

01.07.2022		
16:00	SAR meets gkfd	
17:20	Long Conversation Wrap-Up	
18:00	Opening Ceremony	
18:30	Camille Jania Norment	Keynote 'Unfolding'
19:45	Reception at Library Foyer	Steubenstraße 6/8, 99423 Weimar
20:15	Welcome Dinner at BUW Mensa	Marienstraße 15b, 99423 Weimar

Day 2 / Weimar

02.07.2022	Session 1	Audimax: Steubenstraße 6/8, 99423 Weimar
10:00	Open Doors & Session Intro	
10:20	Emanuel Mathias	Please be Observant! Principles of Mimetic Appropriation in Artistic Research Practice.
10:50	Rebecca Collins	Parametres for Understanding Uncertainty
11:20	Break	
11:40	Ivan C. H. Liu	Complexity, Environment, and Future Aesthetics
12:40	Session Wrap-Up & Discussion	
	Session 2	SeaM - Studio für elektroakustische Musik: Coudraystraße 13a, 99423 Weimar
10:00	Open Doors & Session Intro	
10:20	Guy Livingston	**ONLINE** Imposing/Inviting: Gestural Indications for Silence in Beethoven's Last Piano Sonata
10:50	Márcio A. S. Steuernagel	Attend to the Tension: Recalibrating Relationships Between Performer, Composer, and Score in Notated Composition Performance Practice
11:20	Break	
11:40	Edgar Omar Rojas Ruiz	The Prehispanic Numerical Systems in New Media Musical Design
12:40	Session Wrap-Up & Discussion	
	Session 3	Hörsaal A: Marienstraße 13c, 99423 Weimar
10:00	Open Doors & Session Intro	
10:20	Claire Waffel	Sensing the Border: Between Water and Land
10:50	Ramon Parramon, Irati Irulegi, Anna Recsens	What's Behind that Silence?
11:20	Break	
11:40	Pekka Ilmari Niskanen	Sandoponic Gardens, a Contemporary Farming Discourse in the Sahrawi Refugee Community
12:40	Session Wrap-Up & Discussion	
	Session 4	Hörsaal B: Marienstraße 13c, 99423 Weimar
10:00	Open Doors & Session Intro	
10:20	Kamogelo Molobye	Locating the Point, Centring the Self
10:50	Mev Luna	Materializing Citations: Autotheory and Artistic Practice
11:20	Break	
11:40	Jessica Renfro	Attending to Procedural Authorship in Participatory Art Practice
12:10	Session Wrap-Up & Discussion	
13:00	Lunch Break	
14:30	Session 5	Audimax: Steubenstraße 6/8, 99423 Weimar
	Open Doors & Session Intro	
14:50	Adnan Hadzi	Interdisciplinary Research in European Extended Reality Labs
15:20	Katerina Krtilova, Yuval Levi	Perspectives of Human-Computer-Vision: A Space Odyssey

# Mend, Blend, Attend: Advancing Artistic Research

13th SAR International Conference  
on Artistic Research

# Sandoponic Gardens in Sahrawi Refugee Camps in Algeria and Helsinki Biennial 2023

## Pekka Niskanen

### Abstract

The gardens in the refugee camps of the Sahara are in many ways utopia, not merely an imagined or unreachable sense, but utopias that have become realities. Not only do the gardens provide a source of food for Sahrawi refugees, but they also serve as a valuable research model for horticultural practices in extreme conditions. Helsinki Sandoponic Garden, also known as 'PHOSfate', is a project by the artistic research group — 'PhoFATE', formed by Pekka Niskanen and Mohamed Sleiman Labat in 2018. The Helsinki Sandoponic Garden will be constructed on the occasion of the Helsinki Biennial during the spring and summer 2023. The 'PHOSfate' garden to be shown relates to phosphorus and its impact on the Sahrawi, but also the environmental challenges posed by climate change and sea eutrophication caused by phosphorus fertilizers. This research paper focuses on different gardens located far away from one another but united by a common innovation, combination of sand and water.

Keywords: Sahrawis, refugee camps, sandoponic garden, Baltic Sea, phosphorus, Helsinki Biennial 2023

### Introduction

This article highlights how these community and family gardens act as sites of resistance and resilience. Over the course of the research, I became familiar with several family gardens in the refugee camps in the Algerian Sahara, as well as community gardens in Rome, Paris, and Helsinki. Gardens have sometimes been framed in theoretical discourse as either utopias or heterotopias. Foucault theorized that gardens can be considered 'crisis heterotopias', a category he also extends to psychiatric hospitals, nursing homes, and prisons. Heterotopias are 'other places' in relation to normative cultural places in a given society. Heterotopias have a relationship with all other places inside a particular culture. Gardens as heterotopias, can be spaces of both imagination and action. (Foucault 1997: 332–34). Sahrawi

refugee camps and their gardens in the South-western part of Algerian Sahara can also be understood in terms of a crisis heterotopia, as the Sahrawis population enclosed within the refugee camps do not have the right to go outside of the camps, nor can they return without specific permissions.

The gardens in the refugee camps in the Sahara are in many ways utopias — not merely in the speculative sense, they are utopias that have become reality. These gardens are political statements about the strength, resistance and resilience of a community in a geographical place in which it is presumed that there is an inevitable lack of resources and unavoidable marginalization. Not only do the gardens generate a source of food for Sahrawi refugees, but they also function as an important research model of horticultural practices in extreme conditions. They are poetical places where the Sahrawis' oral knowledge of the Sahara and its climate conditions are evident and pronounced. This collective knowledge demonstrably affects the design and practices of the gardens. Mohamed Sleiman Labat's film *Desert PhosFATE* (2023) brings to the fore aspects of the Sahrawi context, through storytelling that centers around the family gardens.

I will explore the connections between the Sahrawi gardens in the refugee camps in the Sahara with the Baltic Sea when I discuss the Helsinki Sandoponic Garden, called 'PHOSfate'. It is a project by the artistic research group PhosFATE formed by Pekka Niskanen and Mohamed Sleiman Labat in 2018. The Sandoponic Garden will be built for the Helsinki Biennial during the spring and summer 2023. The 'PHOSfate' garden presented at the biennial addresses the topic of phosphorus and its impact on the Sahrawi, but also environmental challenges, in the form of climate change and sea eutrophication caused by phosphorus fertilizers. Phosphate mining is a principal factor behind the Sahrawi people's loss of their nomadic way of life, in addition phosphate mining has reshaped the Baltic Sea ecosystem. The fertilizers made of phosphate rock extracted in the Western Sahara end up in the Baltic Sea.

This research text focuses on gardens that are geographically distant, but which are united by a common gardening innovation, a combination of sand and water. I will move between the two in my reading, with an approach that emphasizes the consequences of climate change, and the adaptation to it, as well as ecological and environmental resistance. I will describe the various manifestations of ecological and environmental resistance that arise when the established notions of ecological and environmental justice within a community or society are disrupted and confronted. The primary place of the resistance in these gardens is not just through art, but also takes place on an environmental and horticultural level as well. When focusing on the importance of gardens, I will engage with some of the discourses around environmental justice and ecological justice.

I will explore how the practices of various discourses and disciplines can alter the perception of gardens, transforming them from mere sites of rational plant cultivation into something more nuanced and multifaceted. Instead, I suggest that the gardens in Sahrawi refugee camps and the one featured in the Helsinki Biennial embody a multi-dimensional approach, integrating various levels of action and contemplation, and a commitment to acknowledging injustices, in a method that embraces poetics. What

constitutes wrongdoing can be related to unrecognized identity, or to ecological and environmental damage. In response to the reality of structural violence, environmental and ecological violence, the gardens become a crucial site of counter resistance. As shown in this case, gardens have both the potential to produce and reposition identities and social subjects.

### **Environmental Justice and Ecological Justice**

Environmental justice as a discourse focuses especially on certain communities that suffer from poverty, misrecognition, and marginalization. They might be indigenous communities, communities of color, or those dealing with the varied effects resulting from colonial regimes. It is typical that these communities have disproportionately faced environmental injustice, and less environmental protections. In environmental justice discourses, the focus is predominantly on the consequences of environmental politics and changes to human communities. This is almost the polar opposite to the discursive practices of ecological justice in which the central concern is for the natural world with or without human presence. (Schlosberg 2007: 4–6)

I don't wish to stress here the separation of these two different approaches to justice and injustice. Instead, I'm interested in exploring their interconnectedness and how these justices are actually linked together as part of a broader more inclusive discourse. Notions of justice regulate how we define social and economic equality and inequality, based on their respective politics of recognition. Lack of recognition can lead to devaluation on the individual, cultural, and global level, and causes great harm to oppressed individuals and communities. (Schlosberg 2007: 13–16)

Sahrawis suffer from a lack of recognition as a minority in Algeria, Western Sahara, and in Morocco. Morocco succeeded in denying the Sahrawis' the right to the Western Sahara after they conquered the area and its natural resources 1975. Morocco took over the region after Spain gave up its colony (Sleiman Labat and Niskanen 2020a: 4; Sleiman Labat and Niskanen 2020b: 244). The United Nations has never accepted the occupation (UN Resolution 380 1975). The Sahrawi exile and their dislocation into refugee camps in Algeria has led to the disappearance of the Sahrawi traditional way of life. In the past, they were pastoralist nomads primarily in the Western Sahara region. Sahrawis have been stripped of their political rights and denied any proactive role in deciding the fate of the Western Sahara and its natural resources.

Misrecognition is often tied to institutional power in a manner that reproduces and constructs subordination, inequity, and disrespects identities and communities. Recognition requires conditions in which individuals and their communities are entirely free of any threats. They must have political rights as well and the freedom to practice their cultural traditions. Extreme injustice happens when a whole community is excluded from the possession of political rights and who as a result are unable to protect the natural resources in their historical area against colonial and post-colonial powers (Schlosberg 2007: 13–16). This is very much the current situation for the Sahrawis who as a group have also lost most of their traditional nomadic identity. There is no irrefutable evidence that the Sahrawis would have not just continued expanding the mining operations that were started by the Spanish colonizers in the Western Sahara. Sahrawi history doesn't have an easy answer for this dilemma.

### **The Sahrawi Gardens**

It is possible to understand the Sahrawi hydroponic and sandoponic gardens in the Sahara refugee camps as a combination of both activism and art (*Desert PhosFATE 2023*). The extended field and practice of art and gardens means that the aesthetic level of them is just one among many. The political and social level of art and gardens emerges when different discourses affecting them are recognized. The significance of art and gardens can be seen in how they produce and affect the world. Knowledge about the existence of the Sahrawi gardens brings to the surface discourses of colonialism, post-colonialism, injustice, in addition to several other discourses which go well beyond the control or intentions of those who manage and maintain the gardens.

Sahrawi knowledge is still strongly based on oral traditions, which has transmitted and preserved the stories and events of Sahrawi history. Oral traditions highlight geographical areas and places and their poetical dimension. At the same time, desert knowledge about weather, seasons, and plants is passed on, (Sleiman Labat and Niskanen 2020a: 4) as new oral knowledge about horticulture bears fruit in the Sahrawi gardens.

I claim that art in the gardens of the Sahrawi refugee camps is related to two fundamentals aspects. The first is the new identity of the Sahrawis that the gardens are involved in producing. The second is the multisensory environment of the garden with its smells, scents, shadows, and sounds, which makes possible a poetical space for discussions and dreaming. Sahrawis have developed a new relationship with plants. The herbs and vegetables in the gardens and also the plants kept inside the houses are indications of this altered relationship. The gardens are important spaces for the oral tradition now enriched with new knowledge about Sahrawi horticulture. At the same time, this represents a shift in the identities of the Sahrawi communities living in the Sahara refugee camps.

The first small scale family gardens started to emerge in the Sahrawi refugee camps in the Hamada Desert, southwest Algeria around 2002. Ever since then, they have been increasing. The different garden models are strong expressions of resilience. They provide necessary food for the Sahrawis to survive. International aid has been ongoing since the arrival of the Sahrawi to the refugee camps 1975. (Sleiman Labat and Niskanen 2020b: 243–44)

The gardens of the refugee camps in the Sahara are indicative of the transformative and adaptive way of life of the Sahrawis. The Sahrawi gardens are based on their knowledge of living in the Sahara Desert, which is often flattened out and simplified in Western discourses as one and the same place without accounting for local differences. The Sahrawi Pastoral Nomads are forced into the limited area of refugee camps in the Algerian Sahara. The emergence of the camps and Morocco's decision to occupy most of Western Sahara have practically destroyed their former way of life. The UN resolutions against the occupation have not prevented Morocco from remaining permanently in the land once home to Sahrawi nomads.

Land use and mining in particular produce threats against indigenous peoples and their native lands. These are often considered direct attacks against indigenous cultures. Even though the Sahrawis are not strictly an

indigenous group of people, their position and identity are very close to that of indigenous peoples. The Sahrawis are refugees who have undergone a loss of their land and nomadic way of life, especially as a result of the mining industry. Phosphate rock from Western Sahara has been exported out of the country for over forty years. The Bou Craa mine in Western Sahara is one of the main sites from which Morocco extracts and exports phosphate rock to be sold outside the region (Western Sahara Resource Watch Report 2021).

The takeover of lands is always a threat to prevailing cultural practices. The destruction of the lands of the indigenous people and nomads has led to the erosion of their traditional ways of life and culture, which has sometimes been characterized as an act of genocide (Schlosberg 2007: 72). This is also happening to the Sahrawis, whose knowledge of moving in the Sahara is disappearing due to their current stationary way of life in the refugee camps. Although some of the desert knowledge benefits the Sahrawis' horticulture, it is an entirely new discourse, which simultaneously participates in the production of a new Sahrawi identity.

### **Sandoponic Garden**

Sand surrounds the Sahrawis in huge quantities, yet it's seldom thought of as a resource for food. Sand has mostly been considered in the negative, as lifeless and useless. The Sahrawis have started to engage in organic farming and to develop new knowledge around it. The most important new garden model is the sandoponic garden, where plants grow in a controlled sand environment, designed to preserve as much water and biological nutrients in the desert as possible.

The sandoponic garden experiment is led by Saharan agricultural engineer Taleb Brahim. The experiment is based on other garden models that have been developed in the refugee camps in the Sahara during recent years, such as family gardens and hydroponic gardens (Sleiman Labat 2021b). Gardens and agricultural knowledge have significantly changed the food production of the Sahrawis. They have been dependent on international food aid since their arrival at the refugee camps in 1975. The gardens have the potential to change the diet of the Sahrawis and to help them in providing more nutritionally balanced food with vegetables and herbs. (Sleiman Labat and Niskanen 2020a: 3, 8; 2020b: 244, 261) With sandoponic gardens, they are rethinking their relationship with sand as a medium, in which they can grow plants. The sandoponic gardens provide a novel solution to the challenging situation of water scarcity and other limitations in the refugee camps. (Sleiman Labat 2021b)

Sandoponic cultivation requires water and humidity control as water dissolves very quickly in the sandy soil and evaporates when the garden is exposed to direct sunlight. A sandoponic garden can prevent these problems with the help of various control mechanisms such as the use of straw and other covering materials. The sandoponic garden has only fifty centimetres of sand on a sloped surface that does not allow the water to go through to the soil. The grains of sand should be relatively large, allowing water to flow to different parts of the garden. Excess water is collected at the lower end of the sloping surface of the garden and reused again. (Sleiman Labat 2021b)

The sandoponic garden requires the use of organic fertilization from local sources, such as manure that is made into compost together with organic kitchen waste, leftovers like vegetable peels. As they are mixed together with the ash and the manure of the animals, the green leaves of the trees and the residue of the crops this catalyzes a process of anaerobic fermentation. Compost produces nutrient solution for the gardens like compost tea. (Sleiman Labat 2021b)

So far, there are only a handful of sandoponic gardens in the Samara refugee camp in the Sahara. However, this new form of garden is a promising breakthrough, especially within the Samara camp, where the water shortage is a big problem.

### **The Performativity of Gardens**

Not everything is possible within a certain time and place, because events and phenomena are always culturally determined and structured (Butler 2006: 42; Pulkkinen and Rossi 2006: 10). Only certain ways of obtaining food become comprehensible categories in a given nomadic culture. Gardens are not part of a mobile and perpetually changing nomadic lifestyle. Changes in the nomadic way of life often have occurred as a result of coercive forces related to colonialism. The emergence of a garden in the refugee camps of the Sahara Desert has, at first, to be understood as above all an exception, in comparison their previous way of life as refugees.

The life of the Sahrawis in the refugee camps marks the end of their nomadic pastoralism that previously remained unchanged over generations. New institutions such as schools, hospitals, and cultural centers have been established as part of the camps. Above all, the gardens are the result of the development of the Sahrawi civil society and not to be understood as directly connected to the official policy of the refugee camps. The establishment and growth of the gardens was required to underline the possibility of horticultural practice in the Sahara Desert. This practice has been repeated for more than twenty years, which is the reason why I also view the gardens in relation to ideas of performativity.

When thinking about performativity, one must take into account its counterpart — the pedagogical narrative. A form that seemingly lends itself more to more static forms, the rigidity of this kind of narrativity doesn't allow much room for the possibilities of retelling and variation as does the performative. (Huddart 2006: 108–09, 121; Bhabha 1994: 145) The pedagogical implies normativity and continuity, while the performative embraces a certain kind of restlessness, a constant movement away from what once was (Huddart 2006: 108). The phenomenon of family gardens in the Sahrawi refugee camps might productively be understood in this way, as a countermove against the pedagogical. The gardens can also be seen as performative in the sense that its development was only possible at a certain place and time, and under specific and situated conditions of the refugee camps.

In my thinking, I consider performative repetition, repeating differently, doing differently and acting differently in a certain place as a counterforce to the subjugation of individuals and groups by dominant powers. The emergence of all these 'othernesses' is also influenced and shaped by mistakes and coincidences. A stray seed landing in the wrong place in the Sahara Desert can mark the unintentional beginnings of a basil garden. Such

accidental beginnings have played a role in the past in the case of Sahrawi's Samara refugee camp in southwestern Algeria.

One of the key functions of gardens has been to act as a place of rest and recovery. They have the capacity to activate perceptions and invite multi-sensory experiences — rich with scents, colors, shapes, and textures.

### **Helsinki Sandoponic Garden PHOSfate**

In summary, our 'PHOSfate' garden centers around the issue of phosphorus and its impact on the Sahrawi, but also environmental injustice, climate change, and the eutrophication caused by phosphorus fertilizers in the Baltic Sea. As I have outlined earlier, the Sahrawis have started to engage in practices of organic farming and are continually developing new knowledge around it. The most important innovation is the sandoponic garden, a gardening method in which plants grow in a controlled sand environment.

The aim of our 'PHOSfate' garden is to combine two geographically distinct realities, that of the struggle of the Sahrawis and the Baltic Sea. The garden on the Helsinki Island, Vallisaari, is inspired by the model developed in the Sahrawi refugee camps but takes another form entirely. It resembles the blue-green algae cells as they divide and multiply. In the Vallisaari garden, we will grow basil, coriander, carrots, potatoes, kale, and lettuce, the same plants that the Sahrawis have in their sandoponic gardens in the Sahara. Our garden will signify an artistic and ecological resistance against forgetting and marginalization.

The Sandoponic garden in Helsinki Biennial 2023 will be a place to understand the consequences of phosphate rock mining in two very distinct locations, in the refugee camps of Sahrawis in the Sahara in Southeast Algeria in the North European Baltic Sea. There is currently no in-depth understanding as to how the mining of phosphate rock has traumatized Sahrawis in the refugee camps and in the communities on the shores of the Baltic Sea.

Phosphate mining is the reason for the Sahrawis losing their nomadic way of life and it has reshaped the Baltic Sea marine ecosystem over a half century. The phosphorus fertilizer made up of the distant phosphate rock in Western Sahara has in turn found its way into the Baltic Sea as well (Western Sahara Resource Watch Report; 2020). The mined phosphate rock used for fertilizers in agriculture has increased the phosphorus fluxes to marine areas threefold (McCrackin, et al. 2018: 1107). The excessive use of processed fertilizers on farms is causing widespread eutrophication. It is most evident in the form of cyanobacteria blooms, especially in the summer (Meier et al., 2018: 3227), sometimes also perceivable as traces in the frozen sea. The algae get their nutrition from phosphate and nitrogen fertilizers. Finally, the algae die in the sea. Dead algal blooms absorb oxygen from the water and sink to the bottom (Gupta et al., 2015: 22–23, 35). This causes oxygen depletion in large areas of the Baltic Sea. Significant oxygen loss in turn leads to the death of fish and further decimation of marine life. It is most evident in the form of cyanobacteria blooms that consume oxygen (Ahtiainen et al., 2014: 9–10).

My understanding of the environment is linked not only to nature and its surroundings but also extends to perceptions of social, racial, and economic justice. In environmental justice, social and ecological views interlock.

They raise issues related to the fair distribution of natural resources, the importance of community and democratic responsibility (Schlosberg 2007: 73).

The perspective that we present in the Helsinki Biennial sandoponic garden is philosophical and political in nature, as identities related to the environment are always political questions. Our sandoponic garden brings to light the marginalized identities of the Sahrawis as well as the under-acknowledged ecological and environmental identities of the Sahara and Baltic Sea.

This text is an attempt to engage with the subjugation of the Sahrawis along with their resistance which has emerged in the form of the Sahara refugee camps family gardens. My aim is to do the same with the Helsinki sandoponic garden together with Mohamed Sleiman Labat on the island in the Baltic Sea in Helsinki Biennial 2023.

Sahrawis have their very own oral knowledge formation that Mohamed Sleiman Labat has called 'desert knowledge'. In recent years, the Sahrawi horticultural knowledge has been shaping and changing their traditional oral knowledge. The Sahrawi horticultural knowledge and practices can be thought of as the formative beginnings of a new horticultural discourse. It developed in the Sahrawi refugee camp under extreme conditions, in which the Sahrawis combined both Western garden knowledge and their own knowledge of the Sahara desert and its conditions.

In Sahrawi family gardens, discussion is an important tool to connect the gardens to the discourses of art. I argue that they have a connection with art because they manifest a resistance to power. Conversations taking place in the gardens can be classified as conversation art. Gardens have an artistic dimension in addition to their horticultural level as the gardens challenge misrecognition, subordination, inequity and bring to light the communities whose identities are being disrespected. The gardens I'm bringing up perform as they repeat differently the form and the idea of a garden. The Sahrawi gardens are sites of resistance in the face of the idea that UN food aid is the only solution for the Sahrawi refugee's nutritional needs.

The Helsinki 'PHOSfate' sandoponic garden is a promise for the future, one that attempts to light up the injustice of two different albeit interlocking realities, the Sahrawis and the Baltic Sea. This could be a meaningful place to begin a shared struggle against the neglected injustices of phosphate rock mining in Western Sahara and the subsequent harm and destruction phosphorus fertilizers have wrought to the marine ecosystem in the Baltic Sea.

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I Pekka Niskanen and Mohamed Sleiman Labat. *Nomadic Seeds*, experimental garden, 50 cm x 400 cm, forum box, Helsinki, Finland, 2023. Photo: Pekka Niskanen

II Pekka Niskanen, *Baltic Sea*, poster, 94 cm x 134 cm, forum box, Helsinki, Finland, 2023. Photo: Pekka Niskanen

III Pekka Niskanen, *Phosphorus fertilizers*, poster, 94 cm x 134 cm, forum box, Helsinki, Finland, 2023. Photo: Pekka Niskanen

PhosFATE.  
The Effect of  
Phosphorus  
on the Baltic  
Sea and the  
Saharawi  
people in  
the Hamada  
Desert

# Baltic Sea

**The human intervention**  
in the Baltic region is reshaping  
**THE BALTIC SEA  
MARINE ECOSYSTEM.**

**The excessive** use of processed  
fertilizers on farms is causing  
blue-green algae to bloom.

THE ALGAE GET THEIR NUTRITION FROM  
**PHOSPHATE AND NITROGEN FERTILIZERS,**  
**AND THEY DIE IN THE SEA.**  
This causes oxygen depletion  
in large areas of the bottom of the Baltic Sea.

ALTHOUGH PHOSPHORUS EMISSIONS INTO THE BALTIC SEA  
AND THE WATERS LEADING TO IT HAVE DECREASED,  
EUTROPHICATION AND THE RESULTING LOSS OF OXYGEN ARE  
A SIGNIFICANT PROBLEM FOR THE BALTIC SEA ECOSYSTEM.<sup>5</sup>

PhosFATE.  
The Effect of  
Phosphorus  
on the Baltic  
Sea and the  
Saharawi  
people in  
the Hamada  
Desert

# Phosphorus

**fertilizers** previously used  
on fields can leak  
into water bodies  
**FOR DECADES.**

**THIS HAS DELAYED**  
measures to reduce nutrient loading in  
lakes, rivers and coastal seas, where  
phosphorus is increasingly accumulating.

THE MINED PHOSPHATE ROCK USED  
FOR FERTILIZERS IN AGRICULTURE HAS  
increased the phosphorus fluxes  
to coastal oceans threefold.

**Less than half of the** PHOSPHORUS  
FERTILIZER APPLIED TO THE FIELD  
is converted into a harvested crop,  
**AND LESS THAN A QUARTER**  
**PRODUCES FOOD FOR PEOPLE.**<sup>7</sup>

**Colophon**

**Mend, Blend, Attend**  
**Advancing Artistic Research**

**13th SAR International Conference on  
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