, and the use of symbols is central to the role of Arts in communication and in the awareness of consequences.” [4], (p.3).



Figure 3: Olafur Eliasson and Minik Rosing, “Ice Watch” (2015) (photo by Martin Argyroglo, © 2015 Olafur Eliasson) [1]

The Danish-Icelandic artist Olafur Eliasson[6] lives and works with an interdisciplinary team in Berlin, Germany. His works are performed in multiple languages and reflect environmental concerns. The work that will be addressed in this paper, entitled “Ice Watch”, from 2018 (figure 3), was carried out in London, in two different places in the city: in the external area of Tate Modern museum and in front of the Bloomberg headquarters, in London’s financial district concurrently to COP-24, which took place in Poland during the United Nations Conference about Climate Changes.

In 2020, the artist Roberta Carvalho, from Pará, Brazil, performed an intervention in the west region of São Paulo that drew attention to the water issue, especially the rivers and their relationship with the city. This intervention entitled “Transbordas” (figure 4), took place through macro projections on gables of buildings, that portrayed images of large Amazon rivers, transposed to the city of São Paulo, where rivers are dead and devastated by pollution.

This work presents the cinematic and immaterial condition of the projected image over the architecture – tensioning verticality and horizontality – presenting river flows, printing the surface of cities with muddy waters, which are typical from Amazon rivers, in constant movement, which always seek forms of overflowing and maintenance of its unstoppable and irrepressible nature.

In this sense, [19] regards artists as ecologists, because they perform their action from environmental relationships. Ecology is



Figure 4: Roberta Carvalho, “Transbordas”, 2020. Source: Courtesy of the artist.

defined as a totality of relationship patterns between organisms and their environments. Therefore, for an artist, creation is not about the invention of new objects, but the revelation of unknown relationships amongst phenomena, whether they are physical or metaphysical.

5 WATER IN THE WORKS OF THE CAT GROUP: “SOPRO”, “TOQUE” AND “GESTO”

Since 2015, the cAt (science/Art/technology) research group from the Arts Institute of UNESP, has been developing works that take into account the issue of technology and its sustainable use in the construction and poetics of these works. During this period, three interactive works were projected, from which two of them have already been completed: “Sopro” (“Blow”) in 2015 and “Toque” (“Touch”) in 2017. The third one entitled “Gesto” (“Gesture”) is yet to be developed. These titles are related to the way audience participation brings works to life.

The proposal is characterized in the Post-digital context, in which the presence of technology, though present, is no longer the focus. These works no longer use computer or commercial energy, but simple materials and technological devices, maintaining many concepts established during the phase of digital technology deployment [7] in society. The technological system used, in addition of being simple, is visible so that the audience may understand its operation during the moment of interaction. The transparency of materials in the works recollects the discussions presented by Vilém Flusser in his work entitled *Black Box Philosophy* [9].

The poetics of the works is related to their own interaction form, in which the bodies of visitors become part of the technological system for the generation of power and functioning of the work. Just like the conception of a simple system, although resulting from a complex thought.

The three works of this series constitute a set that uses elements according to the table below, which lists materials and intended forms of audience participation.

Even though these elements form a set in the sustainability proposal, this paper will be driven to the presence of water in the works. Water is a vital element, and it is present in the three works in different ways, with diverse metaphorical meanings and as a

	SOPRO (BLOW)	TOQUE (TOUCH)	GESTO (GESTURE)
Audience Participation	To blow	To touch	To move
Sensor	Fan/Engine	Peltier Cell	Magnets/Reel
Actuator	Vibracall	Vibracall	Humidifier
Noticed outcome	Water movement	Sounds	Visual effect
Work Shape	Sphere	Cube	Cylinder
Water State	Liquid	Solid	Gaseous

Figure 5: Components of the works “Sopro”, “Toque” and “Gesto”.

physical element that contributes with its properties in each system. Therefore, it is part of the whole system, with conceptual as well as technological contribution for the construction of a sustainable system.

The physical states of water: solid, liquid and gaseous - a state in each work - build a sequence and a relationship between them, evidencing to be a triptych artwork, reinforced by the types of geometric volumes and by the three interaction forms.



Figure 6: Photo of the work “Sopro”, created by the cAt group - UNESP, in 2015. Source: <https://grupocat.wordpress.com/>.

In the first work (Figure 6) of the triptych, water emerges in the discussion about life, and the form which the result of the audience interaction take place, bringing the work to life. The acrylic spherical forms interact with biology. These forms are in the context of water to vivify through the human blow. Therefore, this essential element for the existence of life is employed in spherical forms – some encapsulated, in different dimensions – which denotes biological instances – cells, ovaries, gestations.

Water, in liquid state in the work “Sopro”, is presented as a metaphor for life. At the same time, it has physical functions in the work, enabling the movement of spheres affected by the engine vibration that produces small waves, which reflexes on the base make them more noticeable.

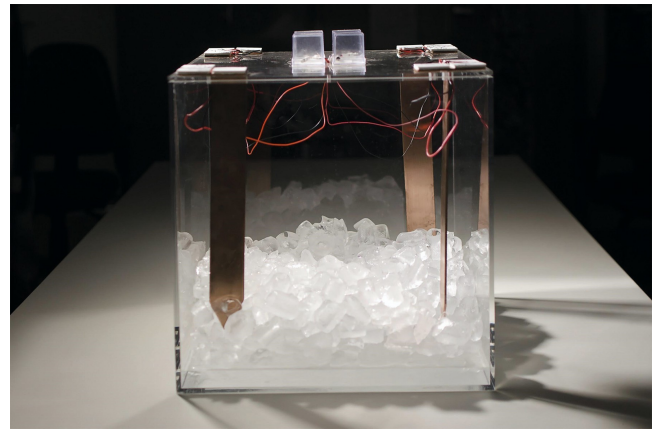


Figure 7: Photo of the work “Toque” created by the cAt group - UNESP, in 2017. Source: <https://grupocat.wordpress.com/>.

In the second work (Figure 7) of the triptych, entitled “Toque”, the interaction with the audience happens when the Peltier¹ cell is touched. The heat of the hand contrasts with the low temperature of the cell, which activates the work. The Peltier cells are cooled down through contact with one extremity of a copper bar, while the other is submerged in constant contact with the ice inside the work. The temperature contrast, heat (from the audience) with the cold (from ice) causes the Peltier cell to generate the energy that moves the vibracall engines placed inside the glass cups on the top of the work. In addition to its visible movement, it also produces different sounds due to the materials used in each glass.

In this work, water is predominantly present in solid form. The ice and the cold water resulting from its melting are primary elements so that the heat brought by the touch of each visitor is felt by the system. Simultaneously, the cold is felt by the visitor when he or she touches the work.

Similar to the work “Sopro”, in addition to the poetic element, water, now in the ice form, constitutes a structural element of the system, because it maintains the work under adequate temperature for the audience interaction. Ice, which usually has the rectangular shape in our imagination, reverberates in the straight lines that compose the work – from the transparent cube to the copper columns that conduct the low temperature – except for the engines that are activated, like in the work “Sopro”, although present in the glass cups in this work. The melting of the ice brings a metaphorical element of transience to the work, taking one back to considerations about the ephemerality of life.

The third work “Gesto” completes the triptych. Its completion in 2020 was not possible due to the quarantine of the Covid-19 pandemic.

The project of this work is predefined by the two previous works “Sopro” and “Toque”, since they use water in liquid and solid state presented in spherical and cubic shape, with interaction through blow and touch, respectively. Consequently, the third work, entitled “Gesto”, would have to use water in gaseous state, cylindrical shape

¹The Peltier cell is named after the Peltier effect, discovered in 1834, which is constituted by a sandwich of ceramic plate, filled with small Bi₂Te₃ (bismuth telluride) cubes. It works as a semiconductor, a thermoelectric material [17]

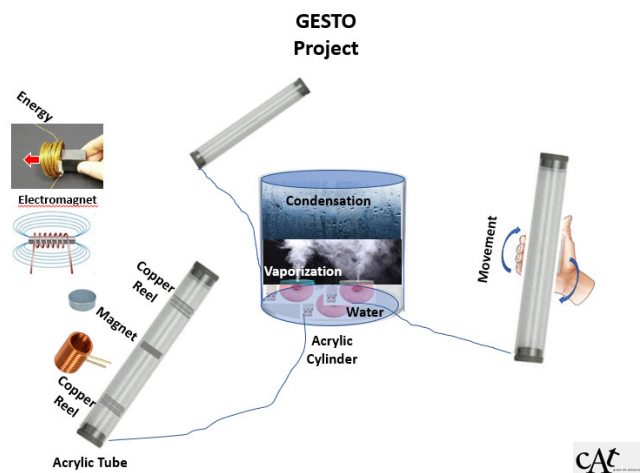


Figure 8: Project of the work “Gesto”, created by the cAt group - UNESP, in 2020. Source: courtesy of the group, 2020.

and with an interaction form that was different from the previous ones, while compatible to the projected system, which was defined as a movement of hands with the interface, like a gesture. Always keeping the transparent quality of the work as a formal aspect of the triptych.

The technology employed in the artwork was chosen after discussions about energy generation possibilities, in an artisanal fashion, without the use of commercial electricity. Electromagnetism emerged as a possibility in first experiments, with the construction of a copper reel with a magnet passing on the inside to generate energy. This system was built in an acrylic tube with several reels. The movement of the magnet is triggered by the audience gesture, as if it were a “rainstick”, an idea that has also emerged in the relation with water.

The energy generated by this gesture activates a vaporizer inside a closed larger acrylic cylinder, with water on the inside. The system with cylinders enables a collective interaction for a higher generation of energy, given that the systems always operate with the least amount of energy, just enough to vivify the work.

In the work “Gesture”, water is also present as a poetic and structural element, through its transformation from liquid into gaseous state, and vice versa. The essential event is constituted by the process of vaporization and condensation, in a continuous process without loss of material.

It is possible to notice that the three works that complete the triptych form a set with similar concepts but with different structures, all of them consistent with the energy generation proposal triggered from the interaction of the bodies of the audience with the bodies of the works.

Water is a structural element in all three works. The physical, liquid, solid or gaseous state is predominant in each work, with their respective transformations. The sustainability issue is present in the entire system projected for the works, from the audience participation form, energy production method, and technology simplicity, to water as a common element in all its possible states, bringing life and building poetics in the works. In the quarantine context,



Figure 9: Synthesis of the triptych composed by the works “Sopro”, “Toque” and “Gesto”. Source: <https://grupocat.wordpress.com/>

the works “Sopro” and “Toque” have already been completed and were adapted to virtual ambiances, which enabled a new experience possibility within the proposal.

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