PENDO EARTH

FIELD REPORT No. 1

Cage tilapia farming at Dunga Beach, Lake Victoria. Kisumu County, Kenya, June 2026.

Life in the Cages

An Exploratory Field Assessment of Cage Tilapia Farming at Dunga Beach, Lake Victoria

JUNE 2026 · KISUMU COUNTY, KENYA

Pendo Earth

REGENERATING ECOSYSTEMS · TRANSFORMING FOOD SYSTEMS

About Pendo Earth

Pendo Earth is an evidence-driven food systems organisation working at the intersection of aquatic animal welfare, regenerative agriculture, plant-forward nutrition, environmental sustainability, and community livelihoods. Through research, practical innovation, and partnership, Pendo Earth develops and demonstrates solutions that allow animals, people, and ecosystems to thrive together.

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Pendo Earth thanks the Beach Management Unit at Dunga Beach, whose leadership opened the door to this work and introduced us to the farmers who took part. We are grateful to those farmers for their time and candour, and for speaking openly about the opportunities and the difficulties of cage aquaculture. We also acknowledge the wider community of people working to strengthen sustainable aquaculture in Kenya, in the hope that this report contributes something useful to that shared effort.

Scope of this report

This is an exploratory scoping assessment, not a controlled welfare study. It was conducted over one week in June 2026 at a single location, with a small number of farms reached through facilitated introductions. Its purpose is to observe cage tilapia farming at close hand, record what was there, and identify the questions most worth pursuing. The observations that follow are the Foundation's own qualitative field findings. They are offered as a foundation for systematic research, not as a substitute for it. A full account of the assessment's design and limits is given in the Methodology.

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Executive Summary

In June 2026, Pendo Earth spent a week on the Kenyan shore of Lake Victoria, at Dunga Beach in Kisumu County, looking closely at how Nile tilapia are farmed in floating cages. This report is an exploratory scoping assessment: a first, careful look intended to understand current practice, notice where the welfare of the fish may be at stake, build relationships with the people who farm them, and set the direction for the research that should follow.

Over the week we visited five cage farming operations, observed roughly fifty production cages, and held six structured interviews with farmers, each introduced to us by the local Beach Management Unit. We watched the cages at close range, before and during feeding. We looked at the nets, the water, and the surrounding environment. And we listened to what farmers themselves identified as the pressures on their work.

Three things stood out.

First, the fish are farmed in very large numbers. A single production cage typically holds around five thousand tilapia. Standing beside one cage, and then another, and knowing that each holds thousands of individual animals, the scale of the lived experience contained in this industry becomes difficult to set aside.

Second, the immediate environment of the cages showed clear signs of strain. The water around the cages was visibly turbid. Nets were heavily fouled with algae and organic material. Small freshwater snails covered the cage infrastructure in large numbers. Farmers themselves consistently named declining water quality, falling dissolved oxygen, and a changing climate as the difficulties weighing most heavily on them.

Third, the fish were quiet before feeding and then fed with sudden vigour. No dead fish were seen during the assessment, and the animals appeared externally healthy, but visual inspection alone cannot reach the conditions that matter most to a fish: the oxygen in the water it cannot leave, the stress it carries, the quality of its daily experience inside a crowded cage.

Beneath all of it ran a single question. The water at these farms is measured from a fixed station set some distance from the cages, yet it is inside the cage, in water they cannot leave, that the fish actually live. Whether those two places hold the same water is unknown. If the conditions the fish experience are not the conditions being measured, then the industry may be watching the wrong water entirely. That gap, between where conditions are measured and where the animals live, became the question the assessment kept returning to.

This report does not claim that welfare on Lake Victoria is poor. It claims that welfare here has barely been asked about, and that it should be.

Pendo Earth's position is plainly held. These are sentient animals, farmed in growing numbers, and their capacity to suffer is real. Our concern is to reduce that suffering, to help farmers and the wider public understand these animals as creatures whose experience counts, and over the longer term to support a gradual shift towards food systems that lean far less heavily on farming animals at all. This assessment is a first step on that path. It works with farming communities rather than against them, because durable change is built alongside the people whose livelihoods are bound up in the present system, not imposed upon them.

What follows takes the reader through the week as we experienced it: the context that sent us to Dunga Beach, how we worked, what we saw, what it might mean, and what should happen next. The observations are allowed to stand on their own. The questions they raise become the agenda for the next phase of the Lake Victoria Aquatic Welfare Initiative.

SECTION ONE

Context: Why We Went

A lake under new pressure

Lake Victoria is the largest lake in the tropics and the second largest freshwater lake in the world by surface area. Its basin supports the nutrition and livelihoods of more than forty million people across Kenya, Uganda, and Tanzania. For most of its recorded history the lake fed those people through capture fisheries. In the last decade something new has taken hold on its shores.

Cage aquaculture, the farming of fish inside floating net enclosures, has expanded rapidly across the Kenyan side of the lake. The cages are stocked overwhelmingly with Nile tilapia, a species chosen for its fast growth, its hardiness, and its tolerance of low oxygen. In little more than ten years, cage farming has moved from a small experiment into a substantial commercial industry, and it is still growing. It now accounts for roughly a quarter of the fish Kenya produces.

The reasons are not hard to understand. Wild tilapia catches in the lake have fallen sharply, by more than seventy per cent over recent decades. Demand for affordable protein has risen. Cage farming offers income, employment, and a domestic source of fish at a time when the lake's older way of providing all three is under strain. The growth has been driven by private investment, by improvements in technique, and by government encouragement of aquaculture as a route to food security.

This is the setting in which Pendo Earth began its work on Lake Victoria.

Figure 1.1. *The Winam Gulf shoreline at Dunga Beach, where cage operations extend across the shallow, nutrient-rich waters of the gulf.*

The animals inside the industry

Almost all of the attention this industry has received concerns production, profit, water quality, and environmental impact. These matter. But they leave out the animals themselves. Comparatively little is known about the day-to-day experience of the fish being farmed, and still less under East African conditions specifically. Fish welfare has become a serious field of scientific inquiry internationally. In the aquaculture systems of this region, it has barely begun.

Pendo Earth begins from a position that the science now supports clearly. Fish are sentient. The accumulated evidence from anatomy, behaviour, pharmacology, and neurobiology has produced a scientific consensus that fish are capable of experiencing pain, stress, and fear. That consensus is reflected in law: the United Kingdom's Animal Welfare (Sentience) Act 2022 recognises the sentience of all vertebrates, fish among them. A tilapia in a cage is not a unit of production that happens to be alive. It is an individual animal with a stake in how it is kept.

This is why welfare deserves to be asked about, and why we went to look.

Pendo Earth's conviction is that improving food systems means attending to the linked wellbeing of animals, people, and ecosystems, and that the welfare of farmed fish cannot be separated from the livelihoods of the people who farm them or the health of the lake that holds them. We also hold a longer view, honestly stated. These animals are farmed in large and rising numbers because a food system has been built to depend on them. Reducing their suffering is the immediate work. Helping farmers and the public come to see these animals as sentient, and supporting a gradual movement towards food systems that rely far less on farming animals, is the work beyond it. The two are not in tension. Meeting people where they are, alongside the fish as they are kept now, is how the longer change is reached.

Why Dunga Beach

Dunga Beach sits within the Winam Gulf, on a stretch of the Kenyan shoreline where cage tilapia farming is active and clustered. Several commercial operations work within a small area, which meant a range of practice could be seen in a short time. The area around Dunga in Kisumu County was one of the early centres of the lake's cage-farming surge, and it remains representative of how the industry is conducted along this shore.

What made the assessment possible, though, was willingness. The Beach Management Unit at Dunga agreed to introduce us to farmers and to vouch for the purpose of our visit. That opened conversations that would otherwise have stayed closed. It also set the tone Pendo Earth intends to keep. We came to the lake as people asking to learn, not as inspectors arriving to judge.

Dunga Beach is a window, not a verdict. It shows how this kind of farming is done here. It cannot yet speak for the whole lake.

What we set out to do

The assessment had a deliberately modest and open remit. We wanted to understand cage tilapia farming as it is actually practised at Dunga, to notice the husbandry and the conditions that bear on the welfare of the fish, to hear how farmers themselves see the pressures and the future of their work, and to come away with sharper questions than we arrived with. Formally, six aims guided the week:

1. To develop a first understanding of cage tilapia farming practices at Dunga Beach.
2. To observe husbandry and identify conditions relevant to the welfare of the fish.
3. To understand how farmers view the opportunities and the challenges of cage aquaculture.
4. To identify the practical questions most in need of systematic research.

5. To build relationships with local stakeholders as a foundation for future collaborative work.
6. To generate the evidence that will shape Pendo Earth's Lake Victoria Aquatic Welfare Initiative.

SECTION TWO

Investigation: How We Worked

This was an exploratory field assessment, and its methods were chosen to match that purpose. The aim was not to test a hypothesis or to score welfare against a validated protocol. It was to look carefully, to talk at length, and to notice the patterns worth pursuing. The work was qualitative and observational throughout.

Where and when

The assessment was carried out at Dunga Beach, Kisumu County, on the Kenyan shore of Lake Victoria, over one week in June 2026. Dunga supports a growing cage tilapia industry and was reached through local stakeholders who were willing to take part. Weather across the week was warm and settled, which is worth recording because conditions in the water are seasonal and a single week captures only one point in that cycle.

How the farms were reached

Access came through the Beach Management Unit. After discussion with the BMU Chairperson, five cage farming operations agreed to take part, entirely voluntarily. Because the farms were reached through facilitated introductions rather than random selection, they form a convenience sample. They should be read as five real and informative cases, not as a representative slice of the lake's industry.

What we did each day

Fieldwork ran across the week and drew on two methods that complemented one another.

Direct observation. At each farm we watched and recorded the things that can be seen: how the cages were built and maintained, how clean or fouled the nets were, how the water looked, how the fish behaved before and during feeding, whether there were visible signs of injury or disease, how feeding was done, what protection there was against predators, and the state of the surrounding environment. Observations were written up as descriptive field notes rather than converted into welfare scores, in keeping with the exploratory purpose.

Structured interviews. We held six structured interviews with participating farmers, each lasting around two hours. The conversations moved through farm management, feeding, the environmental difficulties farmers face, fish health, what farmers believe causes mortality, their con-

cerns about water quality, and their hopes for the industry's future. The interviews were there to understand how farmers see their own work. Where something was reported to us but not seen by us, it is presented as a farmer's account rather than as verified fact.

Figure 2.1a. *Interviews with fish cage farmers conducted during the field assessment to document farming practices, operational challenges, and farmer perspectives on cage aquaculture in the Lake Victoria region.*

Figure 2.1b. *Field interview with a fish cage farmer aboard a commercial cage platform during the field assessment.*

How the material was read

Given the exploratory aim, analysis looked for recurring themes and notable observations rather than statistical relationships. Field notes and interview responses were reviewed together, and patterns were grouped around fish behaviour, husbandry, environmental conditions, farmer concerns, potential welfare issues, and openings for future research. The point was not to conclude. It was to work out which questions deserve rigorous study.

Working ethically

Taking part was voluntary. The purpose of the assessment was explained before each interview, and farmers were told plainly that the exercise was meant to build understanding of cage aquaculture, not to grade individual farms. Findings are presented so as to protect the anonymity of the farms and the people who spoke with us. The relationships that made this work possible matter more than any single observation, and they were treated accordingly.

What this assessment cannot do

The limits of the method are set out here, in one place, so that everything that follows can be read plainly against them.

The assessment covered a small number of farms at one location in one week, and was not designed to produce representative estimates for Lake Victoria as a whole. No independent measurements were taken of dissolved oxygen, temperature, ammonia, pH, or any other water quality parameter. No laboratory analysis or veterinary examination was carried out. Behavioural observation was confined to the periods of our visits and captures only brief moments of the fish's day. The work rests on qualitative observation and on what farmers told us. Those methods are powerful for raising questions and noticing what matters. They cannot establish cause, and they cannot deliver a definitive verdict on welfare.

These limits are stated deliberately. This assessment was built to open a line of research, not to close one.

Assessment at a glance

Study period	June 2026
Location	Dunga Beach, Kisumu County
Design	Exploratory field assessment

Farms visited	5
Cages observed	Approximately 50
Farmer interviews	6, structured, ~2 hours each
Duration	One week
Methods	Direct observation and structured interview

SECTION THREE

Observations: What We Saw

What follows is what the week showed us, across five farms and roughly fifty cages. The observations are grouped by theme: the farms themselves, the environment around the cages, the behaviour of the fish, their visible health, the daily husbandry, and the perspectives of the farmers. They are set down as we found them.

3.1 The farms

The participating farms all ran floating cage systems producing Nile tilapia. Farm sizes varied, but the systems themselves were broadly alike in design and management. Each production cage was stocked with around five thousand fish. Feeding was generally done once a day, using commercially formulated feed.

The operations were well organised. Work was divided clearly among staff, who were familiar with the daily routines and attentive to them. Measures against predators were in place, and no predator attacks were seen during the assessment.

Figure 3.1. *A section of commercial fish production cages illustrating the density and distribution of cage aquaculture operations on Lake Victoria.*

3.2 The environment around the cages

Several features of the immediate environment recurred from farm to farm. The water around the cages was visibly turbid. Algae had accumulated heavily, both across the farming area and on the nets themselves, many of which were substantially fouled with algae and organic material. Numerous small freshwater snails were attached to the nets and the structures that held them. We did not assess which species they were or what their presence signifies, but their abundance was a striking feature of the scene.

Farmers returned to the same theme without prompting. Declining water quality was, for them, the central difficulty of cage farming on the lake. Pollution, falling dissolved oxygen, and the effects of a changing climate came up again and again as the pressures they feel most.

Figure 3.2. *Fish production cage with extensive net biofouling, highlighting the need for regular maintenance to maintain effective water exchange and cage performance.*

3.3 The fish before and during feeding

We watched the fish immediately before feeding and again as feed was introduced. Before feeding, the fish were generally quiet, with little spontaneous movement visible in the cages. When feed arrived, that changed at once. Activity rose sharply, and the fish responded to feeding with vigour.

The fish looked healthy overall. But the contrast between the stillness beforehand and the sudden intensity of the feeding response was among the most striking things we saw all week. Observations of this kind were brief and were not made with standardised behavioural methods, so they are recorded as description, and it is the interpretation chapter that asks what they might mean.

3.4 Visible health

No dead fish were seen at any point during the assessment. Nor were there widespread signs of disease or serious injury on visual inspection. A small number of fish carried minor superficial swellings. From what we saw during feeding and from what farmers told us, these appeared consistent with minor physical contact as the fish crowded to feed. No veterinary examination was made and no diagnosis was attempted.

On external appearance alone, then, the fish were in generally good condition. That is worth saying plainly. It is also worth being clear about what looking cannot reach. Visual inspection cannot see stress, physiological state, or chronic ill health, and these are among the things that matter most to a fish's welfare.

Figure 3.3. *Surface aggregation of fish during feeding, illustrating the behavioural response of cultured tilapia to feed distribution.*

3.5 The daily husbandry

Feeding was generally once a day. Farm management was organised and consistent across the farms we saw, and farmers and workers alike knew their routines and showed a clear wish to keep their operations productive.

Water quality monitoring was part of that routine. During the assessment, monitoring was done from a permanently installed station set some distance from the production cages. This is where one of the week's most important observations arose. The station gives useful information about the wider lake. It is not necessarily measuring the water the fish are actually living in, inside a densely stocked cage. We took no independent measurements within the cages, so we cannot say whether the difference is meaningful. But the question is real, and it became a priority for what comes next.

3.6 How farmers see it

The farmers who took part were open, cooperative, and willing to talk about the hard parts of their work as readily as the hopeful ones. Across the six interviews, some themes came up consistently.

The difficulties named most often were declining water quality, falling dissolved oxygen, pollution, and the broader effects of climate change on production. Yet alongside these concerns sat a real optimism about the future of cage aquaculture, and a strong interest in practical ideas that might help. Just as importantly, the farmers did not see us as outside critics. They spoke to us as potential partners in finding things that work. That openness is itself one of the most valuable findings of the week.

3.7 Drawing the observations together

Taken one at a time, none of these observations settles anything about the welfare of the fish. Taken together, they point clearly to where attention is needed. The week showed us:

- High stocking, at around five thousand fish to a production cage.
- Nets heavily fouled with algae, and turbid water around the cages.
- Large numbers of freshwater snails across the cage infrastructure.
- Fish quiet before feeding, then feeding with sudden vigour.
- Farmers consistently concerned about oxygen, pollution, and climate.
- Water quality monitored outside the cages rather than within them.

- A strong and genuine willingness among farmers to work with future research.

Each of these is a thread. The next chapter follows them, and asks what each one means.

SECTION FOUR

Interpretation and Research Priorities

The purpose of this chapter is to make sense of what the week showed, and to turn each observation into a question worth answering. Nothing here concludes that welfare on Lake Victoria is poor. The argument is narrower and, we think, more useful. Welfare here has hardly been studied, several observations suggest it should be, and each of them points to a specific and answerable line of research. We take the threads from the previous chapter in turn.

4.1 Welfare as a question that has not been asked

Most of the attention cage farming has received concerns production, environment, and economics. The welfare of the fish themselves has been largely absent from that conversation, in this region especially. Our week did nothing to suggest this absence is justified. If anything, the combination of what farmers described and what we saw suggests the opposite. The fish are sentient animals kept in large numbers under conditions their keepers themselves find difficult. That alone is reason enough to make their welfare an explicit subject of study rather than an afterthought.

> RESEARCH QUESTION
>
> Not a single empirical question, but the premise of all that follow: **what is the welfare state of cage-farmed Nile tilapia on Lake Victoria, and by what indicators should it be judged under local conditions?**

4.2 The environment the fish cannot leave

The most immediate impressions of the week were physical. Turbid water. Nets thick with algae. Snails everywhere on the infrastructure. On their own, these do not prove that the fish are suffering. A tilapia is a hardy animal, and hardiness is one reason the species was chosen. But a caged fish cannot swim away from its water. Whatever the conditions inside the cage are, the fish live in them continuously. When the surrounding water is visibly degraded and the nets are fouled enough to slow the exchange of water, the question of what the fish are actually breathing becomes pressing.

The farmers' own testimony converges with the physical picture. They named falling dissolved oxygen and declining water quality as their central difficulties. When the people closest to the fish and the direct observations of visitors point the same way, the matter deserves systematic measurement rather than assumption.

> RESEARCH QUESTION
>
> **Do dissolved oxygen and other water quality conditions inside densely stocked cages differ meaningfully from conditions in the surrounding lake, and how do they vary through the day and across seasons?**

4.3 The stillness before feeding

The single most memorable behavioural observation was the contrast between quiet fish before feeding and vigorous fish once feed arrived. Behaviour, read carefully and within a proper scientific frame, is one of the most informative windows onto welfare that exists. Read carelessly, it tells us nothing. Our observations were brief and unstandardised, so we draw no conclusion from them. But they raise good questions. Is subdued pre-feeding behaviour normal and healthy for cage tilapia under these conditions, or is it a sign of something else, such as low oxygen or the effects of crowding? The honest answer is that we do not yet know what normal looks like for these animals here, and that is itself the finding.

> RESEARCH QUESTION
>
> **What are the normal behavioural patterns of cage-farmed Nile tilapia under East African conditions, and which behavioural indicators most reliably signal good or compromised welfare?**

4.4 Crowding and the individual fish

Five thousand fish to a cage is a management figure. It is also a description of how each of those animals lives, in constant proximity to thousands of others. Stocking density is known to shape health, behaviour, and welfare in farmed fish generally, yet very little is known about how tilapia experience these particular densities in these particular systems. The minor swellings we saw, apparently from contact during feeding, are a small hint that density and behaviour interact in ways worth understanding. The larger point is that density is one of the most adjustable things about a cage, which makes it one of the most promising levers for improving welfare if the evidence supports it.

RESEARCH QUESTION

How does stocking density affect the behaviour, health, and welfare of cage-farmed tilapia, are there thresholds beyond which welfare indicators change, and can husbandry mitigate any adverse effects?

4.5 The cage itself

The fouled nets are not only an environmental observation. They are a husbandry variable. Heavy fouling can restrict the flow of water through a cage, and water flow is what carries oxygen in and waste out. If fouling meaningfully reduces exchange, then the routine question of how often nets are cleaned becomes a welfare question as well as a maintenance one.

RESEARCH QUESTION

How quickly do cage nets foul, does fouling reduce effective water exchange, and which maintenance practices best sustain good conditions inside the cage?

4.6 Measuring where the fish actually live

This is the observation we regard as most important, because it shapes how every other question must be answered. Water quality was monitored from a fixed station some distance from the cages. That station describes the lake. It may not describe the cage. And it is the cage the fish cannot leave. If conditions inside a densely stocked, heavily fouled cage differ from conditions in the open water, then monitoring at a distance could be systematically missing the very thing that matters to the animals. We could not measure the difference. But naming it precisely is the assessment's central methodological contribution.

This is not a hypothetical concern. In September 2025, a mass die-off at Dunga Beach killed the fish in around twelve cages while fish in the surrounding open lake were unaffected. The Kenya Marine and Fisheries Research Institute attributed the deaths to a sharp fall in dissolved oxygen inside the cages, linked to polluted river discharge and poor circulation in the shallow gulf. The episode illustrates the very divergence this assessment identifies. Conditions inside a cage can differ sharply, and fatally, from conditions a short distance away. Measuring inside the cages is therefore not a methodological refinement but a means of anticipating and preventing events of this kind.

RESEARCH QUESTION

How do environmental conditions measured at a fixed monitoring station compare with conditions measured inside the production cages themselves, and how large is the difference?

4.7 Farmers as partners, not subjects

The most encouraging finding of the week was human. Farmers spoke openly, described their difficulties without defensiveness, and showed real interest in practical improvement. They did not experience our questions as accusations. This matters for welfare directly, because durable improvement in how animals are kept comes through the people who keep them. It also matters for Pendo Earth's longer purpose. The relationships built at Dunga are the ground on which farmers and the wider public can, over time, come to see these fish as sentient creatures whose experience counts. Research done with farmers, rather than on them, is both better research and the beginning of that education.

RESEARCH QUESTION

Which welfare improvements do farmers judge practical, what prevents the adoption of better practice, and which low-cost changes offer the greatest benefit to the fish?

4.8 The tool that does not yet exist

Beneath all of these lies one long-term question. Improving welfare requires a way to measure it that works under real commercial conditions, that farmers and researchers can actually use, and that is robust enough to be trusted. No such tool is yet established for cage tilapia in this region. Developing and validating one, simple enough to be practical and rigorous enough to be credible, may be the most consequential research contribution of all, because it makes every other improvement measurable.

RESEARCH QUESTION

Can a simple, repeatable, scientifically robust welfare assessment tool be developed and validated for cage-farmed Nile tilapia under East African commercial conditions?

SECTION FIVE

Implications and Next Steps

The questions raised by this assessment point towards practical action. This chapter sets out what should follow, first for Pendo Earth, then for the others whose work touches the lives of these animals. Throughout, the reason for acting is the fish themselves. Where a change also suits a farmer, that is what makes it possible to adopt. It is not what makes it right.

5.1 Pendo Earth's next phase

This assessment is the first step of the Lake Victoria Aquatic Welfare Initiative, and it sets a clear direction. The Foundation's priorities from here are these:

1. **Establish a baseline** using standardised, repeatable methods, so that later change can be measured against a known starting point.
2. **Measure conditions inside the cages,** with particular attention to dissolved oxygen and water exchange, and compare them directly with the readings from fixed monitoring stations.
3. **Develop behavioural indicators** suited to cage-farmed Nile tilapia under local conditions, so that the state of the fish can be read from how they actually behave.
4. **Build a practical, tested way of judging** the condition of the fish that farmers and researchers can use in the field.
5. **Identify and test low-cost changes** capable of reducing suffering, and evaluate them honestly, including where they fail.
6. **Publish openly,** so that the evidence gathered here adds to what is known about farmed fish in the region.

The next phase moves from looking to measuring. That is the natural progression of the questions this week produced.

Figure 5.1. *Research team documenting field observations while travelling between fish cage farms at Dunga Beach.*

5.2 For researchers

The gaps this assessment identified are researchable, and several matter beyond Dunga Beach. The priorities are to measure conditions both inside and outside the cages to establish whether they differ, to develop behavioural indicators of how cage tilapia fare under these conditions, to study how stocking density bears on the animals' experience, and to extend the work across more sites and more seasons so that the picture becomes representative rather than local. Collaboration with Kenyan universities and research institutions would strengthen all of this.

5.3 Towards shared standards of care

As understanding grows, it should settle into shared expectations for how these animals are kept. This assessment is too preliminary to set standards, but it points to where they will need to form. The conditions inside the cage, and not only in the surrounding lake, should be understood and managed. The oxygen available to the fish, the exchange of water through fouled nets, and the effects of crowding all shape how the animals fare, and they are not questions of production alone. Pendo Earth's aim is to help build a shared understanding, grounded in evidence and developed with farmers, of what good practice requires under these conditions and how it can be recognised.

5.4 For farmers

The farmers at Dunga were partners in this work, and the way forward is built with them. Continued engagement with research allows improvements to be grounded in real conditions rather than imposed from outside. Regular attention to net fouling helps maintain the water exchange the fish depend on. Keeping simple records of behaviour, mortality, and unusual events builds, over time, a picture no single visit can capture. And taking part in future pilot studies lets practical changes be tested in the places they are meant to help. Behind each of these sits a longer conversation, entered gently and over time, about the fish as sentient animals whose lives are worth attending to for their own sake.

5.5 For government and regulators

Public institutions shape the conditions under which this industry grows. There is an opportunity to build care for the fish into aquaculture development from an early stage rather than retrofitting it later. Environmental monitoring that better reflects the conditions inside cages, support for collaboration between agencies, researchers, and farming communities, and the eventual in-

clusion of animal wellbeing within best-practice guidance would each strengthen the evidence base on which sound policy depends. Kisumu County's willingness to engage with this work is an encouraging foundation to build on.

5.6 The wider horizon

Pendo Earth's recommendations here are deliberately practical and near-term, because the fish in the cages now cannot wait for the larger change. But the larger change remains the Foundation's purpose. Every fish farmed is farmed because a food system has been built to require it. Reducing the suffering within that system is urgent and worthwhile in itself. Helping farmers and the public understand these animals as sentient, and supporting a gradual, culturally grounded movement towards eating in ways that depend far less on farming animals, is the work these first steps serve. This report improves conditions where it can, now, and names that horizon honestly. Both are true at once, and Pendo Earth holds them together without apology.

SECTION SIX

Conclusion

For one week in June 2026, Pendo Earth stood beside the cages of Dunga Beach and paid attention. We watched the fish before feeding and as they fed. We looked at the nets, the water, and the snails on the infrastructure. We listened to farmers describe the pressures they carry. And we came away with the assessment's real product, which is not a set of answers but a set of sharper questions.

We saw fish farmed in very large numbers, in water their keepers themselves find increasingly difficult, monitored from a station that describes the lake rather than the cage. We saw animals that looked externally healthy and behaved in ways we could not yet interpret. None of this proves that welfare on Lake Victoria is poor. All of it says that welfare here should be studied, and has not been.

That is the finding. The rest is the work it sets in motion.

The fish in these cages are sentient animals, and their experience counts. Reducing their suffering is the immediate purpose of the Lake Victoria Aquatic Welfare Initiative. The longer purpose, held honestly and pursued gradually, is a food system in which far fewer animals are farmed at all, and in which the wellbeing of animals, people, and ecosystems is understood as a single thing rather than three competing ones.

This report is where that work begins.

Pendo Earth · Reimagining food systems