

Human Nature



Fig. 1 Clearcut #1, Palm Oil Plantation, Borneo, Malaysia, 2016

When looking at the photo series created by the Canadian photographer Edward Burtynsky, we notice, as Burtynsky so poignantly puts it, “the indelible marks left by humankind on the geological face of our planet.”¹ The photos clearly show the impact of humankind on landscapes (Fig. 1), oceans, and the air; in short, the habitats of everything that lives on our planet. The influence on the ecosystems, whether positive or negative, is portrayed in a manner that emanates beauty and vulnerability. At the same time, a story is told that leaves a far greater impression than tables, figures, and facts. The photos reveal that a change in perspective has a major impact in raising awareness of the considerable influence of humans on their environment. A changing perspective is one of the key starting points for modern designers who incorporate nature in their design concepts. To salvage nature is to discover new possibilities that emerge from rescuing or reusing various raw materials that are found in nature. Even the redefinition of what is meant by a natural raw material is taken as a starting point in some cases. In this interpretation, reclaiming raw materials refers to the search for new perspectives, applications, or products in which the tackling of ingrained opinions and the proper care of our lives and our planet form the connecting factor. Diversity is a crucial principle for maintaining balanced ecosystems, whether large or small. Over the past few billion years, this balance has been disrupted regularly, often with serious consequences for existing ecosystems. Our planet has been changing constantly for 4.5 billion years, a process that continues without interruption today. Under the influence of a changing climate, natural ecosystems have been displaced, existing species have evolved, and new entities have developed.

For the first part of our Earth’s history—the Hadean eon that occurred 4.5 to 4 billion years ago—there is no proof of life. The first conclusive proof of life on Earth dates to around 3.7 billion years ago. This proof consists of stromatolites from the Precambrian period, sedimentary rock that was formed by the capturing and depositing of sediment by bacteria and cyanobacteria. The first traces of these stromatolites were found in the oldest rocks of Greenland, which became exposed as a result of the persistent thaw in 2016.

Every period of the geologic timescale has its peculiarities. The first mollusks in the sea appeared during the Cambrian period, and the first insects emerged during the Devonian period, when carbon was responsible for the development of vast areas of mangrove vegetation and river deltas. These forests and marshes disappeared around 290 million years ago due to the influence of the changing climate. The climate became drier and hotter, which led to desertification. Carbon laid the foundation for the later development of coal, limestone developed during the Cretaceous period, and the end of the last ice age was important for the evolution of algae, which made it possible for life forms such as seaweed to develop.

During the entire history of humankind, humans have been capable of using the raw materials of each specific geologic period, whether as fuel, as a basis for new products, or even to create completely new materials. Scientific and technological developments have played an important role in the extraction, processing, and use of these raw materials. As mentioned earlier, many of these raw materials were the result of climate changes, whereby longer periods of warm weather alternated with relatively short periods of cold weather known as the ice ages. These changes were largely caused in the past due to the shifting of the continents and changes in the composition of the atmosphere. Major natural disasters such as volcanic eruptions or falling meteorites have also had an influence on Earth’s changing climate.

Anthropocene

The term “Anthropocene” was introduced eighty years ago by the geologist Alexie Pavlov, and gained more prominence thanks to the ecologist Eugene F. Stoermer and the Dutch Nobel prize-winning atmospheric chemist Paul Crutzen. According to this theory, the Holocene epoch, which started around twelve thousand years ago, made the transition into a new geological period, the Anthropocene, under the influence of human activity. The Anthropocene is characterized by the enormous impact of human activity on the Earth, its climate, and its atmosphere. In this regard, there are particularly important roles for the phenomenal growth in population, the strong increase in carbon dioxide concentration in the atmosphere, and the extinction of numerous species. All of these factors trigger far-reaching changes in the atmosphere, lithosphere, biosphere, cryosphere, and oceans. There has been a significant change in the concentration of certain substances in the atmosphere due to deforestation, combustion of fossil fuels, and widespread agricultural practices, all of which have led to the development of the greenhouse effect and, with it, global warming.

Earth Ecosystem

One form of evidence of the drastic influence of humankind on our living environment is the vast amount of plastic in the oceans. This so-called “plastic soup” can be found at several locations in the oceans and on beaches. One consequence of this is that sediments are containing more and more plastic. In Hawaii, for example, sandy beaches polluted with plastic are being transformed through hot lava flows into a new type of stone called Plastiglomerate.² This “new raw material” is regarded by many scientists as a potential feature of the Anthropocene.

The theory surrounding the Anthropocene and the development of Plastiglomerate play a central role in the speculative design project *Metamorphism* (2017–ongoing).³ This project, created by the Israeli-born designer Shahar Livne, is based on the theme of Plastiglomerate and explores the possibilities of using this stone as a raw material for designing new products. The blurring of what is seen as natural and what is synthetic fascinates Livne in her research. She uses Plastiglomerate as a basis to create a new clay-like material that she calls Lithoplast. This speculative design project is based on her assumption that plastic will disappear in our modern world and that future generations will regard the plastic waste as a new natural resource that can be extracted in underground mining and used as a rare commodity for the production of new objects. In the creation of these new objects, craftsmanship and traditional production techniques play an important role. According to Livne, traditional craftsmanship will disappear along with the traditional raw materials of today. Through her project, she questions our definition of nature and culture within the context of this disappearing craftsmanship.

Sand consists of tiny hard or soft loose and granular particles of rock, and is one of the most common natural substances on Earth. It is formed by the erosion of rocks (such as mountains and boulders), and also consists of organic material (shells, coral) and minerals. This means that sand can originate from many different geological eras. In a collaborative project by Lonny van Ryswyck and Nadine Sterk of Atelier NL,⁴ this more traditional resource is used, but with the designers taking a more personal, innovative approach.

As part of this project, entitled *A World of Sand* (2010–ongoing),⁵ people are invited to send sand from every conceivable location in the world in order to make tangible the infinite riches under our feet, in both physical as well as digital form. Along with their bottle or container of sand, participants are also invited to submit their stories: stories about the sand’s origin, the special meaning of where the sand was found, and what the people experienced there. A digital map of the stories and locations will be drawn up and made available online and the sand will be fused into glass objects to create a physical world “sand map.” Dazzling colors are revealed when this sand, which originates from numerous different places on our planet, is heated to form



Metamorphism, 2017-ongoing; Shahar Livne (Israeli, b. 1989); Plastic, minestone, marble dust; Dimensions variable





A World of Sand, 2010-ongoing; Nadine Sterk (Dutch, b. 1977) and Lonny van Ryswyck (Dutch, b. 1978), Atelier NL (Eindhoven, Netherlands, founded 2007); Sand, glass



glass. These colors range from very light to deep dark green and to brown and even turquoise tints. This creates an alternative to the traditional glass industry, which may cause sand quarries to become exhausted at some point in the future. The entire project is characterized by a physical and digital approach, which contributes to the impact of *A World of Sand*.

Another material that originates from eroded rock is clay. Clay is made from sand that is transported by water to the lower parts of a landscape. This is why clay is usually found in the deltas of large rivers or in troughs in the landscape from which it cannot drain away. One of the purest types of clay is porcelain clay, of which kaolin or china clay is used most often. The designer Kirstie Van Noort considers herself to be part designer and part researcher. Her work is conceptual in many cases and she prefers to tell stories via the process rather than via the search for the perfect shape. As part of her project *Latitude for Uniqueness Series* (2014–ongoing),⁶ she conducted a study into porcelain production in the Japanese village of Arita, where almost pure kaolin is used to produce the finest porcelain. She discovered tiny amounts of dark residual material that could not be used to make delicate white kaolin porcelain. Van Noort developed a new line based on the brown-black residues left over from normal production in Arita. This approach produced sufficient quantities of clay that could eventually be used to create a series of porcelain objects, including the use of a new palette of seven colors that are characteristic for Arita.

Air Ecosystem

According to the World Health Organization (WHO), 91 percent of the world's population lives in conditions that exceed WHO guidelines for air pollution, with the consequence that 4.2 million people in the world die per year as a result of poor air quality. These figures show just how important it is to find practical solutions that improve air quality, particularly in large cities.

A major consequence of human activity that influences air quality is the emission of carbon dioxide into our atmosphere. This is a huge challenge that designers are tackling in a variety of ways. The high concentrations of carbon dioxide in major cities are caused mainly by the incomplete combustion of fossil fuels. This theme forms the basis of the *AIR-INK™* (2013–ongoing)⁷ project set up by Anirudh Sharma, cofounder of Graviky Labs, which had its beginnings at MIT Media Lab in Massachusetts. The idea to convert carbon dioxide air pollution into ink was born when soot from exhaust gases landed on the white T-shirt that Sharma was wearing.

The project involves collecting the fine particulate matter from cars in Asia for subsequent use in production of water-resistant ink. The emissions from cars and, for example, diesel generators are collected using a filter device called Kaalink, which is attached to the exhaust pipe. The collected soot is then purified and what remains is almost pure carbon pigment. This pigment is used to manufacture the ink, which is now being used by more than one thousand international artists to create their works of art and murals.

The next step in the project is to supply Kaalink devices to bus and taxi companies who can store the captured soot emissions in "carbon banks." These containers are then collected by Graviky Labs and processed into ink. A thirty-milliliter bottle of AIR-INK is the equivalent of forty-five minutes of air pollution caused by a car. The approach taken by Graviky Labs is a good example of tinkering, a process in which goals are achieved through experimentation and trial and error, with prototyping playing an important role.

Water Ecosystem

Our oceans are the most important ecosystem on Earth. They are crucial for the survival of all known life forms on our planet and are also one of the most important biotopes. For designers, the oceans are a rich source of inspiration for new products and applications, which are of paramount importance now that the oceans are under severe threat from the influence and consequences of human activity.

The vast amount of plastic in our oceans shows clearly that we need to change the way we think if we still wish to have any influence on the impending extinction of animals and the presence of minuscule plastic particles in our food and seafood chain. This forms the starting point for a collaboration between the global sports manufacturer adidas and environmental collaboration network Parley for the Oceans.⁸ Following Parley's AIR strategy (Avoid, Intercept, Redesign), their goal is to bring about a change in thinking and producing in which design is integrated at all different stages. Both partners hope this strategy will achieve an end to marine plastic pollution and its destructive consequences for animals, plants, and humanity. Parley regards plastic as a design failure that must be remedied as quickly as possible by reinventing the material itself.⁹ In this approach, "Avoid" refers to the avoidance of using plastic where possible. "Intercept" is the removal of immediate plastic threats from nature. "Redesign" represents Parley's ultimate objective, which is presenting alternatives to plastic based on sustainable and reusable materials. To achieve this AIR goal, they are working on intercepting and "upcycling" plastic from the oceans. Upcycling is a principle that also plays an important role in the Cradle to Cradle design movement.¹⁰ This refers to the fact that marine plastic is collected from the sea and reused in the manufacturing of new products, creating a closed circle in which no new plastic is incorporated.

This method creates an important role for consumers and designers. If people want to bring about change, then it is necessary to change the mindset of consumers. One of the results of this adidas × Parley collaboration is the introduction of the *UltraBOOST Shoe* (2016–ongoing), of which a total of five million pairs have been sold. These running shoes largely incorporate the plastic that was collected from remote shorelines and coastal areas such as the Maldives via the Parley "Intercept" activities. The shoe has a woven upper made from a mixture of Ocean Plastic™ (95 percent) and recycled polyester (5 percent). The heel cap, heel webbing, heel lining, and sock liner covers are also made from recycled materials. Appropriately, the design of the shoe has been inspired by ocean waves.

As an ecosystem, the sea contains many different forms of life that provide more and more inspiration for new concepts and products. A great starting point is provided by algae or seaweeds that can be found in various forms in the sea, ranging from single-cell to multicellular organisms. Their common feature is that during their growth they absorb carbon and emit oxygen.

The collaboration between Studio Eric Klarenbeek, Maartje Dros, and Atelier LUMA is an example of a design group that focuses on researching and designing new applications without losing sight of the past. They cooperate not only with designers, but also with chemists, color experts, fuel experts, and representatives of the regional salt industry. *The Algae Lab* (2018)¹¹ researches the possibilities of a circular concept by applying bioproduction in a decentralized setup, using equipment such as 3D printers. In doing so, the group explores the possibilities of cultivating living microorganisms from algae cultures that occur naturally along the coast. The salt flats along the French coast are particularly suitable for the growing of algae. This approach also makes it possible for "algae farms" to be set up in places such as industrial estates. The ultimate goal is to replace plastic produced from fossil fuel. According to the designers, it will be possible to replace all plastic with organic material in the future. One way they hope to achieve this is by setting up a network of "3D bakeries" to provide the opportunity to print objects from biodegradable materials at any of the locations. The Algae Lab is the winner of the Dutch New Material Award 2018.

Seaweed is based on various groups of nonrelated types of algae, which originated somewhere in the region of 3.5 billion years ago. Seaweed itself made an appearance approximately 1.2 billion years ago and has survived many geological changes, including events that led to the extinction of dinosaurs. Seaweed appears in many different forms and varieties and has been used for thousands of years, especially in Asian countries, usually as food. In Japan, for example, seaweed is dried into sheets of nori that are mainly used to make sushi.

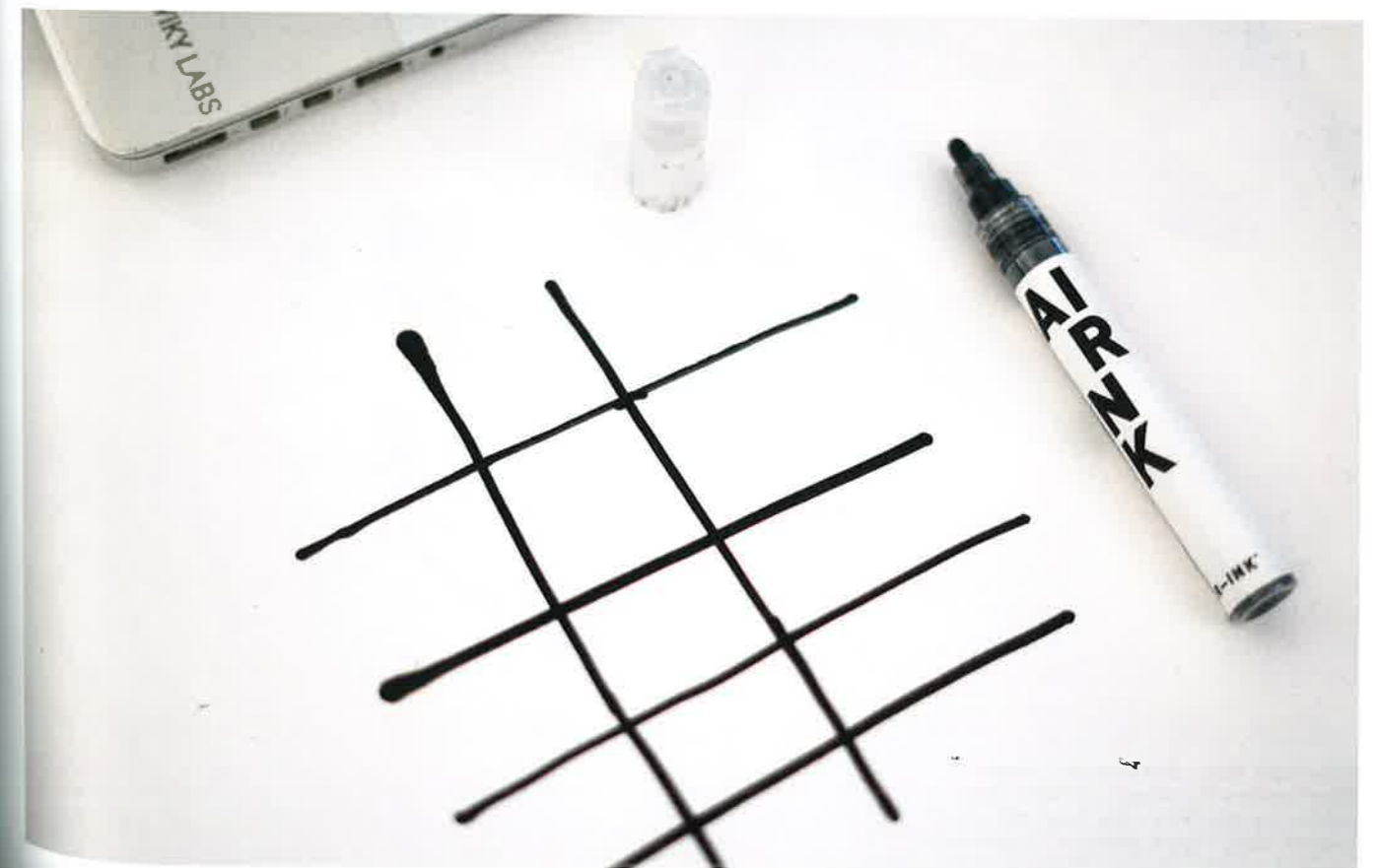


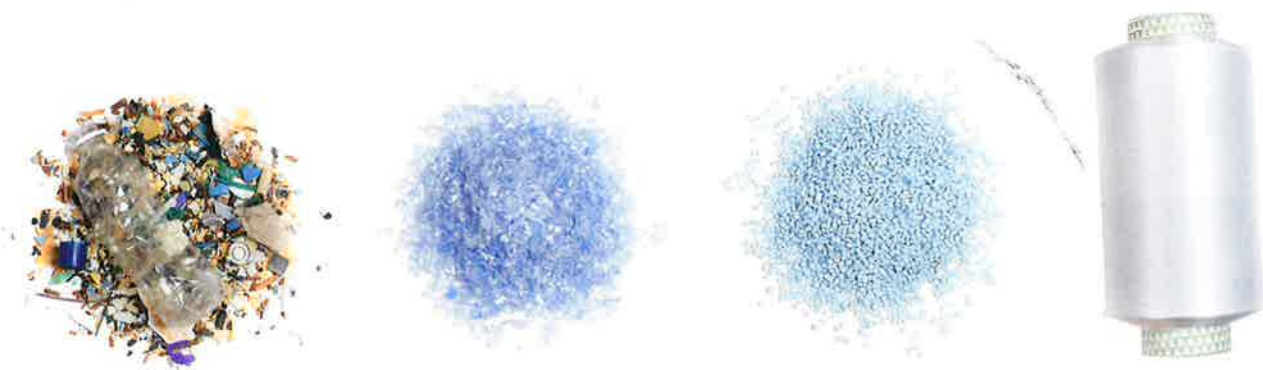
Latitude for Uniqueness Series, 2014-ongoing; Kirstie Van Noort (Dutch, b. 1986); Porcelain, raw kaolin, black Amakusa stone waste; Dimensions variable





AIR-INK, 2013-ongoing; Anirudh Sharma (Indian, b. 1988), Graviky Labs (Bangalore, India, founded 2016); Particulate carbon matter, glass vial, brushes



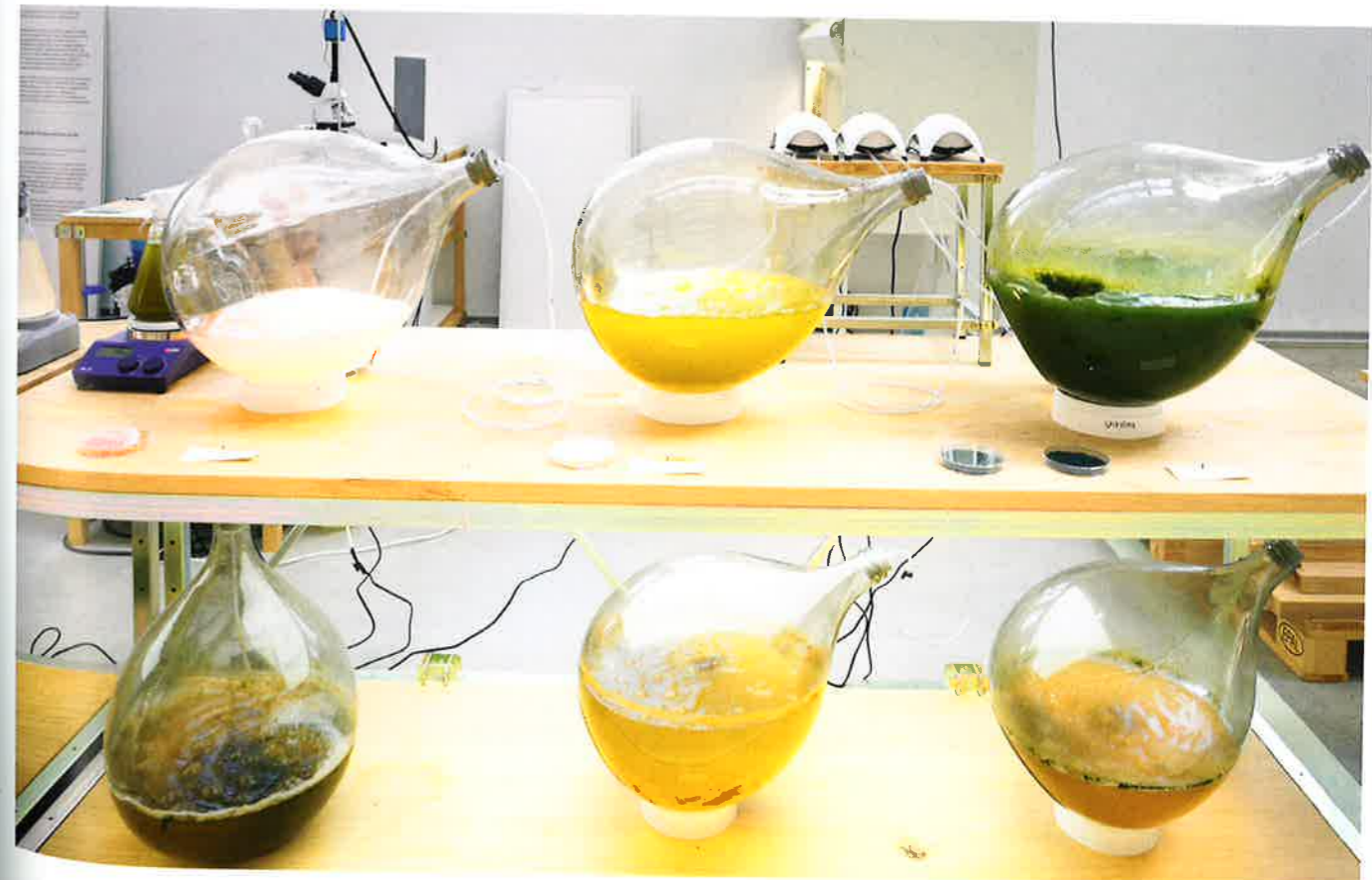


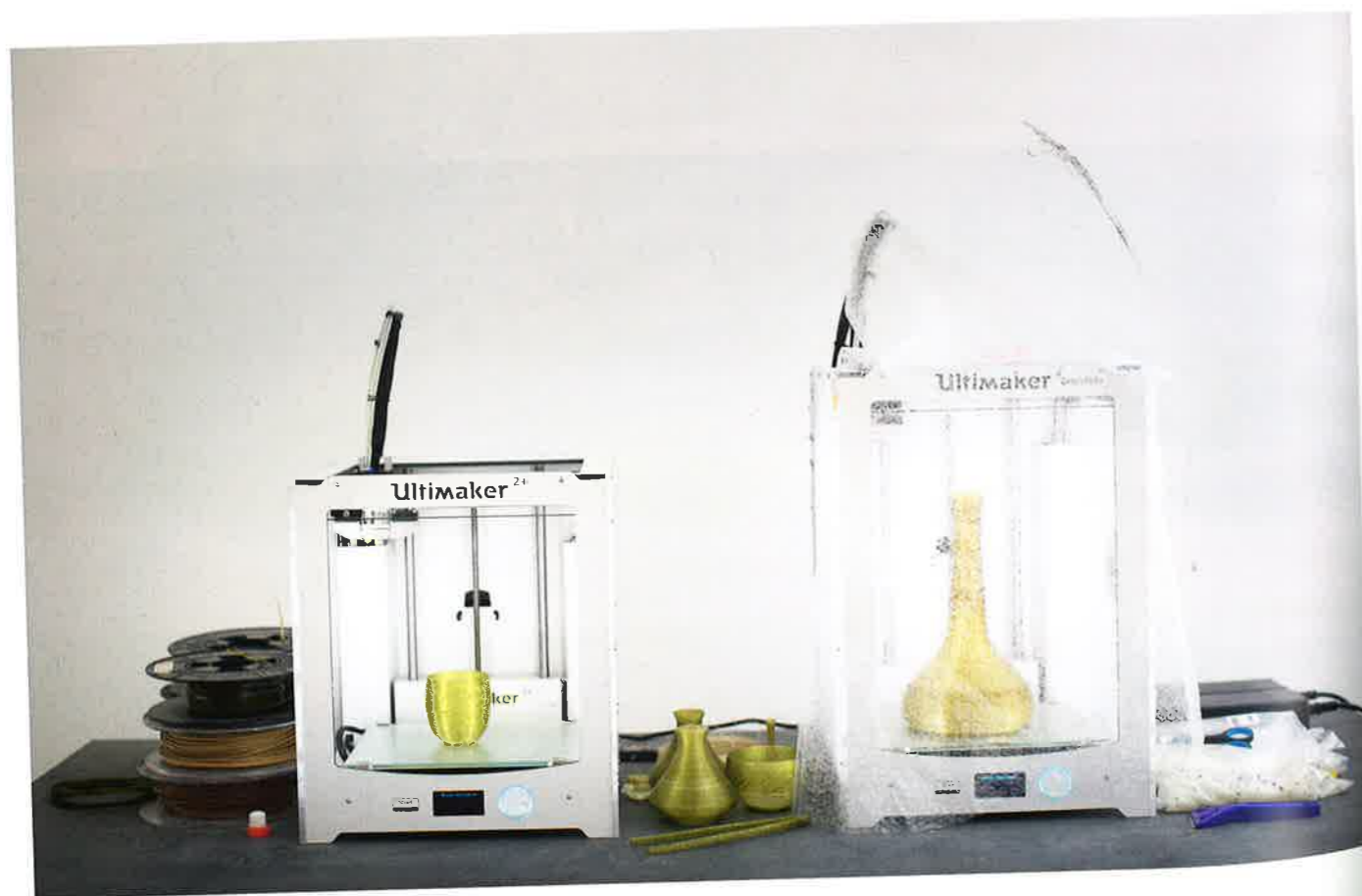
UltraBOOST Shoe, 2016-ongoing; adidas (Herzogenaurach, Germany, founded 1949) and Parley (New York, New York, USA, founded 2012); Ocean plastics, synthetic textiles, rubber; Dimensions variable





Algae Lab, 2018; Studio Klarenbeek & Dros (Zaandam, Netherlands, founded 2004) with Atelier Luma (Arles, France, founded 2016); Biomaterial made of locally grown microalgae, sugar-based biopolymer; Dimensions variable





Algae Lab, 2018; Studio Klarenbeek & Dros (Zaandam, Netherlands, founded 2004) with Atelier Luma (Arles, France, founded 2016); Biomaterial made of locally grown microalgae, sugar-based biopolymer; Dimensions variable



Designers are often on the lookout for new materials or new material properties. The search for new materials and applications calls for an openness in interpreting the design trade, from which it is evident that a theoretical approach alone does not produce the desired results. Hands-on experience and the use of one's senses are important components on the road to success. Julia Lohmann is somebody who fully embraces this approach. She has combined experimenting, researching, and designing as her main mode of operation, giving an entirely unique interpretation to her profession. She became inspired by seaweed while visiting a fish market in Japan and turned this fascination into a project called *Department of Seaweed: Living Archive (2018–ongoing)*¹²—a mobile, multidisciplinary research environment that offers makers, designers, researchers, and architects the opportunity to conduct research, based on speculative design principles, into possible environmentally friendly and socially sustainable visions for our future. The objective of this environment is not purely and simply to exhibit the work that has been created, but also to provide the public with insight into her methods and approach. In her work with seaweed and particularly kelp, Lohmann is inspired by the properties of other materials, such as the translucency of glass, the structure of wood, and the strength and flexibility of leather. At the same time she is investigating whether seaweed could be used as an alternative for these materials, as a veneer, leather, or parchment, or as a replacement for oil-based products such as plastic. The objectives of the *Department of Seaweed* projects are to increase awareness of the origin of materials that we use and to restore the connection between our modern way of life and the plant and animal kingdoms. Lohmann experiments with seaweed from various parts of the world. She discovered that seaweed from Japan has very different properties than seaweed from Iceland. This difference in properties has consequences for products and the processing technology.

Sea Me (2017–ongoing) from Nienke Hoogvliet takes a different approach to generating awareness around the pollution of our seas and the resources we find in water ecosystems. Hoogvliet has developed a yarn out of natural sea algae, using seaweed pigments as dye. Sea algae grows more quickly and needs less nutrition than more traditional materials used in textiles, such as cotton. She combines the yarn with waste found in oceans, such as plastic fishing nets, to create handmade rugs.

The designers that are being explored in *Salvage* share a clear vision of nature as well as the passion to have meaningful impact and find solutions to crucial issues. All of the projects emphasize the importance of awareness and activating people. They look for alternatives to materials that have an impact on our climate or have a polluting effect on our environment. This search is one of the driving forces for some of today's generations of designers. In the projects described, we have seen that all applications and possibilities are examined and that the young generation of designers is not concerned exclusively with designing beautiful products. There is also an awareness that people are responsible for the consequences of using materials. Indeed, research into new applications and the consequences of the application fall under the designer's responsibilities.

The projects illustrate clearly that the design discipline is undergoing drastic changes. A multidisciplinary approach, the practice of tinkering, a multimedia concept, and the combination of design and research can be seen in many of the projects. All of the designers look at the bigger picture; they work on concrete solutions and applications but, at the same time, regard this as a starting point for building networks and communities.

The projects detailed in *Salvage* show that not only do people cause "the indelible marks left by humankind on the geological face of our planet"¹³ but they also can prevent these scars from appearing in the first place.

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