The ocean is a world full of sounds generated by the most diverse sources. The wind, the rain and the swell of the waves all make the ocean a rather noisy environment. When it blows over the ocean, the wind generates waves that produce sound as they break. Raindrops, too, when they fall on the sea surface, create a sound that propagates through the water.

If we place a hydrophone (aquatic microphone) underwater, we become aware that both the waves and the rain produce subaquatic sounds that are very similar to those we hear in air. There is a difference, however: the way that sound propagates through water is much more efficient, moving nearly five times faster than it does in air. We thus find a transformation of energy from the aerial to the aquatic environment that spreads from the surface into the entire mass of water, modulating the noise level in the ocean environment.

In addition, various aquatic organisms produce a multitude of sounds that transform many parts of the ocean into a real biogenic cacophony. Seaweeds, for example, produce sound resulting from photosynthesis. The oxygen produced by this physical-chemical process is released into the water column in small bubbles. When the bubbles are released from the surface of the seaweed, they emit a *ping* sound that is ultimately caused by the transformation of solar energy into acoustic energy in the ocean. Sounds associated with the feeding or movement of animals can dominate aquatic soundscapes. The movement of sea urchins when feeding on the surface of rocks or the claws of the snapping shrimp can produce a *crackle* of such high intensity that even humans are able to hear it, despite our ears not being adapted to the underwater environment. In turn, the larvae of fish and invertebrates such as crabs are guided by this crackling noise to choose safe places in which to grow, as these rocky zones are rich in food and offer shelter from predators.

In addition to navigation, sea creatures use sound to find prey or to flee from predators. This is the case with orcas, which use echolocation (biosonar) to find prey such as small cetaceans, seals or fish, which in turn change their behaviour when they detect the echolocation clicks, to reduce the chances of being hunted.

Equally important is the mediation of social interactions through communication sounds: the noises produced by one animal will alter the actions of others. Sounds emitted by marine mammals can be important for the cohesion of groups or for mating rituals, even if they are miles apart. Interestingly, low-frequency sounds from some cetaceans spread for hundreds of miles and can even cross ocean basins.

Many species of fish use vocalisations when they fight, to defend a territory or to mate. In some species, the male emits courtship sounds to attract the female to mate in his territory, while in others, these sounds are responsible for gathering large fish aggregations during reproduction – this is the case with meagre and cod. Mating sounds can mediate females' reproductive decisions and change their physiological state to increase their spawning readiness. Fish are a very representative group of marine animals, not just due to their abundance but also because they occupy almost every part of aquatic environments. Thus, the actions of fish (bio)transform the soundscape of the ocean.

The ocean is a world full of sound, but not all sounds are available to all animals. While marine mammals are able to hear a broad range of frequencies, the majority of fish and invertebrates can only detect very low frequencies: the *pings* of a seaweed during photosynthesis can be detected by a dolphin but not by a fish. Yes, the ocean is a world full of sound. And increasingly so! Human activities, such as maritime traffic or seismic exploration, produce sounds that raise the level of ambient oceanic noise and transform it. The ocean has thus started to integrate continuous low sounds and other, shorter but more intense ones. What transformations might these sounds be causing in sea life?

Clara Amorim

Berru

Transforming Energy

1 JUL – 4 SEP 2022
Culturgest Porto

LIST OF WORKS

GROUND FLOOR
Transforming Energy, 2022
Five metal sheets, five-channel audio interface

SAFE BOX/BASEMENT
Transforming Energy, 2022
Full HD video, colour, 16:9, stereo, 26’24’’

TRANS·FORMA

Mar, águas em movimento, arrasto lento, mas constante, perseverante, cíclico mas irrepetível.
Traços de um tempo, acontecimento, gravado num corpo, cicatrizado, permanentemente em mudança.
Ferro, bruto, pesado, quinado, suspenso.
Sensível, manifesta existência, autónoma e presente, digna de alteridade.
Fenomenológico, susceptível. Em si, agente e mudança.
Barreiras à inteligibilidade, categorias, caixilhos.
Existência, taxonomizada.
Linguagem, palavras, normas.
Construção de uma realidade, auto-centrada.
Contestável e contestada.
Evidenciada pela diferença, hierarquizada.
No acto da criação, uma tentativa, manifestada.
A relevância de ser, horizontalizada.
Dependente do corpo, tudo e nada.
Continuamente em construção e desconstrução.
Existência, tentada. Transiente.
Ruidoso.
Em silêncio,
Tumultuoso.
Aos sentidos, limitada.
Pela arte, clarificada.
Errada.
Impermanente.
Imperfeite.
Incomplete.

Praia. Maio. Céu encoberto mas luminoso. Depois de recolhidas, as estruturas de metal estão agora verticais. Enterradas na zona de rebentação. O ferro juntou-se ao sangue mas os trabalhos prosseguem. A chuva torna tudo mais árduo. As ondas colidem com as chapas e as areias movem-se no seu sopé. Ruídos, arrastos, lavagens – em ondas. Por instantes, calmo, mas nunca por muito tempo. A força da água perseverante vence. Mais forte que todos os esforços. As chapas tombam. A rebentação arrasta os materiais sem esforço, pela areia, rochas e algas. Os corpos ficam marcados pelo ritual de baptismo. A maré cheia vem depois do almoço. O cansaço instala-se. Praia. Junho. As cicatrizes transformam-se em conhecimento. Outra abordagem, mais controlada.

Gui Flor
At the author’s request,
this text was not translated.

berru’s ***transforming energy***, experiments on the effect of existence on existing. Metallic structures resonate, through their bodies, registries of their existence. Vocalized in a sensory modality unexpected to the material. Unique to their individuality. More than merely objects, bodies that have lived. Bodies that construct their reality. Bodies that don’t need our bodies to be bodies. Anode and Cathode. Energy flux, from sea to sound. Translated in time and space. Energy that transformed matter – reincarnated.

When we experience, we create ourselves. Present. Here and now. Our bodies, interfaces to the world. We change, ourselves and others, in this exchange. Leaving part of us and bringing part of the other. Our lives, an accumulation of all of our experiences. An infinite game between future, present and past. Existing is a process. Beautiful are the marks of imperfection, in peace with the continuous mutation of all that is, and is not.

In this exchange, to what extent are we able to consolidate our limits?

When bodies and matter interact, we taxonomize. Our sensory perception discretized. The senses, broken. No longer in the continuum of existence, weakened in their hierarchy. Liminal existence, packed into boxes. We hear with our body, smell with our mouth, touch the heat, see with our eyes closed, savour life... what other sensorial modalities exist? Do objects produce alterity between them? What if reality doesn’t depend on me?

We’ve built the Anthropocene and we observe the decay from its core. We will transcend our perspectives in order to survive.

Gui Flor

Talks and Lectures ×

Berru: Ocean Sound
With Berru, Clara Amorim, Olivier Adam and Samuel Silva (moderator)
3 SEP 6 PM
Free entry
In english

As part of the Portugal-France Season 2022, Culturgest and COAL present a double conference on the theme of the oceans and human interaction with this global but sensitive ecosystem. Taking place both in Portugal and in France, this conference will gather guests from both countries sharing perspectives from areas such as the arts, biology or the social sciences.

Acknowledgements Álvaro Oliveira, Bruno Lança, Clara Amorim, Filipe Pedro (Doca Pesca), Gui Flor, Helena Cardoso (Doca Pesca), Lendl Barcelos, Pedro Goncalves, Artworks, Wasted.

Organized in the scope of the Portugal-France Season 2022

Co-funded by the Creative Europe Programme of the European Union, following ACT – Art, Climate, Transition project

Partnership