How fair is our water footprint in Peru?

The role of fresh fruit and vegetable production for export in Ica's water emergency, and lessons for sustainable water use in the global economy.

WATER WITNESS

Water Witness leads action, research, and advocacy for shared water security, where all people have access to the water needed to thrive, and are protected against pollution, droughts, flooding, water conflict and ecosystem degradation.

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The study contributes to the delivery of the Glasgow Declaration for Fair Water Footprints which commits its Signatories, including the governments of the United Kingdom and the Republic of Peru, to ensuring sustainable, equitable, and resilient use of water in supply chains facing significant water and climate risk by 2030. The Declaration mandates Civil Society Organisations to provide objective reporting and oversight to hold other constituencies to account, to ensure that the voices of communities, women, youth, the marginalised, future generations, and the needs of nature are represented, and to elevate the public and political profile of water, and advocate for fair water footprints.

The views and opinions expressed do not necessarily reflect those of our donors or the Signatories to the Glasgow Declaration for Fair Water Footprints.

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Cover image:

Blueberry production for EU and US supermarkets in the hyper-arid desert of Ica. (Water Witness)

CONTENTS

ACRONYMS AND ABBREVATIONS

ANA	Peruvian National Water Authority (Autoridad Nacional de Agua)
AWS	Alliance for Water Stewardship
CAO	(OECD) Compliance Advisor Ombudsman
CDP	International Environmental Impact Disclosure Organisation (Formerly: Carbon Disclosure Project)
CEPES	Peruvian Centre for Social Studies (Centro Peruano de Estudios Sociales)
CSO	Civil Society Organisation
ESG	Environmental and Social Governance
GAP	(Global) Good Agricultural Practices
GIZ	German Development Aid (Deutsche Gesellschaft für Internationale Zusammensarbeit)
GRASP	(Global) GAP Risk Assessment on Social Practice
IFA	(Global GAP) Integrated Farm Assurance
IFA	International Fiscal Association
IFC	International Finance Corporation
ISEAL	International Social and Environmental Accreditation and Labelling Alliance
JUASVI	Board of Groundwater Users in Ica (Junta de Usarios de Agua Subterraneas del Valle de Ica)
MAR	Managed Aquifer Recharge
MERESE	Mechanisms of Remuneration for Ecosystem Services
MIDAGRI	Ministry of Agrarian Development and Irrigation (Ministerio de Desarrollo Agrario y Riego)
MINAM	Peruvian Ministry of the Environment (Ministerio del Ambiente)
NCP	(OECD) National Contact Point
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Cooperation and Development
PES	Payment for Ecosystem Services
PETACC	Technical support for water management in Ica (Proyecto Especial Tambo Ccaracocha)
SDC	Swiss Agency for Development and Cooperation
SDG(s)	(UN) Sustainable Development Goal(s)
SEIA	Social and Environmental Impact Assessment
SMART	Specific, measurable, achievable, relevant, and time-bound
SPRING	(Global GAP) Sustainable Program for Irrigation and Groundwater Use
SUNASS	Water supply & sanitation regulator (Superintendencia Nacional de Servicios de Saneamiento)
UNGA	United Nations General Assembly
UNGP	United Nations Guiding Principles
WASH	Water, sanitation, and hygiene
WRG	2030 Water Resources Group

EXECUTIVE SUMMARY

An explosion in the production of high-value agricultural export crops has helped to fuel Peru's impressive GDP growth over the past two decades, and positions Peru as the world's leading exporter of asparagus, blueberries, and table grapes. It is also a strategically important source of avocados, pomegranates, mangoes, and citrus fruit. Year-round cropping supplies the world's supermarkets and consumers in key export destinations of the USA, the Netherlands, the UK, Spain, Australia, France, Germany, Japan, Switzerland, Sweden, and China. The epicentre of this boom is the hyper-arid coastal region of Ica, where the agro-export business generates US$1.2 billion per year in export revenue, equivalent to 0.5% of Peru's GDP.

In 2010, the alarm was raised that water use for irrigation of export crops in Ica was profoundly unsustainable, driving some of the most rapid rates of aquifer depletion ever recorded. Unfettered exploitation of the Ica-Villacurí aquifer, well in excess of its safe, sustainable yield, was shown to have catastrophic impacts on local communities and the environment, imposing water shortages, water quality and ecosystem degradation, climate vulnerability, spiralling costs, social unrest, and conflict. Global news headlines and the formal declaration of a water emergency by the Peruvian government triggered a range of initiatives to address the problem, including a ban on drilling new wells.

Over a decade on, this study takes stock of progress towards the sustainable management of the Ica-Villacurí aquifer, to generate new evidence, lessons, and action. Its ultimate goal is to protect the economic and social benefits of Peru's agro-export trade through the sustainable use of water resources upon which the sector depends. The lessons from Ica are of global importance given recent analysis which shows a growing dependency on water use in the Global South to meet demand for food, clothing, and goods in the Global North, and that 50% of this 'external' water use is likely to be unsustainable, depleting and degrading aquifers and rivers. The case is of particular relevance because of the direct links between resource use in Ica and the behaviour of end consumers, supermarkets, brokers, and investors, and the performance of Environmental and Social Governance (ESG) policies, standards, trade agreements, and disclosure which are supposed to ensure sustainable resource use. Learning from Ica can therefore inform the changes needed to bring our water footprints to within planetary boundaries of sustainability, build resilience in the global economy, and achieve the Sustainable Development Goals.

In 2022, a study team of local and international academics, NGOs and officers from Peru's National Water Authority led a participatory review of the water situation in Ica and the effectiveness of action to date. They consulted 35 organisations and interviewed 79 individuals, visited farms and communities, reviewed available research, collected new data, and convened local and national workshops to validate findings, and generate the recommendations set out in this report. All organisations mentioned have been provided with the opportunity to respond, and factual corrections made based on their feedback. The evidence presented here can be considered robust and reliable.

KEY FINDINGS

Increased production and trade

Production in Ica has continued to grow rapidly, with agro-export revenues six times larger than in 2010. Production has also diversified with rapid growth in grape and blueberry cultivation alongside asparagus, pomegranate, avocado and citrus. Trade with some nations has grown dramatically. For example, the volume of fresh fruit exported to the UK market has grown tenfold since 2010, with much of this production in Ica. A wave of investment from commercial and development banks, as well as private investment and equity firms has driven this expansion, with significant investments made by Santander, Rabobank, Banco de Crédito del Perú, Interbank, Metropolitan Life Insurance, Cordiant Capital, RRG Capital Management, the Inter-American Development Bank (IDB Invest), the Development Bank of

Latin America and the Caribbean (CAF), and the International Finance Corporation (IFC). A growing number of brokers work as intermediaries between growers and the supermarkets served by Ica's production, which include all the major UK supermarkets (Tesco, Sainsbury's, Asda, Morrisons, Aldi, Lidl, Coop, Waitrose, and M&S), alongside Edeka and Carrefour in the EU, and Walmart, Costco, and Kroger in the USA. Figure I maps available information on the producers and brokers supplying the major supermarkets in the UK, together with current or recent investors in agro-export production in Ica.

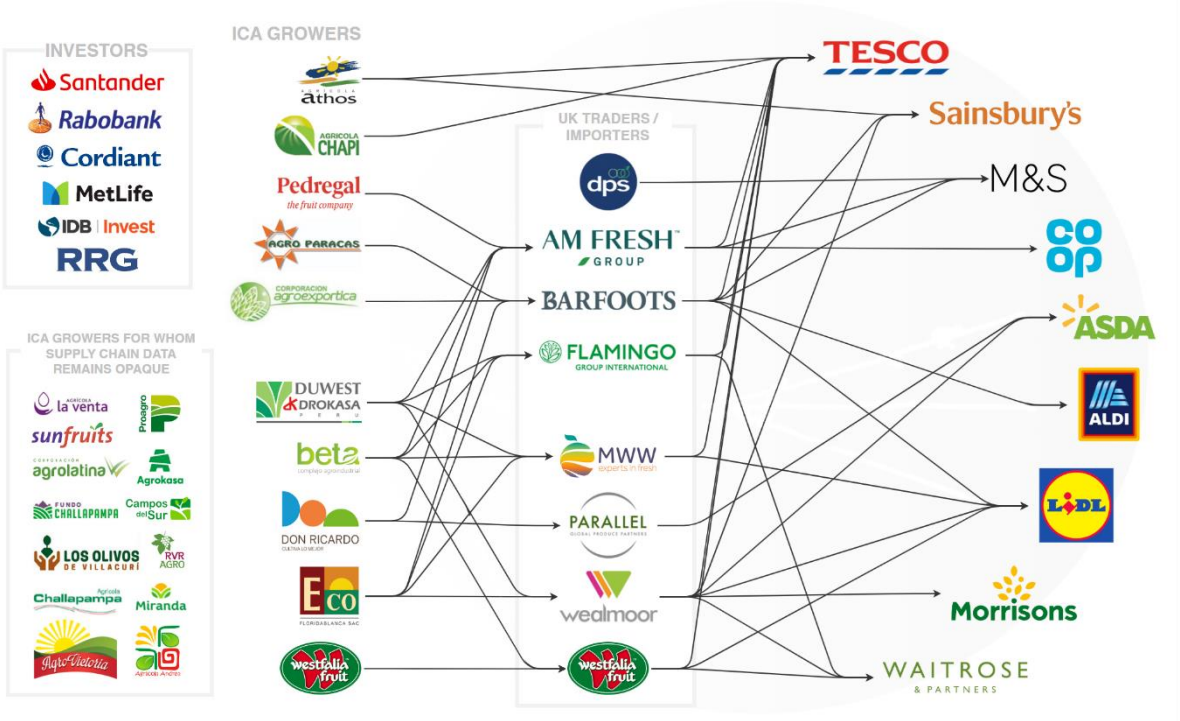


Figure 1. Known growers, brokers and investors behind the UK-Ica supermarket trade in fresh fruit and vegetables. All sources of evidence and data on supply chain and investment relationships are set out in Appendix A and are taken from Peruvian customs data, as reported by Veritrade, from supermarkets' published supplier lists, published media articles and/or direct communications with parties involved.

Rapid expansion of irrigated area and population

To supply this market growth, the area under irrigation for production in Ica has expanded rapidly since 2010, by over 100 square kilometres, most of this on land which was previously desert. Over 200 agro-export businesses are now in operation, with around 30 dominant large firms of typically 400 to 1500 hectares in size. Inward migration of farm workers has driven rapid demographic growth, by an estimated 100,000 additional people, increasing the population of Ica municipality by 50% since 2010.

Spiralling water demand and unsustainable abstraction

There are now an estimated 2116 wells in Ica supplying an ever-growing demand for water. Despite the drilling ban in 2008 the number of wells has increased by at least 30%. It is reported many wells are unauthorised. Calculating exact figures for the total demand is therefore difficult since abstraction rates from illegal wells are not reported. The most recent figure for demand from the National Water Authority of 373 Million cubic metres per year (Mm3) in 2017 is now dated, and a modelled figure of 483 Mm^3/year or the OECD's estimate of 563 Mm^3/year are likely to be better reflections of true demand.

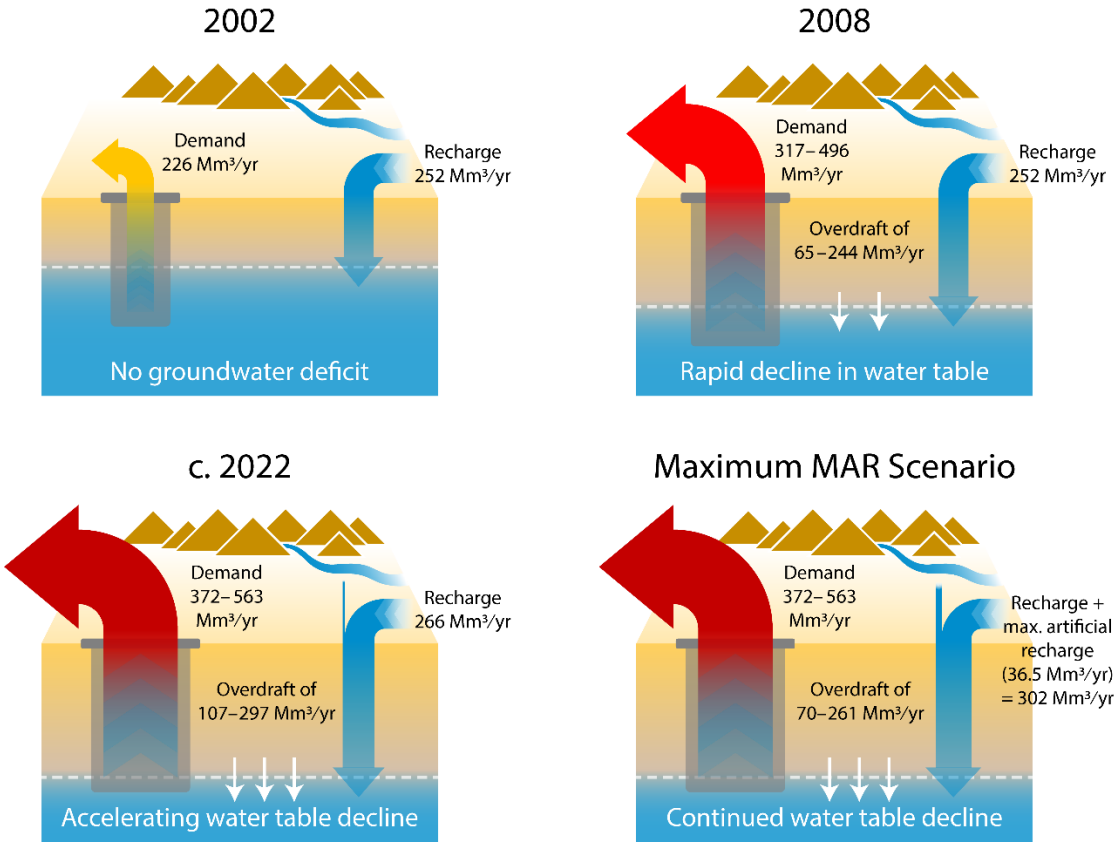


Figure II. Evolution of Ica-Villacuri aquifer exploitation from sustainable equilibrium in 2002 to circa 2022, showing the maximum potential managed aquifer recharge (MAR) scenario.

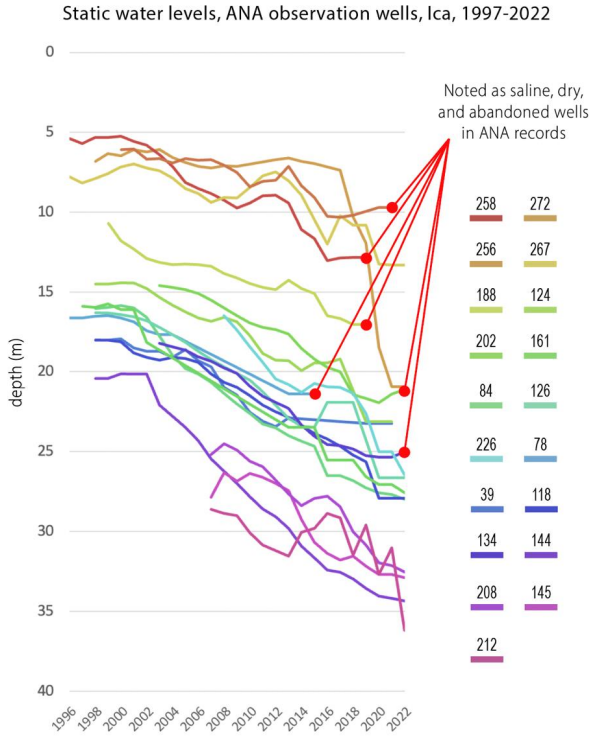


Figure III. Long-term static groundwater level trends for the Ica aquifer, 1997-2022 showing consistent decline since circa 2002 and abandoned dry or saline wells. Based on primary data from ANA observation wells. Note: well numbers correspond to IRHS numbers

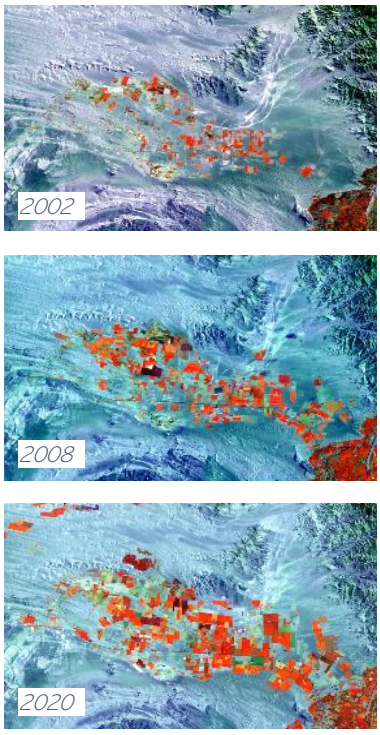


Figure IV. Satellite imagery showing expansion of agricultural production (in red) across Villacuri between 2002, 2008 and 2020 (Montesinos,. 2020)

Our knowledge of the available water resource and aquifer recharge is more reliable and puts the safe yield at 266 Mm^3/year. Abstraction in excess of this is unsustainable and will drive resource depletion and degradation. These figures suggest that the overdraft on the aquifer may now range from 107 to as much as 297 Mm^3/year. It is reasonable to assume that the rate of over-abstraction now exceeds 200 Mm^3/year and approaches double the recharge, or twice the sustainable yield. To help comprehend the scale of the challenge, this equates to an over-abstraction in Ica of 219 full-size Olympic swimming pools per day.

Accelerating depletion and degradation of the Ica-Villacurí aquifer

Over-exploitation of the Ica-Villacurí aquifer, the largest and most strategically important in Peru, is driving an ongoing and precipitous decline in water levels, by between 0.31 to 1.84 metres, and in some places as much as 4 metres each year. Figures II, III and IV illustrate these trends and the corresponding decline in observed groundwater levels across Ica. Over-abstraction is causing wells to dry as well as salinisation of groundwater due to 'up-coning' of very salty water. Groundwater has also been degraded by pollution from agricultural fertilisers, with levels of nitrate, associated with acute health risks, particularly for children, now exceeding guideline limits for safe levels in drinking water. Regulators fear that groundwater is polluted with pesticides but lack the monitoring capabilities to investigate this. Such profoundly unsustainable resource use is driving escalating impacts and an unfolding water disaster.

VOICES FROM ICA
CONSENSUS ON A WATER DISASTER

"The situation in Ica is serious, it is very grave. … Illegal groundwater use is a major problem. …There is a lot of tension and a big sense of injustice."

Senior Manager, National Water Authority (ANA)

"The rate of depletion is very rapid. Ica is suffering from a common pool resource disaster."

Advisor to Ministry of Agrarian Development & Irrigation (MIDAGRI)

"Overall, the aquifer is still at risk and in decline, with terrible outcomes for all water users."

Farm Manager, Agro-Export Business

"The overdraft is costing people. Only the agro-exporters can reach water now."

Civil Society Leader

"Ica is exporting water, a lot of water – but it's a disaster here. When you eat grapes, blueberries, asparagus, or avocado you should think of where it comes from... When you do, think of Ica - and think of thirst, and exploitation."

Agro-Export Farm Worker

IMPACTS

Reduced water access, higher costs, and conflict

- Existing wells used by small farmers and the municipality water utility are running dry, and it is reported that 75% of irrigators in Ica regularly lack water and are forced to reduce or stop production.
- In Villacurí, almost half of all wells yield water which is too salty for use in irrigation.
- Traditional farmers and the municipal are constrained by the costs of finding alternative supplies, or drilling deeper or new wells, with new drilling for agricultural use prohibited.
- Wells and land are abandoned or sold to larger farms, leaving only illegal users and the wealthiest farmers able to operate.

Violation of the human right to safe water

- The rapid influx of workers to serve the agro-export sector combined with polluted and declining groundwater, means the municipal water utility is struggling to deliver safe water, sanitation, and hygiene (WASH) for Ica's population of almost half a million people.
- Interruptions and shortages mean that a reported 70-80% of the population lack reliable supply.
- Some households in Ica receive water for only 2 hours a day, others only twice a week, whilst many migrant workers, at least 35,000 have no water supply at all and are forced to buy water of unknown quality from tankers at three times the price of piped supplies.
- Pollution of surface and groundwater by sewage and industrial wastewater is widespread, with only 34% of the city's wastewater receiving any treatment.
- Ongoing use of agricultural chemicals and nitrogen fertilisers by agro-export companies has elevated nitrate levels in the Ica-Villacurí aquifer, which now approach or exceed the safe limits for drinking water set by the European Union and World Health Organisation.
- Provision of safe WASH facilities for workers on farms is variable: the most responsible agro-exporters operate in line with global best practice, whilst others provide none.
- The urban poor bear the brunt of the impacts, facing ill health and financial burdens, and lost opportunities, particularly for women and girls.
- The situation represents an infringement of the human right to safe water and sanitation, recognised in 2010 through UN General Assembly Resolution 64/292.
- Lack of access to safe water and rising costs in Ica are cited as grievances by workers and farmers and are some of the issues behind regular strikes and protests, which have been violently suppressed by police.

VOICES FROM ICA
INADEQUATE ACCESS TO WATER, SANTITATION, AND HYGIENE (WASH)

"70-80% of Ica doesn't have full access to water. For many it is 2 to 3 times a week. Tanks are filled, but the poor don't have tanks – they buy water at 200 Soles a month compared to 70 for everyone else. The poor pay more – it's a racket. There's no WASH on some farms – the superintendent of water has flagged this – no bathrooms and no water."

Civil Society Leader

"The WASH situation on some farms – it's terrible. One toilet for 1000 workers. The toilet is just a hole, no handwashing facilities, and the workers must bring their own drinking water. It's dangerous for women as we have no separate toilets. There's no dignity – it's shameful. We suffer from diarrhoea, UTIs and stomach bugs."

Agro-Export Farm Worker

"The big issue is WASH access. There has been a big influx over 10 years … people have water in their homes only a couple of days a week."

Farm Manager, Agro-Export Business

"There is salinisation and the water table is dropping – it is caused by the over abstraction. Reduced production in boreholes means demand (for domestic water) outstrips supply. We've approved 6 deep wells to find water but it's costing $13 million and will, take 5 years to deliver.

Superintendent, Ica Water Regulator

Extreme climate vulnerability

- Pollution, salinisation, and declining water levels limit the use of groundwater as a supply 'buffer' and mean that traditional farmers, local citizens, and the municipality are less able to cope with increasingly regular dry periods associated with climate change.
- Collection and transfer of water from the Andes to supplement flows to Ica drives ecosystem and wetland degradation and exacerbates flooding and drought, including for indigenous and pastoralist communities in the mountains of Huancavelica.
- Inadequate WASH provision exacerbates the risk of cholera and other water-related disease epidemics in the aftermath of flood events, which are increasing in severity and frequency.

Water, food, and economic insecurity – within and beyond Ica

- Aquifer over-exploitation is drying and salinising the aquifer, and driving ever greater conflict and competition between users, restricting, disrupting, and raising the costs of water use.
- In this 'race to the bottom of the barrel', only those who abuse the law, or who have resources and influence will be able to access water of adequate quality.
- Local people suffer most through the monopolisation of water by agro-export businesses, as ecosystem services are lost, and poor-quality water becomes more costly, impacting health and social cohesion.
- It is likely that groundwater fed crop production in Ica will become economically non-viable in the short to medium term, and this will have significant impacts for Peru's economy, as well as for food security, health, and the cost of living in countries which now depend on Peru's fruit and vegetables, including the USA, the UK, and the European Union.
- Exact predictions for when the aquifer will become non-viable are difficult because of uncertainty about the true rate of illegal abstraction. However, rapid salinisation and well drying are already underway, and available evidence suggests that the next decade will be a 'do-or-die' period for Ica's survival as a major production hub.

TRANSFORMING WATER USE FOR A SUSTAINABLE FUTURE

Reflecting on efforts since 2010 provides important insights for how Ica can transition towards sustainable water utilisation. These are summarised in the report with two priority lessons emerging:

1. Solutions must be evidence-based.

Since 2010, there has been emphasis and private investment in managed aquifer recharge (MAR), the practice of diverting wet season surface run-off into the ground to artificially replenish groundwater and increase available supply. Agro-export leaders eager to find solutions, have created multiple recharge ponds to capture wet season flow from the Andes and encourage percolation to the aquifer. Whilst these efforts may have slightly increased annual recharge, studies show that MAR is not a viable solution for bringing supply into line with demand. Low infiltration rates mean a massive land area would be needed, and there simply isn't enough water flowing from the mountains to 'pay-off' the overdraft. Even if the entire annual flow of the Ica River could be captured, a physically impossible scenario, it would offset only around 10-30% of the overdraft.

Despite these limitations being well-documented in the scientific literature, MAR continues to be promoted as 'the' solution and funding for implementation continues to be sought. Such a dominant focus on supply-side solutions rather than on demand management is problematic. It risks diverting investment and action away from more effective approaches and creates an illusion of progress which legitimises the status quo of gross aquifer over-exploitation.

To transform water use for a sustainable future in Ica, scientific evidence must be heeded. All credible analyses of Ica's water emergency conclude that serious demand management measures will be required, achieved primarily by reducing water consumption and the area under groundwater irrigation.

2. Standard systems need to be strengthened and used more widely.

Recommendations made in 2010 prioritised the use of voluntary standards to guide and differentiate responsible water stewards in the market, and enable responsible buyers to recognise, reward, and incentivise sustainable water use in Ica. The main standards of relevance are those managed by Global GAP (34 certified sites in Ica), the Alliance for Water Stewardship (with 4 sites) and the National Water Authority's Certificado Azul, used by a handful of growers.

Our study identified shortcomings in these standard systems which undermine their contributions to sustainable resource management and invite accusations of greenwashing. The standards in use do not appear to be strong enough to curtail unsustainable water use, and audit bodies are failing to identify and challenge unsustainable practices. More specifically:

- Some actions proposed by agro-export farms in response to standard requirements such as 'ending the ban on new wells' are likely to increase water security for businesses at the expense of resource sustainability and the public interest.
- The absence of effective stakeholder engagement processes for workers, government, civil society and communities, and a lack of grievance and complaint mechanisms means that the standards in use are not aligned with the United Nation's Guiding Principles on Business and Human Rights, specifically Principles 30 and 31.
- Within standard plans and audit reports there is an unchallenged overemphasis on MAR. More realistic solutions involving demand management receive scant attention. There is also a failure to flag priority water risks such as nitrate pollution.

These findings represent a potential breach of the Code of Good Practice established by the International Social and Environmental Accreditation and Labelling Alliance (ISEAL). ISEAL's Code of Good Practice provide a globally recognised framework, defining practices for effective and credible sustainability systems.

More broadly, there has been inadequate uptake of standards and low demand from buyers, brokers and customers. There are simply not enough producers using standards to make a difference at the scale required. To change this, the standard holders have an urgent obligation to strengthen their standards, stakeholder engagement and certification processes, as well as market demand. Should they fail to do so, then confidence in the ability of voluntary standards to prevent environmental and social harms will be further undermined, and a potential route towards sustainable water use – not only in Peru, but elsewhere in the global economy – will be blocked.

It must be noted that the most progressive agro-export producers in Ica are well aware of the water risks facing their business and the community and are now leading efforts to find effective solutions. To sustain these efforts, global buyers and supermarkets who are widely acknowledged to 'hold the power' to reverse Ica's escalating water emergency have a key role to play. They must strengthen procurement due diligence and safeguarding, ensure rigorous compliance with improved production standards, drive their widespread uptake, and co-invest in solutions. Critically, international buyers must stop doing business with those who are using water illegally, and send clear market signals which reward and incentivise genuinely sustainable production.

THE PRIORITIES AHEAD

Our analysis shows that expansion of agro-export crop production for consumers in the Global North is driving unsustainable water use in Ica, a phenomenon first identified 14 years ago, and which ranks as one of the most alarming examples of aquifer overexploitation on earth. It sets out the negative impacts imposed by production for global supply chains, and the depletion and degradation of groundwater and the wider catchment. Together with chronic underinvestment in water supply and sanitation infrastructure, unsustainable aquifer use is driving violation of the human right to water and causing ecosystem degradation, and affecting the health, wellbeing, and peaceful co-existence of local communities. The study shows how interventions to date, including regulatory bans on well-drilling, managed aquifer recharge and market-based standards, are failing to curtail unsustainable patterns of water use.

Without urgent action, these negative impacts in Ica will intensify, with significant consequences for the economy and people of Peru, and its trading partners. Ica's water disaster threatens to become a totemic example of our generation's failure to align patterns of production and consumption within planetary boundaries and sustainable limits of earth's resources.

To support the change needed, we set out priority actions based on the lessons learned since 2010 and the recommendations of stakeholders. The water disaster in Ica represents multiple system failures: of state governance of natural resources, responsible trade and food security; of corporate good governance for socially and environmentally responsible production; and of due diligence by retailers and financiers. All stakeholders involved in the production and trade in fresh fruit and vegetables need to act now to remedy the harms seen in Ica, and to guard against similar crises elsewhere in our supply chains.

Long-term sustainable resource management and climate resilience can be secured in Ica through achieving hydrological equilibrium, and the use of aquifer storage to balance between high and low river-flow years to buffer against drought and climate impacts. Ultimately, water abstraction needs to be brought to within the safe and sustainable yield of the aquifer so that the volume of water removed no longer exceeds the volume replenishing the water table. This will require revision of licensed abstraction rates to bring them into line with available recharge, regulatory and financial reform, together with metering and robust enforcement against illegal wells. Additional goals include provision of water supply, sanitation, and hygiene for all, as well as effective pollution control.

PRIORITY 1 – Action by Government

Transform water governance and regulatory performance.

The governance, management, protection, and control of water resources for public benefit, and ensuring access to safe water supply and sanitation are primary functions of the State. The National Water Authority which has delegated powers for water management in Peru, and Ica's water utility are struggling to fulfil these mandates, and the following steps are needed to remedy this:

A. **Reformed policy, law, and regulatory practice to ensure sustainable water resource use.** The severity of the situation warrants a detailed review of the institutional arrangements for water resource management, so that opportunities for more effective water resource regulation, such as meaningful sanctions, can be identified and acted upon. Reforms must enable the stronger leadership and regulatory power needed to control water use.

B. **A coherent plan to rebalance the aquifer and water management at the basin scale.**

   Such a plan must:
   - Provide reliable knowledge on the available resource and its use.
   - Set appropriate allocations among stakeholder groups in line with sustainable yield which prioritise the human right to water and environmental flows above commercial use.

- Guide and incentivise investment, demand management and use of surface water over groundwater.
- Establish viable and cost-effective targets for increased storage, seasonal surface water use and recharge.
- Prioritise effective monitoring and enforcement to maintain water use within allocated limits and scale back use during dry periods to mitigate drought.
- Secure nature-based solutions, catchment stewardship, and effective control of pollution and salinisation.

C. **Reliable and adequate financing and human resources for regulatory implementation and enforcement.** The chronic shortage of budgetary and staff resources which has seen water management regulations, plans, and strategies 'left on the shelf' must be addressed.

D. **Reform of water use fees and charges to reflect the value of water and to generate revenue for water management.** In addition to enabling funds to be ploughed back into resource management and provision of services, a proper price for volumetric water use will strengthen incentives for prudent use. This reflects recognition by multiple stakeholders that water is significantly undervalued and underpriced in Peru.

E. **Policy coherence and complimentary regulation across government.** To bolster regulatory effectiveness, complementary measures could include a requirement to demonstrate legally compliant and sustainable water use as a pre-requisite to obtaining a business or export licence, or within statutory corporate or financial reporting. Screening out illegal water use could be achieved through reconciling land and water allocation with production volumes to identify and sanction anomalies. Institutional arrangements for land planning currently permit ever greater agricultural expansion in unsuitable locations, and require urgent review and reform.

F. **Closing the water supply, sanitation and hygiene (WASH) gap.** Action and investment to implement the municipal utility's 'optimised masterplan' to deliver full WASH access to the people of Ica needs to be prioritised. Regulatory and financial reform including introduction of a canon, or public works for taxes scheme are likely to be required.

PRIORITY 2– Action by Business

Prevent, mitigate and remedy violation of the Human Right to Water and the impacts of unsustainable water use.

Businesses which have benefited from and driven the water emergency in Ica proclaim human rights and environmental credentials, or due diligence procedures that, on paper, should prevent harms in their supply chains. But through weak, selective, or at times non-existent implementation, all have apparently failed to identify, mitigate, or remediate the harms which their practices and purchases directly link them to.

These acts of omission constitute a failure by multiple businesses to fulfil their responsibilities under the most authoritative international business and human rights standards: the UN Guiding Principles on Business and Human Rights (UNGPs), and the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct. Given that these harms were first exposed 14 years ago, the ongoing sourcing of fresh fruit and vegetables and inaction to address impacts represents a serious and conscious violation of these obligations by the businesses involved. In response, businesses engaged in or benefiting from trade in Ica must take immediate measures to prevent, mitigate and remedy the harms caused.

A. **Remedial action to protect the human right to water.** Substantial investment and collective action by brokers, retailers, agro-export farms, and their financial backers must focus on two areas. Firstly, they must remedy the infringement of the human rights to water and sanitation which their activities have driven by ensuring universal access to safe WASH on farms and in affected communities across Ica. Second, they must end the over-exploitation of Ica's shared

water resources through action to reduce agricultural water demand to within sustainable limits. Given the risks of procedural and policy capture, action must be guided by evidence, in line with good practice such as that set out in the CEO Water Mandate's Integrity Guidelines.

B. **Responsible procurement to ensure fair water use in supply chains and action to identify, prevent and remedy environmental and human rights abuses.** Weak market and buyer demand for sustainable water use has driven the water emergency in Ica. It is incumbent on responsible businesses to strengthen and implement procurement policies and due diligence processes so that 'drought fruit and vegetables' – those produced through irresponsible or illegal resource use, cannot enter the market. Brokers, retailers, and investors must demand production based on a fair water footprint and be prepared to pay a fair price for this. Going forwards, evidence of responsible and legal production which does not drive resource depletion and degradation, alongside disclosure on levels of WASH access must be preconditions to doing business. The European Union's Corporate Sustainability Due Diligence Directive looks set to make this a legal obligation which will shift sourcing away from catchments where water is used unsustainably, to where water is available within hydrologically sustainable limits. Supermarkets must therefore invest and use their influence to unlock shared water security in sourcing hotspots like Ica.

PRIORITY 3 – Action by Standards Systems

Strengthen and scale credible standards.

Improved regulation and governance are the top priorities for addressing the egregious water-related harms seen in Ica, and whilst more evidence on their role in improving water governance is needed, there are opportunities for voluntary standards to play a role. To realise this opportunity, standards systems need to be strengthened, and to be used at a meaningful scale.

A. **Reform of existing standards systems to drive meaningful action.** The mischaracterisation of good practice for water stewardship in Ica poses significant risks for water users and the credibility of voluntary standards. We urge an immediate review by the holders of these standards to establish the reasons for shortcomings and enable weaknesses to be addressed. Reform must ensure that site actions are relevant to the risks facing stakeholders, and that they genuinely contribute to the goal of sustainable, socially equitable, and economically beneficial water use. Revision will be required to standard content, stakeholder engagement, rigor of reporting, assurance process and impact evaluation. Specifically, to make these standards credible:

- **Global GAP** requires reform so that demonstration of water abstraction within the sustainable limits of the water resource being exploited, zero pollution and universal access to safe water, sanitation and hygiene become 'major musts', and pre-requisites of certification. The characterisation of agricultural production which depletes and degrades water resources as 'responsible' and 'sustainable' is misleading, in breach of the forthcoming EU Green Claims Directive, and must cease.
- **The AWS Standard** must be revised to indicate unequivocally whether water use at site and the catchment scale is sustainable and equitable. If not, then the steps taken to address this, and their efficacy must be disclosed and reviewed with stakeholders to ensure their relevance.
- **Certificado Azul's** requirements need to be broadened beyond water use efficiency to include a clear indication of sustainable water use. This should require evidence of zero pollution; sustainable and equitable withdrawal; universal access to WASH; protection of nature and planning for drought and flood events.

All standard systems require:

i. Robust audit by professionals who are technically competent, understand the water context and can cross check the legality of water use and relevance of actions against available evidence.

ii. Effective sanctions, such as financial penalties and/or the removal of certification – for use against 'bad actors', and practices which are inconsistent with sustainability goals.

iii. Grievance mechanisms and transparent handling of complaints at site and system scale as a basic obligation in line with UN Guiding Principles on Business and Human Rights.

B. **Establish credible water stewardship as the business norm.** The credible assurance of responsible water use must be more widely adopted through its requirement as a universal precursor to trade. The purchase of produce from water scarce and stressed locations such as Ica in the absence of accreditation against credible standards for sustainable water use must be considered unethical, and avoided by legitimate business entities.

PRIORITY 4 – Action by All Stakeholders

Balanced, multi-stakeholder participation in evidence-based collective action

There is currently no initiative to bring multiple stakeholder groups together to take collective action in response to Ica's water emergency. The creation of an inclusive collective action and dialogue forum will be an important step forwards to exchange knowledge, agree plans, to track action and hold each other to account.

A. **Establish a collective action forum.** Good practice guidance on collective action and lessons from past initiatives in Ica should be heeded to establish a credible, focused and inclusive forum for debate and action. This must be based on balanced representation and genuine participation by both influential and impacted stakeholder group and should include robust safeguarding to protect those who challenge powerful stakeholders against reprisal. Stakeholders suggest establishing an 'aquifer observatory' or 'water tribunal' to track compliance and enforcement.

B. **Joint planning and action based on credible evidence and mutual accountability.** Important roles of the forum will be to generate credible plans based on reliable evidence to target the root causes of the water emergency; to track action and budgetary expenditure against mutually agreed key performance indicators (KPIs) and to hold partners, including business, government, regulators, standard systems and NGO's to account. This will require long-term financial support, diplomatic leadership, and facilitation by a respected, neutral broker.

PRIORITY 5 – Action by Researchers and Civil Society

Knowledge generation, public engagement, and oversight

All stakeholders identified an important role for civil society, NGOs, and research bodies, in remedying the water emergency in Ica and preventing similar problems elsewhere, via:

A. **Generation and sharing of reliable knowledge.** Academic research is needed to provide objective information upon which to base decision making. Reliable knowledge is needed on the status of the aquifer, and viability and efficacy of solutions.

B. **Increased public and political awareness.** Communication of reliable knowledge and constructive remedies and responses is needed, through advocacy, disclosure, and campaigning within and beyond Ica, directed at decision makers as well as buyers and end consumers of Peruvian fruit and vegetables.

C. **Accountability monitoring.** Civil society can play a key role by calling out bad practice, recognising leadership, and tracking progress against responsibilities and commitments, including by supply chain stakeholders outside Peru.

D. **Mobilising affected communities.** Ensuring that local people have their voices heard and needs responded to, and that they are enabled to participate in decision making are priorities.

PRIORITY 6 - Action by Financial Institutions

Adopt policies and due diligence processes to avoid water-related harms.

The water disaster unfolding in Ica has been driven by capital investment and revenue generation based on profoundly unsustainable exploitation of natural resources, in the absence of effective financial due diligence and lending safeguards. Investment to increase and expand irrigation and agricultural production in Ica has been significant despite unequivocal evidence that this is based on unsustainable groundwater use. This includes investment by commercial banks including Santander, Rabobank, Banco de Crédito del Perú, and Interbank; investors including Metropolitan Life Insurance, Cordiant Capital and RRG; and Multilateral Development Banks including the Inter-American Development Bank (IDB Invest), the Development Bank of Latin America and the Caribbean (CAF), and the International Finance Corporation, the private sector lending arm of the World Bank.

This widespread failure to screen, identify and avoid unsustainable resource use suggests that sustainable water use is a systemic blind spot across the finance sector. This demands urgent action, restructuring and reform by regulators, banks, and finance institutions, as well as by those who have profited directly from Ica's water emergency:

A. **Reformed due diligence, disclosure, and investment safeguards.** Decisions to invest in water intensive or water reliant sectors in geographies facing water risk must be supported by much stronger due diligence mechanisms and lending safeguards. Institutional and private financiers alike must be compelled to undertake adequate screening, reporting and disclosure to prevent unsustainable resource use, through new statutory requirements and greater demand from asset owners.

B. **Proactive divestment and investment.** Alongside screening, reporting and disclosure we now need to see active targeting of investment, and where necessary divestment to drive rapid transition towards sustainable resource use in our supply chains. Safe water intensive production needs to be driven by much more rigorous investor scrutiny. Those who demonstrably abuse water and fail to prevent, mitigate and remedy water-related harms such as those seen in Ica should face financial sanctions such as limited credit, and where listed companies are involved, divestment.

PRIORITY 7 - Action by Trading Partners and 'Consumer' Governments

Accountability, reform, and investment

To support delivery of each of these priorities, action is also needed beyond Peru by the trading partner governments whose imports are driving unsustainable water use in Ica. Significant trading partners include the USA, the Netherlands, the UK, Spain, Australia, France, Germany, Italy, Japan, Switzerland, Canada, Sweden, and Denmark, with China an important new actor.

A. **Enactment of trade agreement requirements for sustainable resource use.** Trade between Peru, and the USA, EU and the UK is governed by a powerful set of Trade Agreements, each of which stipulates that trade should be based on the sustainable exploitation of natural resources and should not come at the expense of degradation to the environment or human rights. The evidence set out in this report suggests that all parties are failing to uphold their obligations

under these agreements and that the mechanisms put in place for their implementation are currently ineffective. For example, the EU-Andean and UK-Andean Trade Agreements specify that a sub-Committee on Trade and Sustainable Development will be established to review, monitor, and assess the impacts of trade on the environment, with powers to consult widely and to form Expert Groups to make recommendations. Action is therefore needed to activate these safeguard mechanisms, to understand why they have failed to date, and where necessary, to instigate reform to ensure that they adequately drive sustainable resource use in Peru and elsewhere.

B. **Activating the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct.** The nations which lead trade with Peru in fruit and vegetables are members of the OECD and committed to upholding the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct which oblige companies to respect human rights and to contribute to sustainable development. Given the gravity of the situation in Ica, action is needed to activate the guidelines in relation to those multi-national corporations which source in Ica, and to explore the value of the newly revised guidelines of 2023 in remedying the harms identified by this report, and in preventing future impacts. This will require engagement by the National Contact Points in multiple territories who handle complaints against companies alleged not to have met the guidelines standards. Notably, Peru is currently seeking accession to the OECD and this may provide additional leverage for alignment with the Guidelines. Lessons emerging will be valuable for understanding the relevance of the OECD Guidelines in driving sustainable, water use within the global economy.

C. **Commitment and support for Fair Water Footprints.** The study findings suggest deep rooted systemic failures within our globalised supply chains, which permit the unsustainable exploitation of water resources and impose significant risks for people, ecosystems, and economies. Consumer nations of the Global North have an obligation – and an opportunity – to address these failings through concerted action with stakeholders within these supply chains. Joined up action across government is now needed to remedy the situation in places like Ica and to ensure reform and investment to avoid future harms, and to establish Fair Water Footprints as the business norm. This should include sustained co-investment and diplomatic support for collective action to remedy and reverse the water emergency facing Ica, reform of corporate reporting and financial disclosure mechanisms to strengthen statutory drivers for responsible water use in supply chains, oversight of sustainable development criteria in trading agreements, and formal commitment to the Glasgow Declaration for Fair Water Footprints as a vehicle for transformative change. Commitments set out for governments in the Declaration include:

    - Strengthen the capacity, investment mechanisms, leadership, inter- and intra-ministerial and cross-sectoral coordination, knowledge, and international collaboration required.
    - Enhance water-related data collection and analysis and ensure that farms, factories, and facilities associated with significant water and climate-related risk are subject to effective regulation and enforcement, and publicly disclosed compliance monitoring.
    - Review institutional and corporate governance frameworks, and international agreements, and institute appropriate policy, statutory, procedural, and market-based measures, including the strengthening of safeguarding, due diligence, disclosure, and responsible procurement by government, business, and financiers.
    - Empower and enable citizens, civil society, women, young people, marginalised groups, and the media to fulfil their key roles, including communication, participation, convening, consumer choice, and accountability monitoring for fair water footprints.

Reflecting on the 14 years of piecemeal and ineffective responses to the unfolding water disaster in Ica, working at these multiple scales through concerted and collective action by all stakeholders now holds the best hope for a fair water footprint in Ica. An outline Theory of Change illustrating the approach proposed here is provided as Figure V. It is hoped that the wider lessons emerging from Ica will trigger the systemic change needed to establish credible water stewardship as the global business norm and to ensure a fairer water future for all.

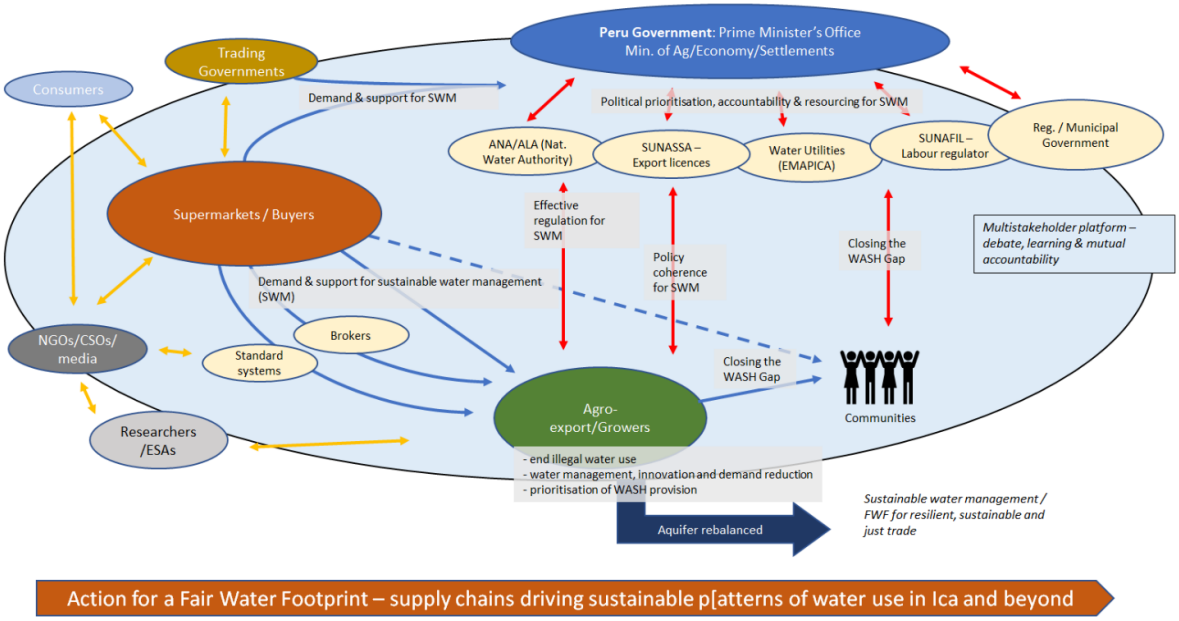


Figure V. An outline Theory of Change for shared water security in Ica

1. INTRODUCTION

In 2009, the UK government funded research into the impacts of the UK's water footprint of consumption and its significant dependency of water use in other parts of the world. The resulting 'Drop-by-Drop' report[1] explored the case study of Ica, the hyper-arid epicentre of Peru's agro-export boom. It drew on over 70 interviews, government data, and academic research, as well as field investigation. Peruvian and international stakeholders agreed that the study provided an objective understanding of the water challenges facing Peru's agro-export sector. There was consensus that abstraction of water for year-round irrigated production of high-value fruit and vegetables, particularly asparagus and avocados to supply supermarkets in Europe, the UK and USA was driving over-exploitation of Peru's largest groundwater resource.

With the water table in rapid decline, by as much as 5 metres each year, the case provided one of the clearest examples of unsustainable water resource use globally. Catastrophic impacts for communities, farmers, ecosystems, and future generations including via salinisation, water shortages, spiralling costs, climate vulnerability, social unrest, and conflict were documented, and linked unequivocally to production for consumers in the UK and across the Global North. These findings were featured in global media and triggered an array of initiatives to address the problem.

Revisiting the impacts of our water footprint in Peru a decade on can provide strategically valuable lessons of relevance beyond Peru. The case is of particular interest because of the direct links between resource use in Ica and the behaviour of end consumers, the control exerted over production by supermarkets, and the performance of the Environmental and Social Governance (ESG) frameworks, standards and disclosure systems which seek to hold them to account for sustainable resource use. The case also shines a light on the role of global trading relationships, the trade agreements which govern them, and on financing by investors including private equity firms, development and commercial banks, and the adequacy of their due diligence and safeguards. The water emergency in Ica can provide valuable lessons to shape action in Peru and globally to ensure that water footprints of consumption are fair, driving sustainable, equitable and resilient water use, and delivery of Sustainable Development Goal 6, 'Sustainable access to water and sanitation for all' by 2030 (see Box 1, p.4).

1.1 OBJECTIVES

The Glasgow Declaration for Fair Water Footprints signed at COP26 in 2021 aims to ensure sustainable, resilient, and inclusive water use within the global economy by 2030. It brings together governments from the Global North and South, with business, investors, and civil society organisations and commits them to transformative action to address the unsustainable water footprint of global trade. Figure 1, alongside Box 1, and Box 2 provide further details of these concepts and rationale for the initiative.

As founding Signatories to the Fair Water Footprint Declaration, Water Witness International and Peru's Centre for Social Studies are formally mandated to:

- provide objective reporting and oversight to hold other constituencies to account;
- ensure that the voices of communities, women, youth, the marginalised, future generations, and the needs of nature are represented; and
- elevate the public and political profile of water, and advocate for fair water footprints.[2]

To deliver against these commitments, this study targets the following specific objectives:

I. Review the current situation and water challenges facing users of the Ica-Villacurí aquifer.

[1] Hepworth et al. (2010)
[2] The Glasgow Declaration for Fair Water Footprints (2022), p.6

II. Explore progress since 2010, in terms of the exploitation of the aquifer and the effectiveness of action taken for sustainable water resource management and use.

III. Generate new evidence, lessons, and stimulate action to drive sustainable water management and fair water footprints in Ica, in Peru, and globally.

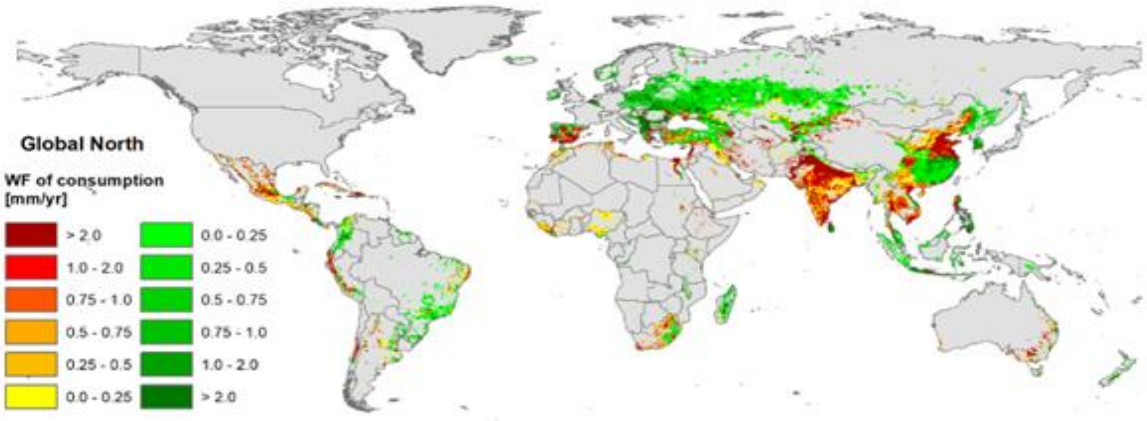


Figure 1. The unsustainable blue water footprint of the Global North economies.[3]

1.2 METHODOLOGY

A study team from Peru's Ministry of Agrarian Development and Irrigation (MIDAGRI) and National Water Authority (ANA) were joined by the authors of the original research from Indiana University (USA), Peru's Centre for Social Studies (CEPES) and the British NGO Water Witness International. Between September and October 2022, they consulted with 35 organisations balanced across businesses (10), civil society/NGOs (10), government (7), and external support agencies (8), and conducted interviews with 79 individuals. The team visited farms and communities, collated data, and convened three multi-stakeholder workshops to validate findings and generate recommendations (see Figure 2). Secondary data from recent studies and assessments have been drawn on and are fully referenced in the report, alongside the testimony of key informants.

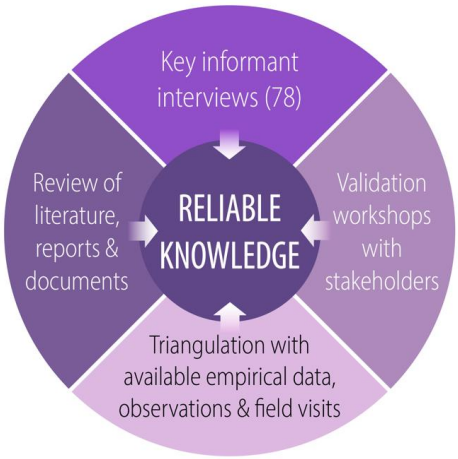


Figure 2. Schematic of our methodological approach.

1.3 STRUCTURE OF THE REPORT

To establish context, Section 2 of the report sets out background information, including a summary of findings from the original 2010 study[4] and responses to its publication. In Section 3, current evidence is appraised to understand how the situation has changed since 2010, and Section 4 summarises the impacts of the ongoing unsustainable groundwater use observed in Ica for communities and supply chain stakeholders. Section 5 generates key lessons by reviewing the adequacy of interventions since 2010 and sets out priorities for action at multiple scales to ensure more sustainable, and fairer water footprints in Peru and globally.

[3] Chapagain & Mekonnen (2023)
[4] Hepworth et al. (2010)

1.4 BACKGROUND INFORMATION

BOX 1.

UNDERSTANDING WATER SECURITY, WATER STEWARDSHIP, AND WATER FOOTPRINTS

Over the past two decades, the concept and practice of water footprint assessment have evolved to appraise the volume and impacts of water used to meet society's needs for food, clothes, and other goods.

Some basic definitions are provided here to support interpretation of this report.

Water footprint: The water footprint of a product is an empirical indicator of where, how, and how much water is consumed in its production, measured across the entirety of its supply chain. Unlike virtual water, which is limited to volume, water footprint analysis also denotes spatiotemporal information, as well as different types of water consumption – evapotranspiration of rainwater (green water), consumption of surface or groundwater (blue water), or pollution (grey water). The water footprint of an individual, business, or nation is defined as the total volume of freshwater used to produce the goods and services they consume.

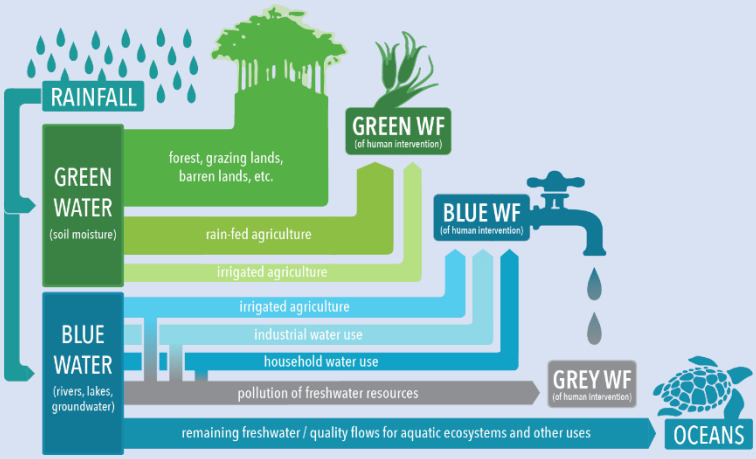


Figure 3. Understanding water footprints.[5]

Virtual water: In the early 1990's, Professor Tony Allan introduced the concept of 'virtual water' as a tool to describe the 'virtual' water flows exported from a region in the form of water-intensive commodities.[6] The volume of virtual water 'hidden' or 'embodied' in a particular product is defined as the volume used in the production process of that product.

Water footprint of national consumption and production: The 'water footprint of a nation', or 'of national consumption' refers to the total volume of water consumed directly or indirectly by the inhabitants of the nation, whereas the 'water footprint of national production' refers to the volume of water used within a nation to produce goods and services that may or may not be used within that nation (i.e., some is exported).

Water security: Shared water security can be considered the ultimate goal of water governance and management, and enables sustainable water footprints, with water security defined as "*the reliable availability of an acceptable quantity and quality of water for production, livelihoods, health and ecosystems, coupled with an acceptable level of risk from hazards including drought, flooding, pollution and conflicts.*" [7]

Water stewardship: Water stewardship defines the role that responsible water users (e.g., businesses) within our water footprints must play to ensure shared water security and is defined as "*use of water that is socially and culturally equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder-inclusive process that includes both site- and catchment-based actions.*" [8]

Fair Water Footprints: The priority is for a water footprint to be 'fair' such that it 'does no harm' and contributes to shared water security and resilient, sustainable, and inclusive development by demonstrating: zero pollution, sustainable withdrawal, universal WASH access, protection of nature, and resilience to droughts and floods.[9] Establishing water stewardship as the global business norm will help to ensure fair water footprints.

[5] Adapted from WWF & AfDB (2012)
[6] Allan (1993)
[7] Grey & Sadoff (2007)
[8] AWS (2019)
[9] Hepworth (2021)

BOX 2.
WHAT MAKES A WATER FOOTPRINT FAIR?

Unlike carbon footprints, water footprints do not always need to be reduced, since in many geographies water is plentiful and its use can take place within a sustainable hydrological yield. In seeking progress towards sustainable resource use and delivery of the Sustainable Development Goals, the priority, rather than simple reduction, is therefore to ensure that water footprints are fair – based on sustainable, equitable and resilient water use. In 2021, in response to the global leadership effort to ensure the sustainable use of water in our global supply chains, a group of experts came together to define a 'Fair Water Footprint'. This definition was embodied in the Glasgow Declaration for Fair Water Footprints launched at COP 26 with 28 Signatories. A fair water footprint 'does no harm' and contributes to resilient, sustainable, and inclusive development by demonstrating zero pollution, sustainable and equitable withdrawals, universal access to safe WASH, protection and promotion of nature, and resilience to droughts, floods, and conflict.[10] (Figure 4)

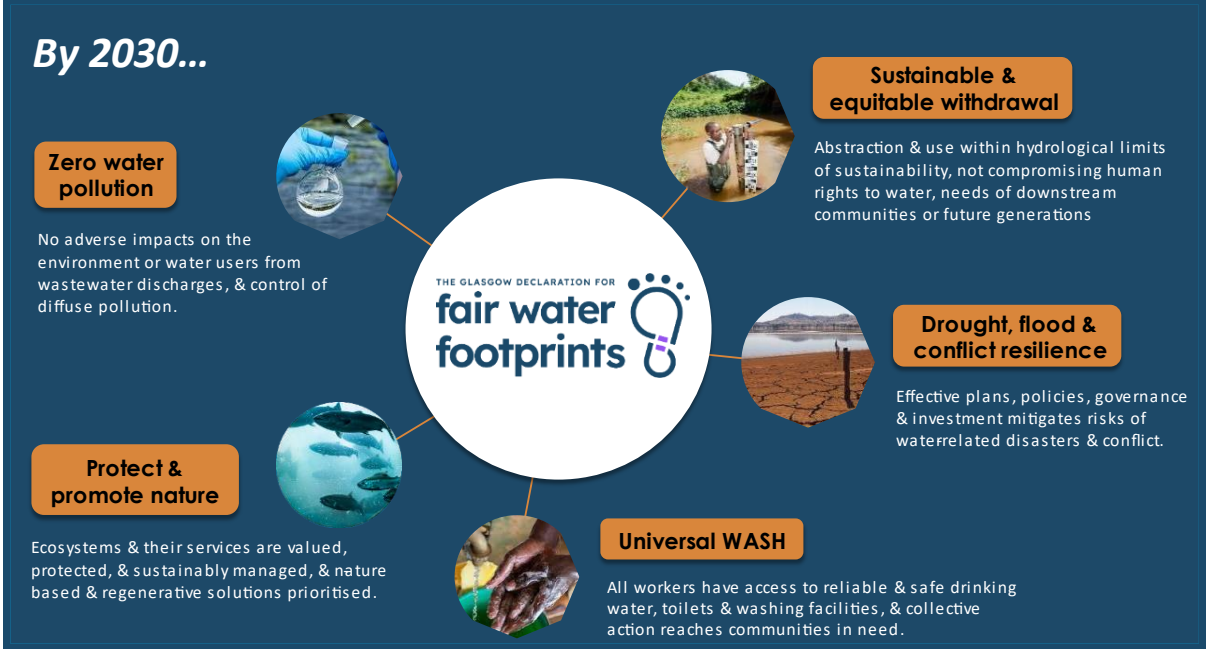


Figure 4. Fair Water Footprints as defined in the FWF Declaration.[11]

In 2023, Water Witness published research which illustrated the relevance and urgency of fair water footprints within the global economy.[12] It revealed that high-income economies of the Global North are profoundly dependent on water use beyond their borders to produce the food, clothes, and goods they consume:

- Typically, between 40% and 80%, but as much as 94% of their water footprints are external, and this dependency is steadily increasing.
- External water footprints can be traced via crops, commodities and products to economies and river basins of production in the Global South which face extreme water insecurity and climate vulnerability.
- Half of the external 'blue' water footprint of the Global North is assessed as being unsustainable. Analysis suggests that drawing water from rivers, lakes, and aquifers to produce crops and goods for the Global North is a primary driver of resource depletion, ecosystem degradation, and conflict.
- As well as locking communities into climate vulnerability, such high levels of unsustainable use threaten the viability of these strategically important supply chains.

The significant implications of these findings for 'producer' and 'consumer' nations, global equity, and climate resilience require urgent individual and collective action by all stakeholders.

[10] Hepworth (2021)
[11] The Glasgow Declaration for Fair Water Footprints (2021)
[12] Chapagain, A.K. and Mekonnen, M.M. (2023)

2. THE ICA VALLEY & THE 2010 WATER EMERGENCY

2.1 ICA'S WATER CONTEXT

Figure 5 shows the geographical location of the Ica Valley in the rain shadow of the Andes in the coastal zone of Peru. The Ica River rises in Huancavelica, where the catchment has been artificially extended into the Pampas-Amazon basin to capture water from wetter areas for use in Ica. Water is diverted from the Atlantic watershed via cut-off drains and transferred via a tunnel through the mountains. On its journey to the Pacific, the river flows through the hyper-arid region of Ica, with annual rainfall of less than 5mm. Some of the flow is diverted to irrigation canals to provide for agriculture directly, and some recharges the Ica-Villacurí aquifer (Figure 6).

Historically, the population of Ica thrived by maintaining a fragile balance between water supply and demand, with a productive agricultural sector which used flood irrigation and groundwater recharged from the mountains to irrigate cotton, nuts, and vegetables.

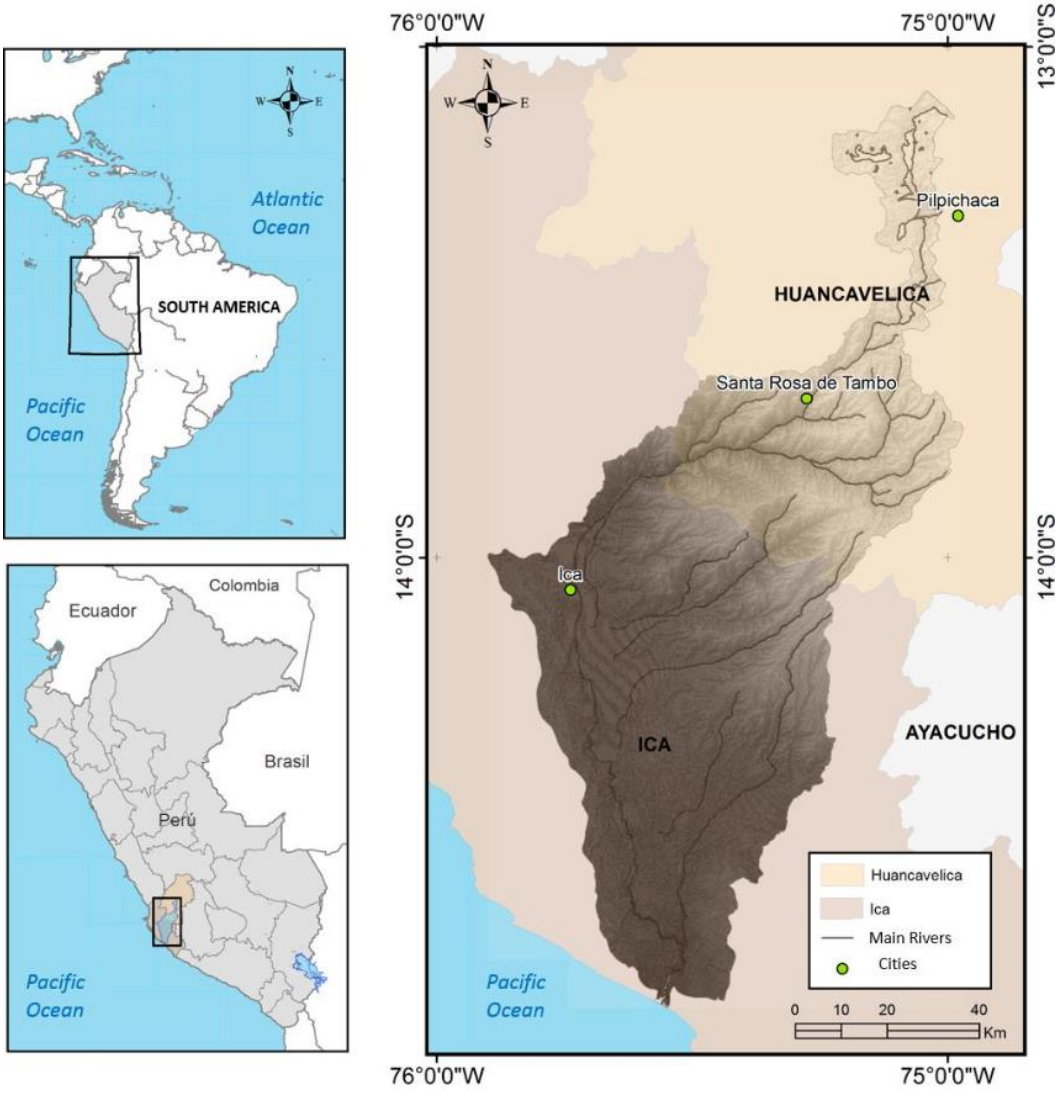


Figure 5. Location of the Ica Valley in the hyper-arid coastal zone of Peru.

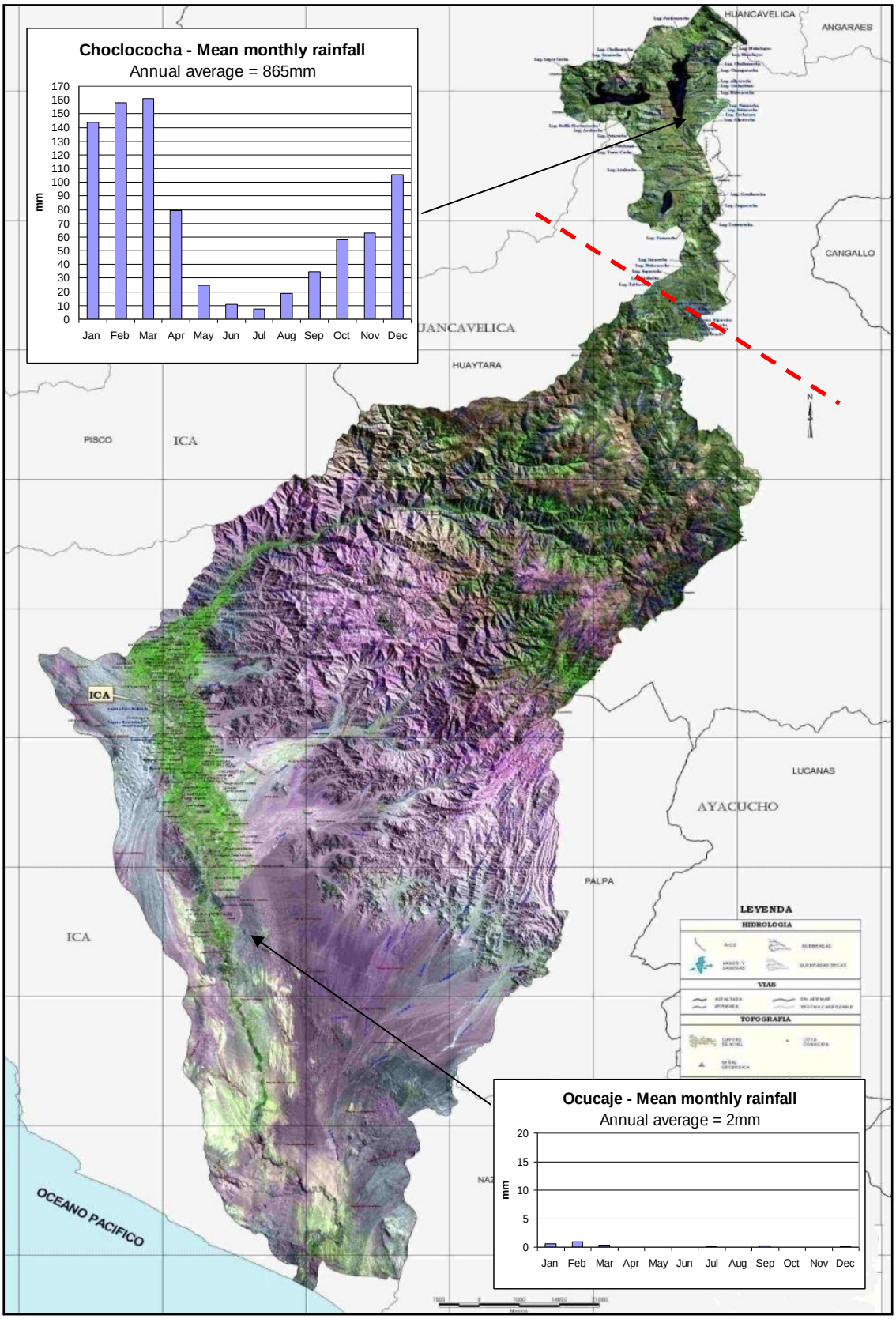
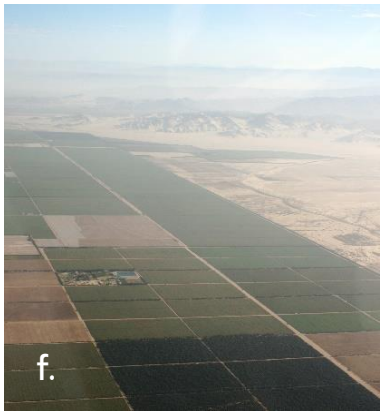


Figure 6. The Ica-High Pampas River Basin showing mean monthly rainfall in the lower and upper basin. Note that the High Pampas falls to the Amazon Basin (the red dotted line indicates the watershed) the PETACC transfer channel artificially extends the Ica basin diverting flow to the Ica Valley (Source: Hepworth et al. 2010).



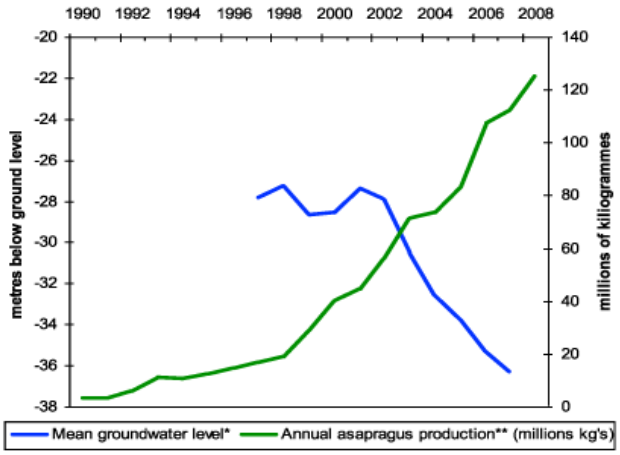
Plates. a: Expansion of the agrarian frontier to grow asparagus in Ica – the land to the left is under preparation through mixing desert sands with compost; b. Agro-export farm workers; c. Asparagus has high water demands, delivered through networks of pipes and drip irrigation; d. Agro-export crops such as asparagus compete for land and water with more traditional farming techniques; e. The edge of the agrarian frontier showing asparagus crops on the left and desert to the right of the hedge and water canal. f. The same 10 km boundary seen from the air.

Between the 1990s and 2009, the cultivation of asparagus in Ica for the export market grew rapidly to cover approximately 100 square kilometres, supported by significant investment from the International Finance Corporation (IFC), the commercial lending arm of the World Bank. By 2008, Peru dominated the global asparagus trade, with 95 per cent of its exports produced in Ica. 40% of Ica's population were employed in the agro-export industry, contributing to near zero unemployment, and generating revenue of USD $200 Million each year.

Asparagus and other high-value crops are grown intensively in large blocks of land reclaimed from the desert and irrigated primarily using groundwater via ostensibly 'efficient' high-tech drip and ferti-irrigation systems. However, the sheer scale of the boom meant that by 2002 this 'greening of the desert' had become unsustainable, with irrigation demand pushing the exploitation of the valley's aquifer into overdraft (see Figure 7). Rates of extraction began to significantly exceed rates of recharge from the mountains, and the water table in the valley began to plummet, typically by between 0.2m and 2.5m a year, and in some places by as much as 5 metres per year. Evidence of this groundwater decline is provided by monitoring data of the National Water Authority (ANA) and the World Bank's Global Water Partnership Associate Programme. This unsustainable aquifer use was found to drive a range of negative impacts which could be traced directly to the water footprint of Global North countries sourcing fresh produce in Ica:

- **Spiralling water costs** due of the need to deepen or purchase new wells, pumps, or tanker water from remote wells, and for bribes to beat the 2008 ban on new wells.
- **Closure of traditional small-medium scale businesses**, some of whom had farmed in Ica for generations – because of a lack of water, drying of wells, increased salinity, and higher costs.
- **Water shortages for the city of Ica** where water levels in strategic boreholes supplying the municipality's domestic needs were falling rapidly.
- **Acute water insecurity for vulnerable people** living in peri-urban settlements, primarily migrant farm workers, forced to survive on as little as 10 litres of water per person per day.
- **Health risks through pollution of groundwater by nitrates** derived from agricultural fertilisers used in agro-export production.
- **Ecosystem degradation and climate vulnerability** through diversion of water needed by pastoralists, farmers and fisherfolk in the mountains, with no provision for environmental flows.[13]
- **Civil unrest, large-scale demonstrations, and violent conflict** including use and threat of use of firearms because of inequitable water access.

Figure 7. Relative trends in asparagus production and groundwater levels in the Ica Valley 1990-2008.[14]



[13] This case was taken to the Latin America Water Tribunal who found in favour of upland pastoralists in 2007 (LAWT, 2007).
[14] Hepworth et al. 2010, * derived from mean annual fluctuation across a composite of 6 wells with reasonable time series data (Nos. 6, 64, 3, 99, 8, 30, 31). Source: ANA/ATDR annual returns, ** Source: MINAG.

2.2 RECOMMENDATIONS OF THE 2010 STUDY

The 2010 study ('Drop-by-Drop') concluded that without urgent action to reverse the overexploitation of the aquifer, the water upon which Ica's economy, people, and ecosystems depend would be exhausted within 15 to 25 years. The study's recommendations fell short of calling for a boycott of Ica's produce. Instead, a set of actions were put forward which aimed to tackle the root causes of the problem, identified as:

- **A failure of regulatory control.** Inadequate institutional frameworks, poorly designed and unenforced water laws which permitted large agribusinesses to secure preferential access to water at unsustainable rates. A lack of rational development planning and absence of Social and Environmental Impact Assessment (SEIA) had facilitated expansion by agribusiness into areas with insufficient water. These problems were traced to limited political will, and power, to control market externalities, and a systematic weakening of Peru's regulatory capacity for natural resource management.
- **A failure of responsibility by the private sector and investors.** Due diligence by investors and purchasers was either absent or simply too weak to ensure that agri-businesses were exploiting natural resources in a sustainable manner. Of specific concern were lending safeguards and market standards which failed to flag, question, or mitigate the water impacts of a water dependent industry overexploiting a rapidly dwindling water resource in one of the driest places on earth. The performance standards of the IFC, along with Global GAP, and the supermarkets' own standards were singled out for criticism since they were all in place, suggesting sustainable use of water by agro-exporters, when in fact it ranked as some of the most unsustainable ever documented.

To bring resource use in Ica into sustainable balance and to prevent similar water crises elsewhere, the report called for an urgent realignment of water supply and demand in the basin and warned of the hazards of focusing only on new supply-side solutions such as groundwater recharge. It proposed stronger incentives for sustainable production and urgent action by stakeholders in Peru and those within the global supply chains which benefited from Peru's production, as set out in Box 3 below.

BOX 3. PRIORITY RECOMMENDATIONS TO REVERSE UNSUSTAINABLE WATER USE IN ICA IN 2010

LOCAL ACTION

a. **Improved scientific understanding** and data on the water resource, its use, the implications of climate change, and the efficacy of solutions, including aquifer recharge.

b. **Improved regulation and effective implementation of water law** to match use to available resources, avoid inequitable purchasing and accumulation of water rights.

c. **Improved oversight by civil society and the media** to incentivise transparent and accountable water management and improved performance by government, investors, and companies.

GLOBAL ACTION

d. **Improved standards for water stewardship**, via review of failing voluntary standards, and a new standard to guide and recognise responsible water use which was under development by the Alliance for Water Stewardship (AWS), together with independent verification and a recognisable brand so that responsible water use could be rewarded by consumers, purchasers, and investors.

e. **Improved financial due diligence and lending safeguards** to ensure responsible investment, including the IFC's Performance Standards, in relation to water resource use and impacts.

f. **Improved engagement, financial and political support by development partners** and the government trading partners with Peru, as well as the finance and retail sectors whose investment and purchasing practices were drivers of the water emergency, particularly those from the UK, the Netherlands and the USA which represented Peru's three largest markets.

2.3 THE RESPONSE TO THE 2010 STUDY

2.3.1 GLOBAL MEDIA COVERAGE & NEW RESEARCH

On publication of the report, stories about the situation in Ica were featured in international news outlets and trade news publications in the UK, Europe, China and the USA.[15, 16] These included a front and double page article in The Guardian, as well as features by Reuters, USA Today and the BBC, alongside radio and television coverage (Figure 8).

Figure 8. Ica features in The Guardian in September 2010

Tracking the reach and influence of these articles is a challenge, but their legacy includes regular requests for updates, photographs, and quotes about the case. Ica's water emergency also now features in multiple teaching programmes and has been the focus of subsequent analysis and research.[17]

2.3.2 GOVERNMENT RESPONSE & DECLARATION OF WATER EMERGENCY

In December 2010, citing water stress and the precipitous drop in groundwater levels in Ica due to overexploitation, combined with failing infrastructure and increasing demand, as well as the 'potential for irreversible harms', the regional government of Ica declared a state of water emergency. The Declaration resolved to develop a water plan for Ica, proposing investment in projects aimed at addressing the emergency, including the construction of a canal and a dam to regulate Ica's water supply, storm flow mechanisms, and the renovation of the irrigation infrastructure of the Ica Valley.[18] It extended the ban on drilling of new wells and emphasised the need for collaboration between executive bodies and other actors, with the aim of limiting agricultural expansion, expanding groundwater protections to the entirety of Ica and Villacurí, and establishing research and monitoring mechanisms to support the efficacy of management initiatives.[19]

Other government efforts included the establishment of the Certificado Azul / Blue Certificate award scheme, set up by the National Water Authority with support from the Swiss Agency for Development Cooperation and the 2030 Water Resources Group. The awards are made to businesses and are renewed annually based on achieving water efficiency targets, measuring water footprints and investment

[15] Al Jazeera English (2013)
[16] McShane (2010)
[17] Notably: Bullock (2016); ANA (2017); Torres and Ciriaco (2018); Wåhlin (2018); Williams and Murray (2019); Fernandez-Escalante et al. (2020); Salmoral et al. (2020); OECD (2021)
[18] The Glasgow Declaration for Fair Water Footprints (2022)
[19] Gobierno Regional de Ica, (2010), ORDENANZA REGIONAL No 0024-2010-GORE-ICA, El Peruano. Peru

in collective action initiatives. 48 businesses now participate across Peru, and 18 businesses have been formally certified.

2.3.3 WORLD BANK CAO INVESTIGATION OF THE IFC

The World Bank's Compliance Advisor Ombudsman (CAO) received six complaints which drew on the findings of the Drop-by-Drop study. Each of these complaints presented concerns about US$23M of grants and loans by the IFC for water infrastructure over a 15-year period to Agrokasa, one of Ica's largest exporters of asparagus, grapes, and avocados.[20] On conducting a full audit the CAO found that the IFC had: [21]

I. Failed to follow the advice of its own environmental and sustainability advisors, and had let *'commercial interests take precedence over the sustainability of water resources'.*
II. Lacked an effective risk management process, had not applied its own policy, and had failed to provide adequate protection for the environment and communities.

In response, a planned US$10M investment in Ica was withdrawn, and the IFC committed to strengthening internal controls and a more effective approach to evaluating sustainability through: [22]

- Revision of its Environmental and Social Performance standards and Sustainability Policy.
- Rolling out a sustainability learning programme and new water advisory capacity.
- A new water strategy and attention to water risks in the IFC agricultural strategy.
- Hosting the 2030 Water Resources Group, a multi-stakeholder partnership.
- Development of an early risk assessment tool and adoption of an IFC water sector business plan, including development of water footprinting tools and joint Bank-IFC country situation analyses.

Until November 2010, the CAO facilitated a multi-stakeholder Water Working Group to develop short-, medium-, and long-term strategies for managing water in the Ica basin. There is no record of what became of this group or its work.

2.3.4 THE ALLIANCE FOR WATER STEWARDSHIP STANDARD

Several supermarkets named in the 2010 report responded to discuss its recommendations, including Tesco, Sainsbury's, Marks and Spencer, as well as Barfoots, an intermediary and grower, and one of the largest importers of Peruvian fresh produce to the UK. The need for a new standard to guide and recognise sustainable water use, or 'water stewardship', was agreed to be a priority, and German Technical Cooperation (GIZ) and Marks and Spencer committed funds for piloting in Kenya to inform design of the Alliance for Water Stewardship's (AWS) international water stewardship standard.[23, 24]

The AWS Standard was launched in 2014 and has now been used in 54 countries to certify 243 sites.[25] The standard requires site managers to understand shared water challenges and demonstrate contextually relevant action to address these. Users of the standard are certified by an independent third-party and some of the world's largest multi-nationals, including Coca Cola, Unilever, Diageo, and Apple, now use the AWS Standard to guide and demonstrate responsible water use in their supply chains.

The challenges documented in Ica were an important driver and test case for how the AWS Standard should handle equitable and sustainable use of water resources. Notably, several of the largest producers and agro-exporters in Peru have adopted the AWS Standard. The performance of the standard and the

[20] The IFC disbursed loans of almost $17 Billion in 2009 ($33 billion by 2022) and exert significant influence particularly in contexts of weak governance, where they are bound by strict performance standards to mitigate social and environmental risks.
[21] CAO (2009)
[22] See IFC Response (CAO, 2011)
[23] Water stewardship is the use of water that is socially equitable, environmentally sustainable, and economically beneficial, achieved through a stakeholder-inclusive process that includes site- and catchment-based actions (AWS, 2019).
[24] Hepworth et al. (2011)
[25] See AWS Performance Monitoring Report (AWS, 2022)

contributions of these companies to addressing Ica's water challenges are explored further in Section 4.1.2. of this report.

3. THE ICA VALLEY TODAY

3.1 AGRICULTURAL PRODUCTION, EXPORTS AND WATER DEMAND

Despite Peru's volatile political situation and the devastating impact of the COVID pandemic, which left Peru with the highest mortality rate of any country, national GDP almost doubled between 2010 and 2021, to reach US$223 billion in 2021.[26, 27]

Figure 9. The area under irrigated production in Ica has increased dramatically since 2010, by an estimated 100 km^2.

The agricultural export sector played a major role in this growth, its value to the economy rising markedly from $645 million in 2000 to an estimated $9.2 billion in 2021.[28] Agricultural production in Ica has accounts for 11% of this, its value having grown by 500% since 2009 and reported by Peru's government to be worth $1.2 billion a year, or 0.5% of national GDP[29]. Some sources report a larger total contribution to GDP, of 3%, and of 7% to total export revenues.[30] This would put the total value of the agro-export sector in Ica at an estimated US$6 billion per year, a figure cited separately by the Ica Chamber of Commerce.[31]

Alongside increased production, the type of crops grown in Ica have also diversified (see Figure 10). Asparagus remains a predominant focal crop and Ica's production on around 10,000 hectares maintains Peru's position as the world's main producer and exporter of asparagus. Table grapes are now grown over 9080 hectares, with Ica's output putting Peru in third place in global grape production. These two crops contribute 68% of production value. Other important export crops include jojoba (2651 ha), pomegranate (2130 ha) avocado (1806 ha), citrus – tangerine/tangelo (1288 ha), olives (1014 ha), and increasingly, blueberries.[32] Peru is now the world's largest exporter of blueberries, with over US$1.36 billion in blueberries sold overseas in 2022, with extremely rapid growth of 172% year.[33]

Primary markets for Ica's agricultural produce remain the USA, the Netherlands, the UK, Spain, Australia, France, Germany, Italy, Japan, Switzerland, Canada, Sweden, and Denmark although China is emerging as an important new destination.[34] A sharp increase in trade between Peru and the UK is notable since 2010. Fruit and vegetable exports from Peru to the UK were worth £314 Million in 2022-23 and have grown dramatically, for fruits, primarily avocado and grapes, by around 1000%, with vegetable trade growing by 50% since 2010.[35] Figure 11 shows this growth of UK-Peru trade in fruit from the 1990's

[26] JHU (2023)
[27] Data Commons (2021)
[28] Peru Agriculture Sectors (ITA, n.d.)
[29] SUNAT/MINCETUR (2023)
[30] OECD (2021)
[31] Fernandez-Escalante et al. (2020); original figures from Ica Chamber of Commerce.
[32] Salmoral et al. (2020)
[33] 50 Años Adex (2023)
[34] MINAGRI, (2019)
[35] See Peru factsheet (UK Dept. of Business and Trade, 2023)

(figures in US$). This trend may be shaped by post-Brexit trade relationships and the UK-Andean trade agreement which came into force in 2021.[36]

Figure 10. Asparagus remains a predominant focal crop (a, b); grape production in Ica has grown rapidly (c, e); Ica has seen rapid growth in blueberry production since 2010 (d, h); citrus and avocado production have witnessed steady growth (f, g)

[36] UN Comtrade (2023)

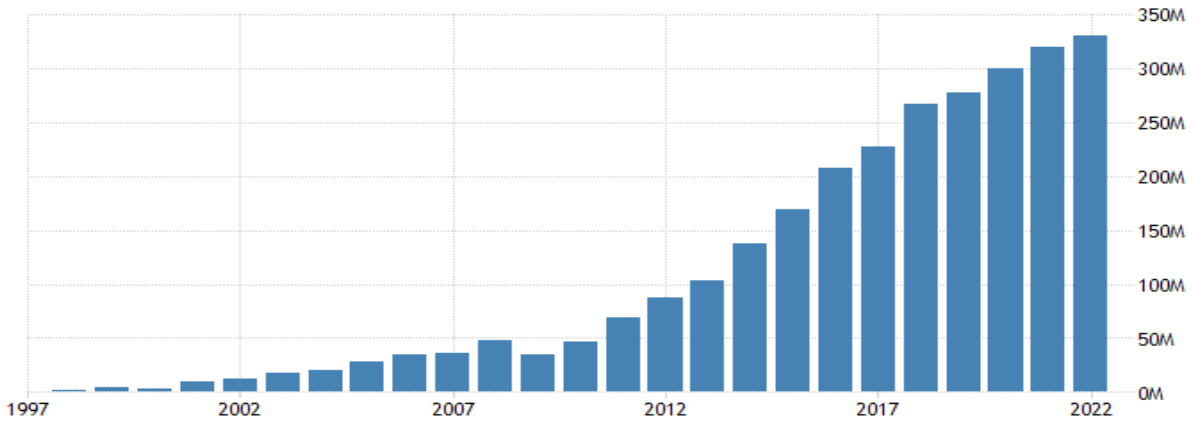


Figure 11. Annual value of fruit exports to the UK from Peru, since 1997.[37]

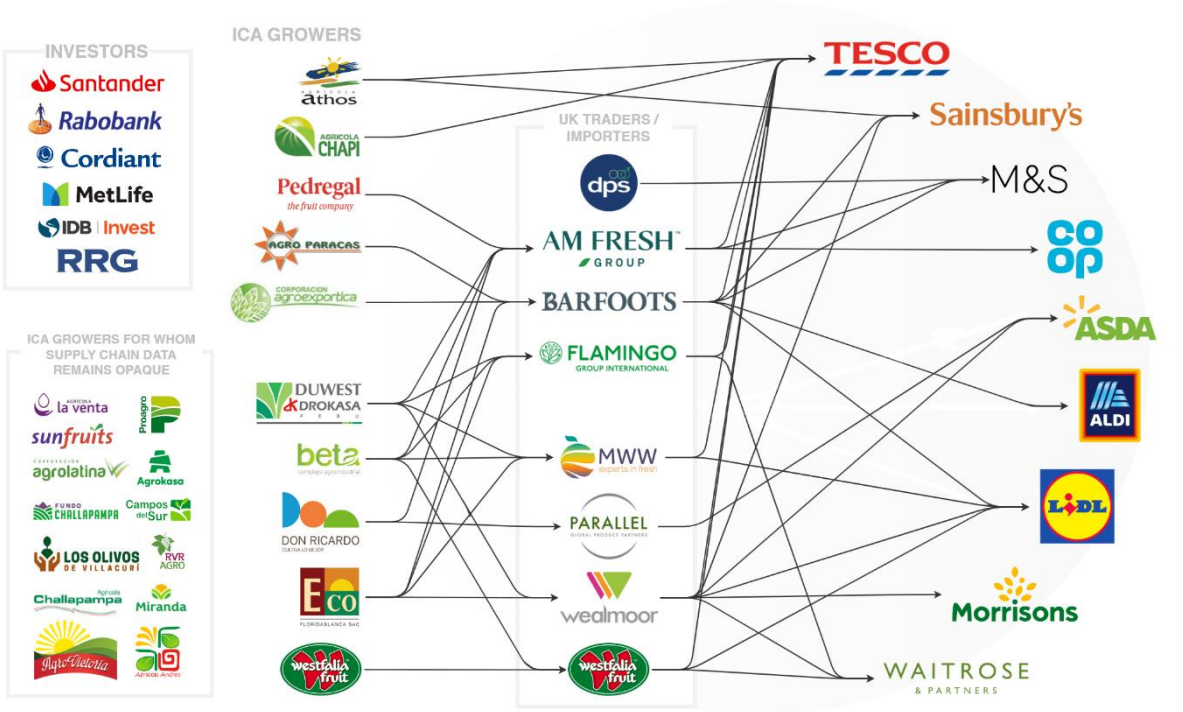


Figure 12. Known growers, brokers and investors behind the UK-Ica supermarket trade in fresh fruit and vegetables. All sources of evidence and data on supply chain and investment relationships are set out in Appendix A and are taken from Peruvian customs data, as reported by Veritrade, from supermarkets' published supplier lists, published media articles and/or direct communications with parties involved.

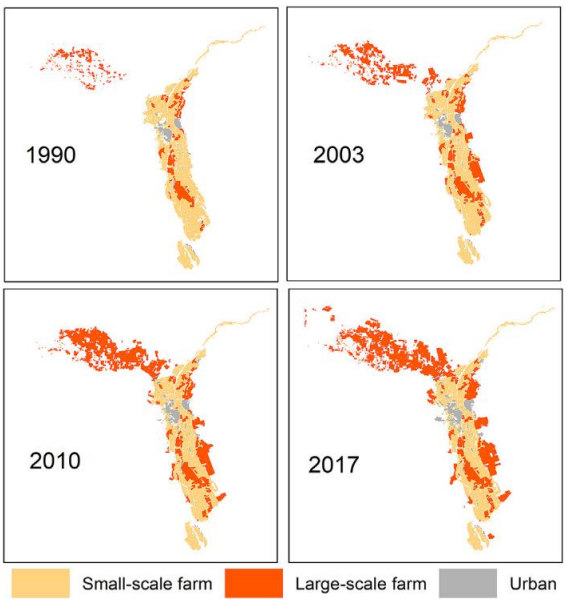


Figure 13. Spatial distribution of small- and large- scale farms for four years (1990, 2003, 2010, 2017)Source: Salmoral et al 2020

Trade is driven and controlled by supermarkets and wholesalers who purchase directly from farms or via brokers. Figure 12 sets out known actors involved in supplying the UK supermarkets, drawn from data and sources set out in Appendix A. The area under irrigation in Ica has expanded dramatically since 2010, by over 100 km^2, from 29,500ha to around 41,027ha, with 72% of this on land that was previously desert. Most of this growth is via large farms between 400-1500ha in size, of which there are now roughly two hundred. Figure 13 illustrates the expansion of farmland in the Ica valley between 1990 and 2017. Figure 14 tracks the changes in crop production, and Figure 15 illustrates the growth in total export trade from Ica over that period. Notably, crop production and total export trade from Ica have doubled over the period.

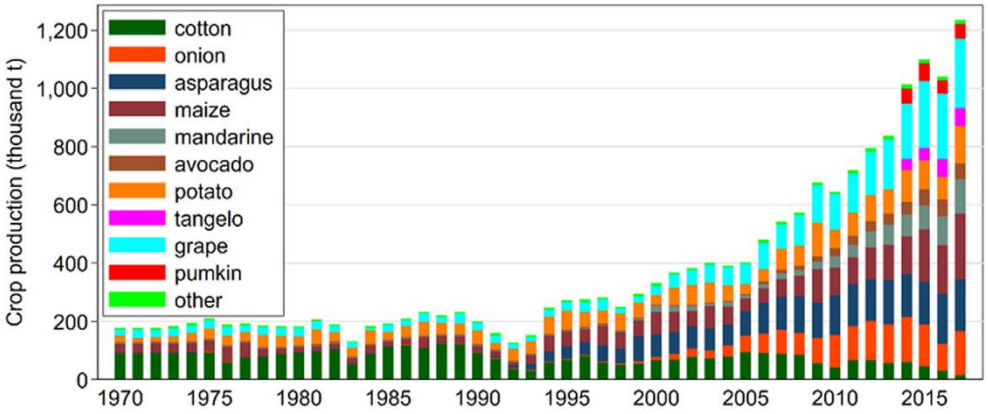


Figure 14. Crop production in the Ica Department (in thousand tonnes for selected crops).[38]

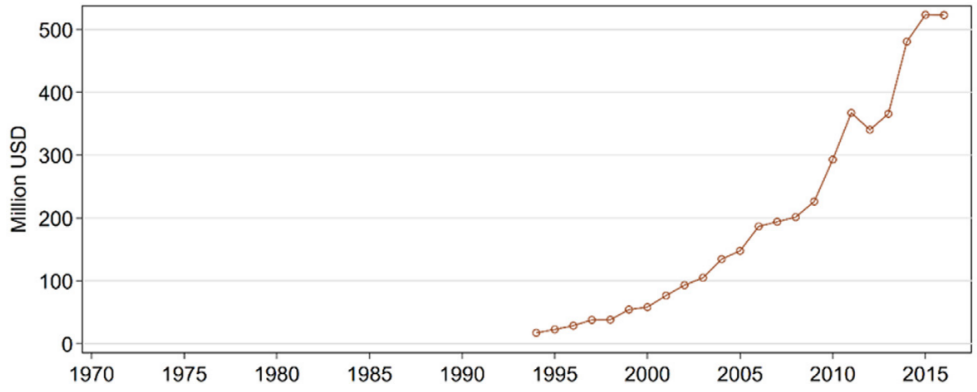


Figure 15. Total export trade from the Ica Valley (in US$ million).[39]

The continued growth of the agro-export sector has stimulated population growth in Ica Region by over 130,000 from the mid-2000s to a total of 850,765 today.[40] Most new settlement has been in Ica municipality, which had grown from 185,000 in 2010, to 282,000 inhabitants by 2017.[41] Given an average household size of five people, this increase of around 100,000 people is consistent with estimates of new employment created by the agro-export sector over that period, of 20,000.[42]

A clear and direct relationship exists between this growth in population, increase in irrigated area and sectoral growth of Peruvian agro-export companies, 26 of which, from a total of 50, have operations in

[38] MIDAGRI (2019); reproduced from Salmoral et al. (2020). Note: no data for pomegranates or blueberries.
[39] SUNAT (2017); reproduced from Salmoral et al. (2020)
[40] MINAM (2019)
[41] Fernandez-Escalante et al. (2020)
[42] Munoz (2016)

Ica.[43] Multiple figures have been cited in the literature to reflect how this growth has increased Ica's water demand:

- In 2017 the National Water Authority (ANA) calculated total demand as 373 Mm^3/year.
- Salmoral et al. calculated demand to be 483 Mm^3/year based on modelling in 2020.
- In 2021 the OECD study proposed a figure of 563 Mm^3/year.

The exact figure is difficult to confirm because large numbers of wells are not licenced or authorised, their capacity is not known, and abstraction rates are not monitored. ANA report that there are now 2,116 wells across the Ica Valley, compared to 1,700 in 2010, and that only 30% of these are legally authorised through a licence.[44] The real figure for annual average demand is therefore likely to be in the upper ranges of these estimates, potentially exceeding 500 Mm^3/year, given the 30% increase of the number of wells and area under irrigated production since 2010, when demand was already between 317 and 496 Mm^3/year.

3.2 AVAILABLE WATER RESOURCES

The water resources available to supply Ica's increasing irrigation and municipal needs comprise the connected Ica and Villacurí aquifers, representing around 1,861 Mm^3 of water, or 40% of Peru's total groundwater resources, together with the annual surface flow and groundwater recharge to the aquifer provided by flow from the highlands, primarily via the Ica River.[45,46] These flows are augmented by water from the PETACC (Proyecto Especial Tambo Ccaracocha) scheme which transfers water from the Amazon Basin into the Ica River).

Fernandez-Escalante et al. (2020) give a detailed account of the hydrogeology of the Ica-Villacurí aquifer system. They note that abstraction from Villacurí to the north of Ica Valley is sensitive to groundwater mining because the system receives almost negligible natural recharge, so that sustainable use is based on transfer and recharge by excess flows in the Ica and Pisco rivers. The main Ica aquifer which supports the regional capital, is recharged by surface water flows from the Ica River and its sustainable use must therefore be guided by a careful balance between supply and demand.

Estimates of the sustainable or 'safe' yield of the system have been revised upwards slightly since 2010. ANA (2017) calculated that annual recharge totalled 266 Mm^3/year split between 179 Mm^3/year for the Ica aquifer and 86 Mm^3/year for Villacurí.

These figures suggest that the overdraft on the aquifer may range from between 107 to as much as 297 Mm^3/year. It is reasonable to presume that the rate of over-abstraction exceeds 200 Mm^3/year and approaches double the recharge – or twice the sustainable yield. To help comprehend the scale of the challenge, this equates to an over-abstraction in Ica of 219 full size Olympic swimming pools every day of the year.[47]

3.3 THE CONTRIBUTION OF MANAGED AQUIFER RECHARGE (MAR) AND WASTEWATER REUSE

Fernandez-Escalante et al. (2020) also evaluate the current and potential role of managed aquifer recharge (MAR), one of several techniques recommended by the World Bank's Groundwater Management Advisory team in 2010 to help bring the exploitation of the aquifer into sustainable equilibrium.[48] They proposed the storage of excess runoff from the Ica River during wet periods and

[43] Salmoral et al. (2020)
[44] ANA (2017)
[45] ANA (2017)
[46] Ore (2005)
[47] A typical Olympic pool is 2500 m^3 (50m x 25m x 2m) – so an over-abstraction of 200 Mm^3/year = 547,950 m3/day = 219.18 pools per day.
[48] Fernandez-Escalante et al. (2020)

introduction of this into the ground via infiltration ponds to increase the safe yield of the aquifer. In response, the number of infiltration ponds (pozas) in the Ica Valley have been increased dramatically from 41 in 2012 covering 22 hectares, to 864 in 2017 across 295 hectares (see Figure 16).[49] In what is now one of the largest MAR schemes in the world, these infiltration ponds receive and store water from the Ica River during the Andes wet season from January to April, and facilitate the artificial recharge of the aquifer with water that would otherwise be 'lost' to the sea.

Figure 16. Artificial recharge ponds (pozas) in the Ica Valley, built to facilitate managed artificial recharge (MAR).

Studies show that between 2012 and 2017 these ponds achieved a mean recharge infiltration rate of 0.06 Mm^3/ha/year, and that the estimated maximum total recharge was 17 Mm^3 in 2017.[50] These studies reveal the limitations of MAR as a solution to Ica's water emergency. Notably:

- The average annual flow of the Ica River reported by Fernandez-Escalante[51] is 36.5 Mm^3/year, so even if the entirety of this flow could be captured, which is unlikely given the 'flashy' nature of the river, it would fall well short of the overdraft of well over 107 Mm^3/yr.
- Theoretically, even if additional flow was available, replenishment of the Ica-Villacurí minimum aquifer overdraft of 107 Mm^3/yr, would require 1,767 ha of land for infiltration ponds. A lack of suitable land severely limits the feasibility of installing ponds at this scale.
- MAR techniques pose a risk of groundwater salinisation where evaporites within the soil are re-mobilised, contaminating the aquifer.
- High sediment loads during times of peak run-off leads to rapid clogging and failure of artificial infiltration galleries.

[49] Navarro and Fernandez (2017)
[50] Fernandez-Escalante et al. (2020)
[51] Fenandez-Escalante (2022a)- note that the record used to calculate this annual mean flow is relatively short, and that quantification of average annual flows in the Ica River over longer periods are needed.

The challenges of MAR are discussed further in Section 5.1.1. alongside the monitoring data which show its limited efficacy in Ica.

Re-use of wastewater is a further potential source of water for irrigation in Ica, and a portion of Ica's municipal sewage is already auctioned to farmers for this purpose (see Box 4).[52] While the practice is an enterprising example of wastewater re-use, the volumes concerned are relatively small, and are not likely to make a significant impact on the aquifer overdraft. For example, if the entire water supplied to Ica municipality was to be re-used without any loss, it would provide only 16 Mm^3/year. Additionally, wastewater reuse in irrigation introduces serious risks of soil salinisation, where salts in the wastewater accumulate in the root zone to cause significant crop damage. The practice also presents challenges for meeting stringent micro-biological standards in export food crop production.

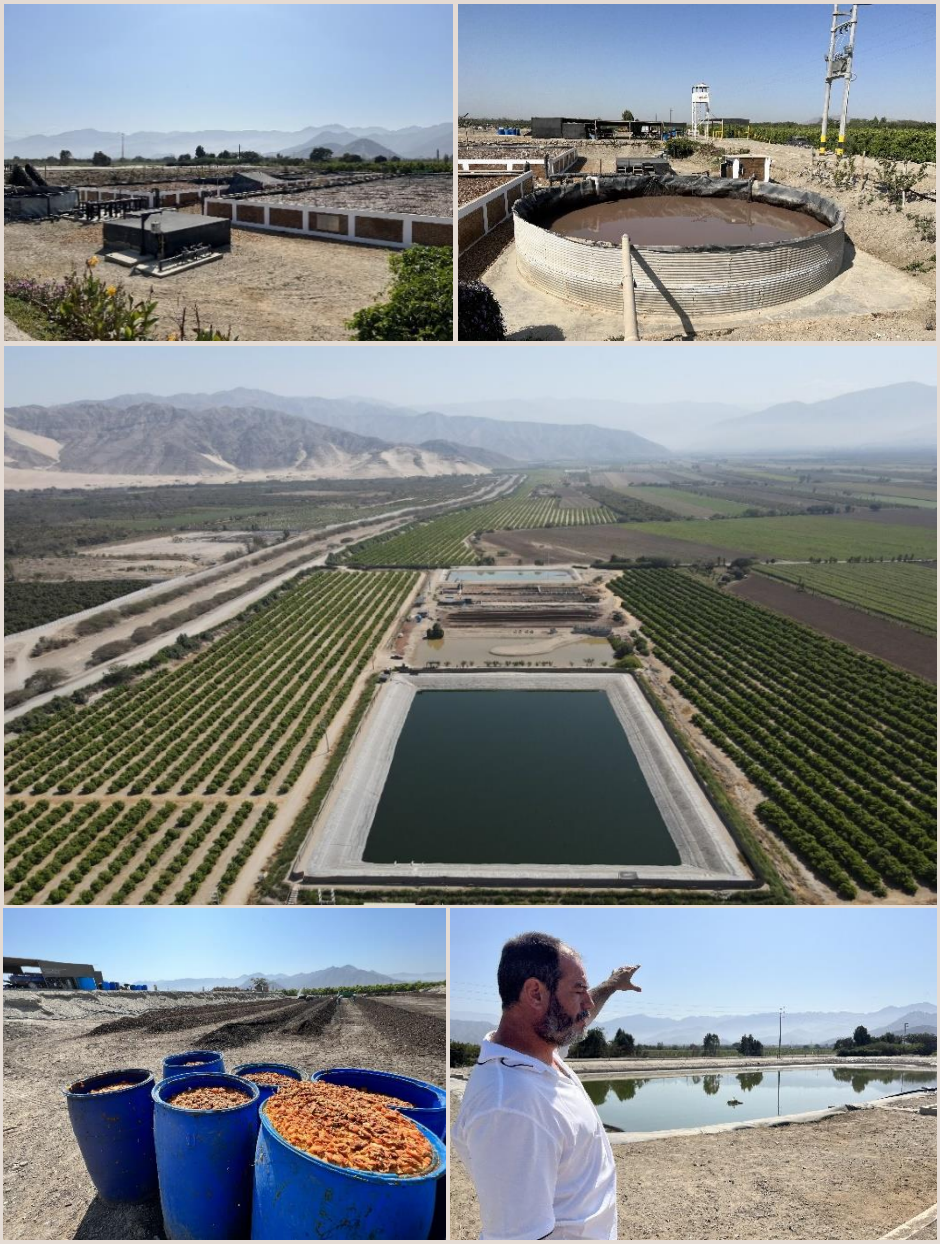
[52] OTASS, (2018)

BOX 4.

EMERGING GOOD PRACTICE TOWARD A CIRCULAR ECONOMY AND NATURE-BASED SOLUTIONS – WASTEWATER REUSE FOR IRRIGATION AND COMPOSTING OF BIO-WASTE IN ICA.

The treatment and re-use of municipal wastewater to supplement irrigation demand has been demonstrated to be a viable solution by several enterprises in Ica. One such enterprise, Sunfruits, won a concession from the municipal authority to receive and treat wastewater generated by several thousand people which had previously received inadequate treatment and created pollution hazards.

Even more progressively, Sunfruits are deploying this wastewater to accelerate composting of vegetable wastes for use as high quality fertiliser and soil conditioner. In the context of Ica, where soil capacity to retain moisture content will be a critical determinant of climate resilience, such innovation is commendable. Additional effort is now required to document and scale such best practice, and to encourage other companies to adopt the approach.



Plates: Sunfruits wastewater treatment facility and composting, Ica

3.4 THE DECLINE IN ICA'S WATER TABLE DUE TO OVER-EXPLOITATION OF THE ICA-VILLACURI AQUIFER

The over-exploitation of the Ica-Villacurí aquifer revealed by these figures results in an 'overall tendency for continual decline' of the water table.[53] The National Water Authority (ANA) have measured an annual decline of between 0.31 to 1.84 metres, with decline by 4 metres per year observed in some parts of the aquifer.[54] Figures 17 and 18 show the long term trends for groundwater levels in Ica and Villacurí respectively based on primary data from ANA observation wells over the 25 year period from 1997 to 2022. Rates of decline vary between wells and over time, with maximum rates reported of around 0.8 m/yr in the Ica aquifer and 3 m/yr in Villacurí. These observed trends are consistent with data published in peer reviewed journal papers and by the Board of Groundwater Users (JUASVI) (see Figure 19).[55] A reduced rate of decline is notable in selected monitoring wells since around 2020. A review of each record for these wells reveals the reasons for this - they have been abandoned because of high salinity or because they have run dry.

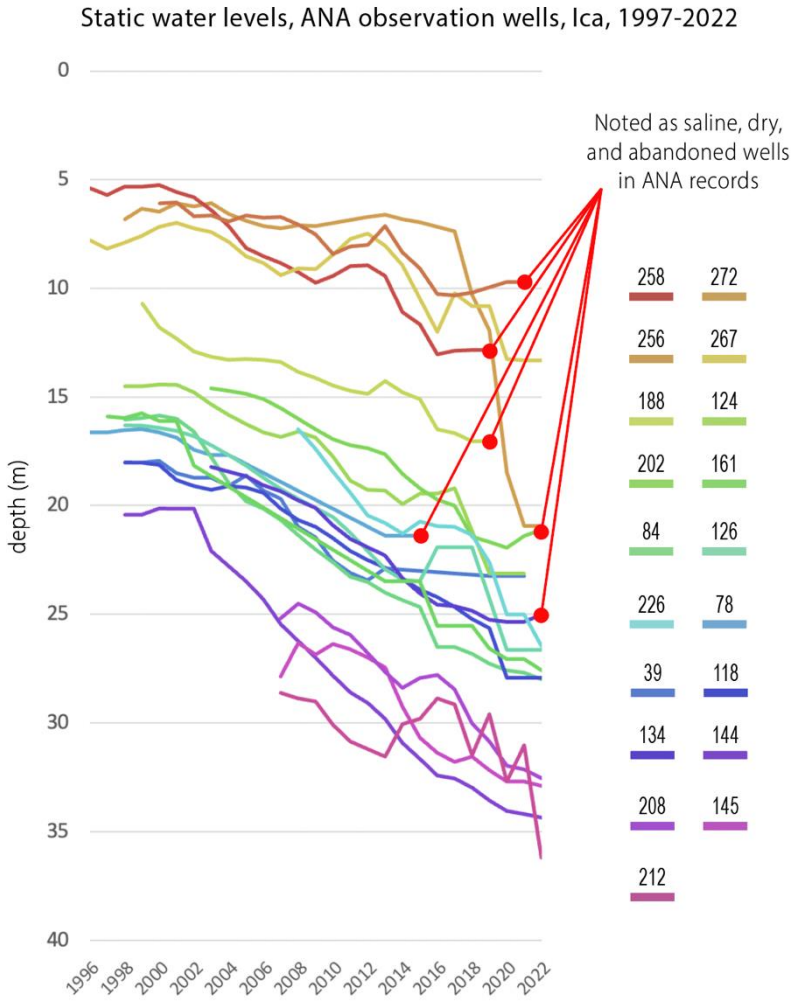


Figure 17. Long-term water table trends for the Ica aquifer, 1997-2022, based on primary data from ANA observation wells. Note: well numbers correspond to IRHS numbers.

[53] Fernández-Escalante et al. (2020), p.2606
[54] Zegerra (2018)
[55] Salmoral et al. (2020); Fernandez-Escalante et al. (2020); JUASVI (2023)

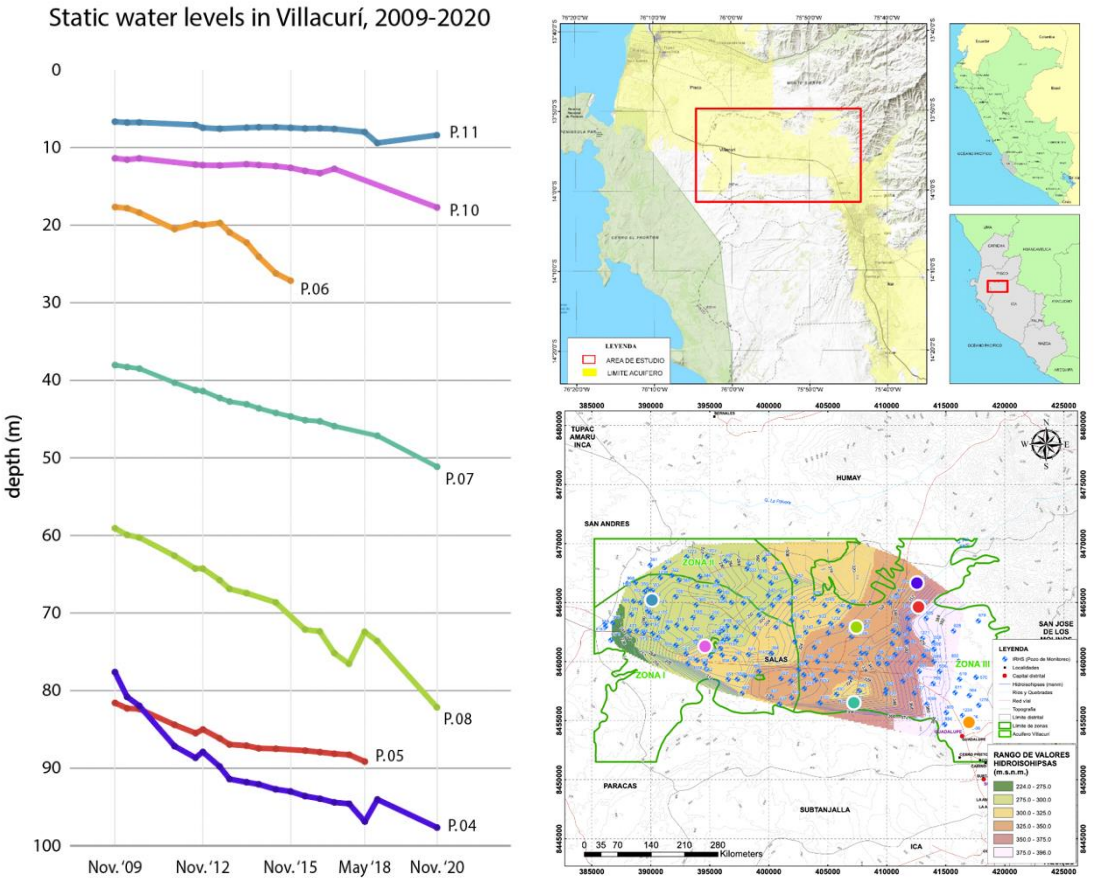


Figure 18. Monitoring wells showing static water levels (metres below ground level) for the Villacuri aquifer, from ANA observation well data, 2009-2020.

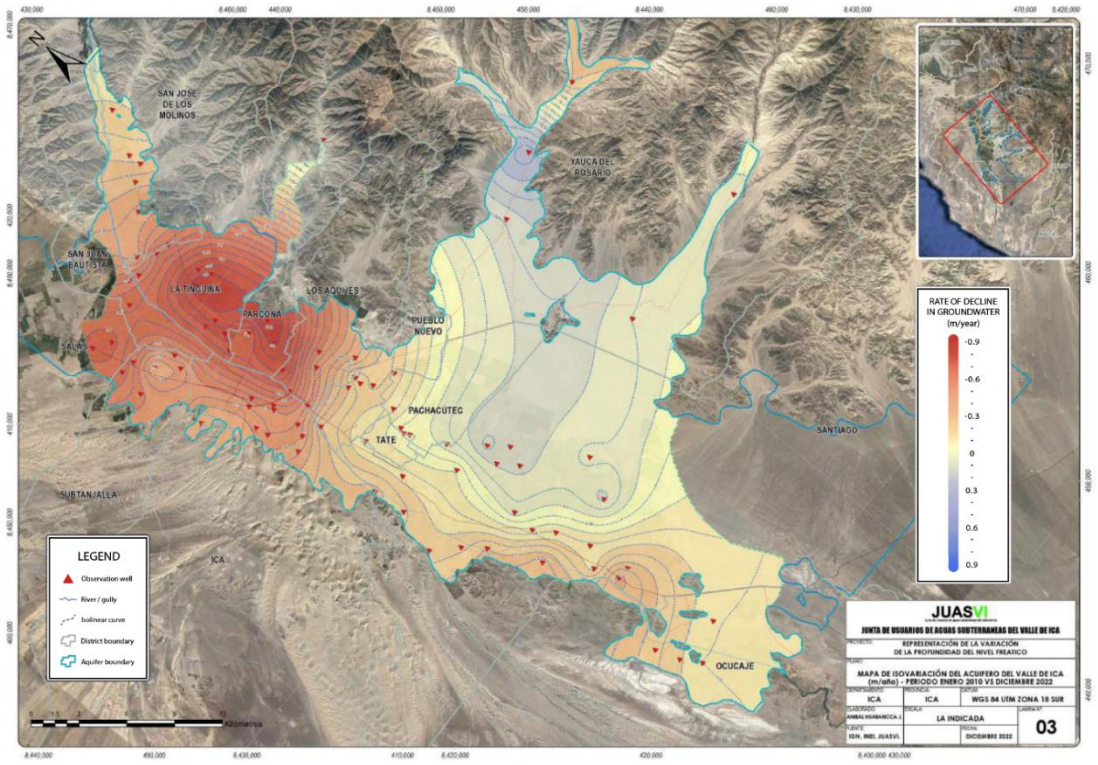


Figure 19. Rates of decline across the Ica-Villacurí aquifer – values ranging from 0.1 metres to +1metres per annum.[56]

[56] JUASVI (2023)

In summary, despite the ban on drilling new wells since 2008, abstraction from the Ica-Villacurí aquifer appears to have increased significantly since then, by between 56 to 246 Mm^3/yr in line with the expansion of the agro-export sector and irrigation demand. Although the level of aquifer recharge has been revised slightly upwards between the study periods, increased abstraction and consumptive use has driven an increase in the overdraft on the aquifer so that it now lies between 107-297 Mm^3/yr. The true figure is likely at the upper end of this range, approaching or exceeding twice the sustainable yield. The continued and in some places accelerating decline of the water table across the Ica-Villacurí aquifer, at some of the fastest rates seen in any aquifer globally, confirms that the exploitation of the groundwater resource is grossly unsustainable.

Figure 20, below, illustrates the evolution of the aquifer overexploitation using the range of figures cited by the National Water Authority and other reliable sources.

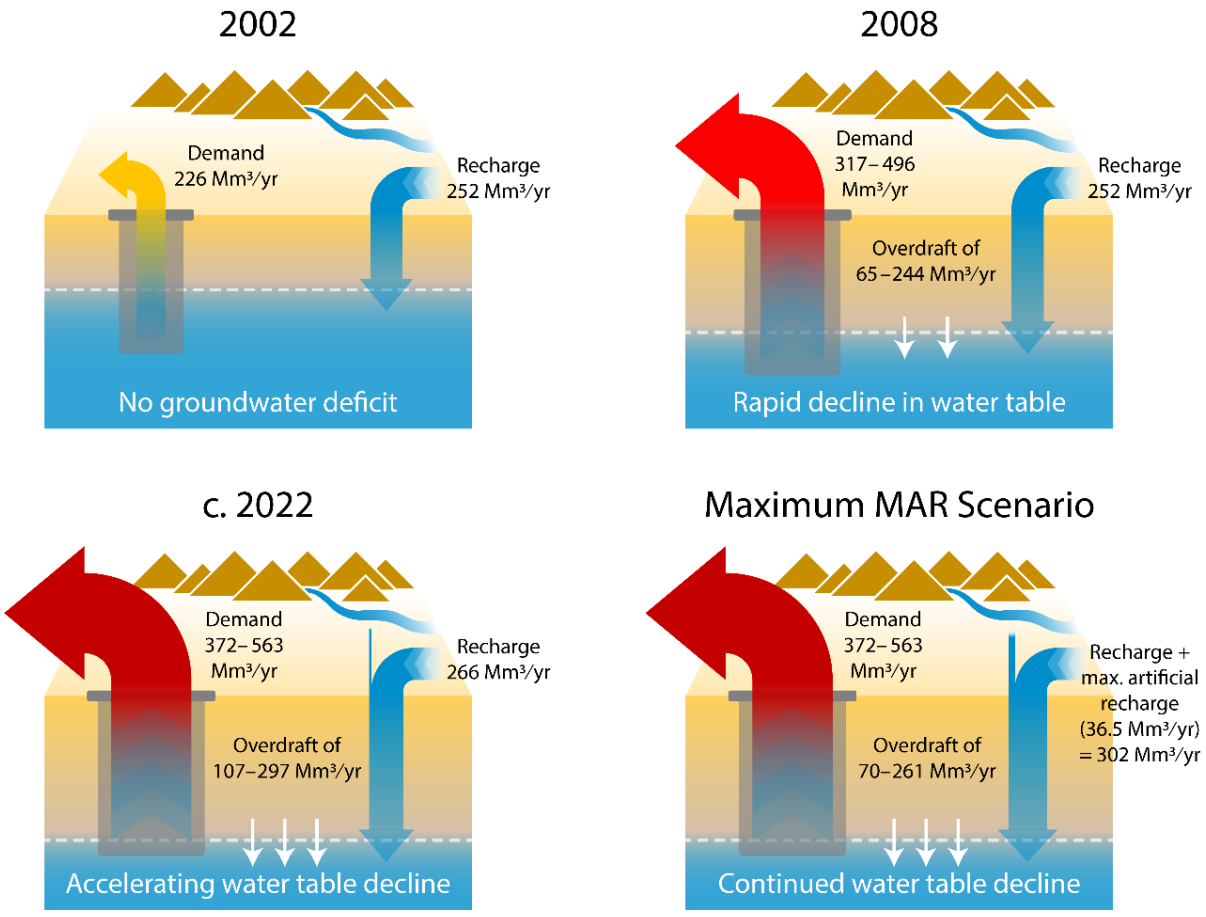


Figure 20. Evolution of the Ica-Villacurí aquifer and overexploitation from a near sustainable equilibrium in 2002 to circa 2022 showing the maximum potential managed aquifer recharge (MAR) scenario. Figures for 2002 and 2008 are drawn from ANA and World Bank figures cited in Hepworth et al. (2010). Figures for later scenarios are drawn from ANA (2017), OECD (2021), and Fernandez-Escalante et al. (2020). Note, modelling by Salmoral et al. (2020) calculated demand at 483 Mm3/yr in 2017.

Figure 20 also illustrates the effect of the maximum contribution of MAR to aquifer recharge, of 36.5 Mm^3/yr (more than double that achieved to date). If this could be achieved, then the overdraft would remain at between 70 and 261 Mm^3/yr. Recent authors and studies reflect this in their conclusions:

"The overexploitation of the Ica-Villacurí aquifer continues to worsen with time … there is insufficient excess flow in the Ica River to compensate for the current rates of aquifer overexploitation via managed aquifer recharge, and serious demand management measures – mainly reducing the groundwater irrigated area – will inevitably be required to reach a sustainable water resource balance." [57]

"Water for irrigation is being used in an unsustainable manner. The study provides valuable evidence of the urgent need to address over-abstraction as current levels of water consumption are much higher than local rates of water renewal." [58]

"Overexploitation of the aquifer in the Ica valley has already caused groundwater salinisation in certain areas and a decrease in water levels across the entire aquifer." [59]

These scientific assessments are echoed by the voices of stakeholders and water users from Ica:

VOICES FROM ICA

UNSUSTAINABLE USE OF GROUNDWATER AND ONGOING AQUIFER DECLINE

"The situation in Ica is serious, it is very grave. We are not granting any new water rights…but Illegal groundwater use is a major problem. Farmers are digging wells without a permit. How much is used? We don't know. There is a lot of tension and a big sense of injustice."

Senior Manager, National Water Authority (ANA)

"The water table is going down and down whilst population growth is driving urban expansion. The water problems affect everyone here – large, medium and small farmers, the population and the environment."

Civil Society Leader

"Based on crop needs we were able to measure how much water is really abstracted. It is over 3 times the annual recharge which is really very serious. It is not sustainable. The rate of depletion is very rapid. Ica is suffering from a common pool resource disaster. Agro-exporters are abstracting a lot more water than their licences allow – water regulation is very weak...It's the largest and most important aquifer in Peru…but the problem is that the institutions for water management are not working."

Economist / Principal Researcher & Advisor to MINAGRI

"Overall, the aquifer is still at risk and in decline, with terrible outcomes for all water users."

Farm Manager, Agro-Export Business

[57] Fernandez-Escalante et al. (2020)
[58] Salmoral et al. (2020)
[59] ANA (2017)

4. THE IMPACTS OF UNSUSTAINABLE GROUNDWATER USE IN ICA

Available evidence and testimony indicate that the over-abstraction of groundwater to irrigate agro-export crops in the Ica valley causes the range of increasingly significant impacts set out below.

4.1 PROBLEMS OF ACCESS TO WATER, SALINISATION, HIGHER COSTS, AND CONFLICT

As documented by the National Water Authority and multiple authors, the over-abstraction of the Ica-Villacurí aquifer by agro-export farms producing fresh fruit and vegetables for supermarkets causes multiple challenges for water users in Ica.[60] They highlight how the shift to highly efficient drip irrigation to support commercial production for export has - somewhat ironically - exacerbated and accelerated aquifer decline. This is because it's precisely controlled delivery of water to the root zone of each plant, in line with its exact water needs, means that almost all the water abstracted is consumed by the crop via evapotranspiration. Historically, the traditional practice of flood irrigation put less pressure on the aquifer because, as fields were flooded, a significant amount of 'unused' water would percolate downwards to aid aquifer recharge.[61]

VOICES FROM ICA
WATER ACCESS, HIGH SALINITY, AND WATER CONFLICT

"The overdraft is costing people. Only the agro-exporters can reach water now. There are no official figures on the depth of the aquifer, but you won't find water at 50m. You need to go very deep."

Civil Society Leader

"We used to grow asparagus on six properties across Ica, around 300 hectares in total. We just about managed, by pumping seven wells non-stop for 20 years, about 2.5 million m3/year. But the water got too salty – too high for asparagus. Our options were to switch to grapes and reverse osmosis or to use surface water."

Farm Manager, Agro-Export Business

"Water quality has declined over time, and the water level dropped between 10 and 15 metres, so we lost our wells."

Farm Manager, Agro-Export Business

"The economic success of the agro-export sector is driving resource depletion and conflict. Our water is for our children and future generations – I will not sell, and they will take it over my dead body."

Ica Farmer

There is salinisation and the water table is dropping – it is caused by the over abstraction…reduced production in boreholes means demand (for domestic water) outstrips supply. We've approved 6 deep wells to find the water but it's costing $13 million and will, take 5 years to deliver.

Superintendent, Ica Water Regulator

[60] See: ANA (2017); Wahlin (2018); Willams and Murray (2019); Fernandez-Escalante et al. (2020); Salmoral et al. (2020); OECD (2021)
[61] Kendy et al. (2004)

Over-exploitation of the aquifer causes two main problems:

1. The lowering of the water table means that existing wells used by small farmers and the municipality are increasingly running dry.[62]
2. Over-pumping causes serious 'up-coning' of highly saline groundwater from deeper in the aquifer which means the water quality is too poor for use.

Small- and medium-scale farmers as well as the municipal water authority are constrained by the costs of finding alternative supplies or drilling deeper or new wells, and they also face regulatory constraints since new well drilling is banned. Where these costs cannot be absorbed, wells and land are abandoned or sold to larger farms, leaving only the wealthiest large farmers able to operate.

These problems are increasingly widespread. Fernandez-Escalante et al. report that 75% of irrigators in the Ica Valley regularly do not have enough water and so are forced to reduce or stop cultivation. They highlight the significant social costs of unsustainable groundwater use, raise serious concerns about yield reduction and pollution, and urge a prioritised action plan.[63] The OECD also highlight rising salinity as a very serious risk to agricultural production in the Ica valley.

These concerns are backed up by primary data and stakeholder testimony collected during the current study. Data on groundwater quality provided by ANA for Villacurí from 1998 to 2021 shows that salinity levels have risen significantly, by an average of 0.1 dS/m/year. ANA determined that the average mineralisation levels for the aquifer were between 2.17-3.99 dS/m (reaching as high as 12.15 dS/m at certain sites) during the wet season, and 1.79-2.38 in the dry season, both of which constitute 'high' levels of mineralisation. Around half (46% and 49%, in the wet and dry seasons, respectively) of all the wells monitored by ANA in Villacurí were found to be yielding water which was unsuitable for irrigation because of high salinity. Figure 21 shows the average rates of salinisation of wells monitored in Villacurí between 1998 and 2021.

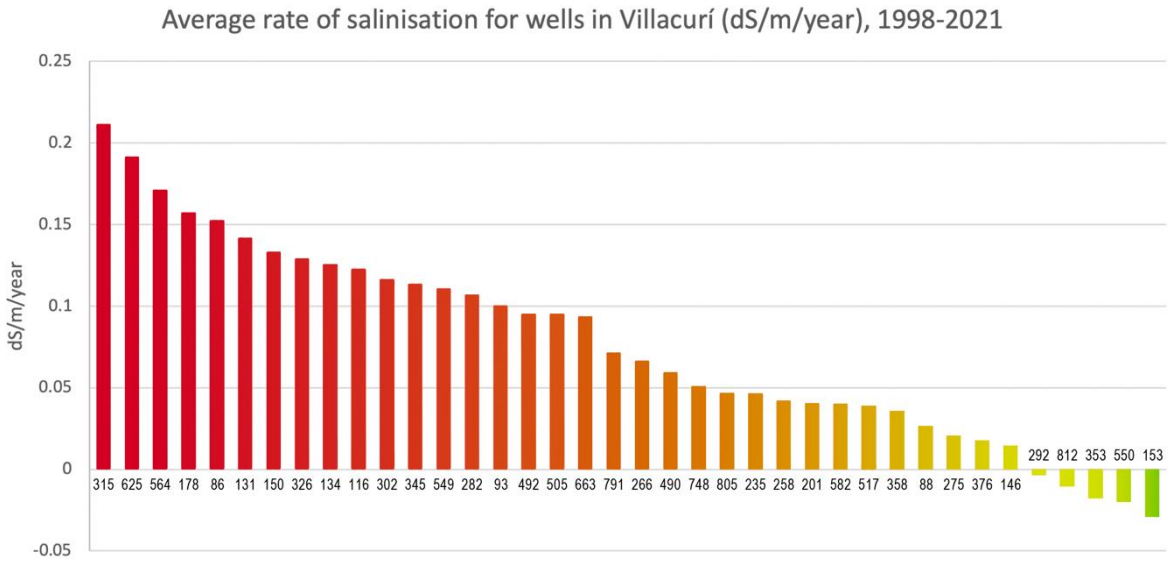


Figure 21. Average rate of salinisation for wells monitored in Villacuri between 1998-2021 (dS/m/year). Notes: labels correspond to IRHS well numbers, only wells with >15 years of data were plotted.

[62] An agro-export stakeholder claims that wells are not maintained by the utility or small farmers and that it is clogging which contributes to the drying of wells. However this would not explain the static water table decline.
[63] Fernandez-Escalante et al. (2020)

4.2 INFRINGEMENT OF THE HUMAN RIGHT TO SAFE WATER AND SANITATION

A combination of dwindling water resources and rapidly increasing demand from Ica's growing population has created serious problems for water and sanitation access, and together these issues are driving infringement of the human right to safe water and sanitation. Since 2010, Ica's population has grown by at least 100,000 people as workers and their families have moved from poorer areas to find employment in the agro-export farms and their service industries. Faced with declining groundwater levels, serious water quality problems because of salinity and pollution by agricultural chemicals, outdated infrastructure and limited investment, the municipal water utility is increasingly unable to deliver safe water and sanitation for Ica's people.[64,65] The problem is particularly acute in the unplanned settlements which have grown around Ica to house agro-export workers.

VOICES FROM ICA
INADEQUATE ACCESS TO WATER, SANTITATION, AND HYGIENE (WASH)

"Ica is exporting water – a lot of water – but it's a disaster here. When you eat grapes, blueberries, asparagus, or avocado you should think of where it comes from... When you do, think of Ica - and think of thirst, and exploitation."

Agro-Export Farm Working

"70-80% of Ica doesn't have full access to water. For many it is 2 to 3 times a week. Tanks are filled, but the poor don't have tanks – they buy water in cylinders at 200 Soles a month compared to 70 for everyone else. The poor pay more – it's a racket. There's no WASH on some farms – the superintendent of water has flagged this – no bathrooms or water."

Civil Society Leader

"The WASH situation on some farms – it's terrible. One toilet for 1000 workers. The toilet is just a hole, no handwashing facilities, and the workers must bring their own drinking water. It's dangerous for women as we have no separate toilets. There's no dignity – it's shameful. We suffer from diarrhoea, UTIs and stomach bugs. There's no respect for women. It's like being in a concentration camp. Unions are a sin. Even where they are allowed, you'll be blacklisted for joining."

Agro-Export Farm Worker

"The big issue is WASH access. There has been a big influx over 10 years … people have water in their homes only a couple of days a week."

Farm Manager, Agro-Export Business

Peru's Ministry of the Environment (MINAM) report that in Ica Region, 87.3% of the population have access to safe water and 79% have access to sewerage.[66] Based on figures reported in 2020 by SUNASS (Superintendencia Nacional de Servicios de Saneamiento - Peru's Water Supply and Sanitation Regulator) potable water is provided to 87% of Ica City's population.[67] However, interruptions and shortages are widespread and testimony from residents suggests that 70-80% of the total population lack reliable water supply.[68] SUNASS report that in some 'zones', or sub-districts of Ica, such as Parcona and Los Aquijes, domestic water demand significantly outstrips – and is almost double – the available

[64] GORE Ica (2014)
[65] Zeisser & Gilvono (2016)
[66] MINAM (2019)
[67] SUNASS ppt (n.d.)
[68] Codehica, pers com. (2022)

water supply, with families receiving water for only 2 hours each day.[69] Some areas are reported to receive water only twice each week.[70] Water insecurity is even more extreme for the 'unofficial' slum populations not included in SUNASS figures.[71] Many of these uncounted citizens, including at least 35,000 people living in informal settlements such as 'the Promised Land' have no piped water at all, and have no option but to pay high prices, almost three times the price of piped supplies, for water of uncertain quality from mobile bowsers and tankers.[72]

84% of households in central Ica are served by sewerage, falling to 30% in outlying districts, and only 34% of the city's wastewater receives any treatment, although treatment facilities are currently being extended.[73] Pollution problems resulting from untreated municipal sewage are compounded by the historical and ongoing use of agricultural chemicals, pesticides, and nitrogen fertilizers, with the latter associated with elevated nitrate levels across the aquifer. Elevated nitrate in drinking water causes methemoglobinemia, or 'blue babies syndrome', a potentially lethal condition for young babies. Nitrate exposure has also been shown to cause health impacts such as nausea, headaches, abdominal cramps and increased gastric cancer risk.[74]

Monitoring by the National Water Authority (ANA) reveals a mean nitrate concentration in the Ica aquifer of 11 mg/l and of 49 mg/l in Pampa-Villacurí.[75] The trend of elevated nitrates through contamination by nitrogen fertilizer identified in the 2010 study has continued, and levels are now approaching or exceeding the safe limit set by the European Union (25 mg/l as NO_3) as well as the maximum limit for nitrates in drinking water set by the World Health Organisation (50 mg/l as NO_3).[76]

It is the urban poor, made up of migrant workers seeking employment in the farms, who bear the brunt of these impacts caused by water shortage and pollution. Housed in unplanned slum areas without running water or sewerage, they face ill-health, as well as livelihood and economic burdens associated with inadequate WASH access. Opportunities for women and girls, in particular, are constrained because they are tasked with domestic water management and caring for the sick.

An additional concern is access to WASH for workers on farms, which is reported to be highly variable. Some agro-export operations are known to provide facilities which reflect global best practice, including gendered access for women. According to workers, others provide none, despite this being a legal requirement, and a requirement of multiple conventions of the International Labour Organisation.

Lack of access to safe water and rising costs in Ica are cited as grievances by workers and farmers and are some of the issues behind regular strikes and protests, which have been violently suppressed by police, resulting in life changing injuries for protesters.[77,78]

[69] Fernandez-Escalante et al. (2020)
[70] Pers. Comm. Agro-export Farm Manager (2022)
[71] SUNASS estimate Ica's total population at 218,670 against other estimates of 285,000.
[72] Pers comm SUNASS (2023)
[73] OECD (2021)
[74] Picetti, et al. (2022)
[75] Fernandez-Escalante et al. (2020)
[76] WHO (1998)
[77] RPP Editorial (2020)
[78] UNCHR (2021)

Figure 22. (a) 'The Promised Land' informal settlement – home to some 12,000 people and migrant workers – receives no formal water supply or sewerage, and the population relies on water from tankers. (b) Poor working and living conditions, higher costs for smaller farmers and lack of water access, are priority grievances behind strikes and protests in Ica. In 2020, protests closed the Pan-American highway and resulted in violent clashes between police and protesters (*Image Alonzo Munoz/AFP)* (c) Limited access to water creates health risks and livelihood burdens in Ica, particularly for women and girls.

4.3 INCREASED CLIMATE VULNERABILITY FOR COMMUNITIES, ECOSYSTEMS, AND THE ECONOMY

Climate records and modelling indicate that anthropogenic climate change is driving more extreme weather events in the Andes and Ica region, irregular flow in the Ica River, and reduced water availability, especially during the dry season.[79,80] Modelling suggests greater run-off from January to March, and higher frequency drought and extreme rainfall events, with greater potential for flash floods and mudslides. The catastrophic flooding seen in Ica in 1978, 1998 and 2023 illustrates this vulnerability and the potential scale of future impacts.[81]

Over-exploitation of the Ica-Villacurí aquifer by the agro-export sector exacerbates climate vulnerability for the economy, communities, and ecosystems throughout the Ica basin in several ways. As set out below, poorer and marginalised communities face the greatest risks.

a. **Pollution, salinisation, and declining water levels combine to severely deplete and degrade Ica's groundwater resource and 'buffer' during dry periods.** All users – small farmers, communities, the municipality utility and agro-exporters – will face greater scarcity and be less able to cope with increasingly regular periods of low flow in the Ica River driven by climate change. The economic, health and food security impacts will be acute since there are no alternative water supply sources in Ica, for example rainfed production is not an option. Desalination is not economically viable and remains beyond the reach of all but the wealthiest water users.

b. **The collection and transfer of water from the upper catchment and Pampas-Amazon Basin by the PETACC scheme to supply agro-export water needs in Ica is already shown to drive ecosystem and wetland degradation, and to exacerbate flooding and drought in Huancavelica and Ica.[82]** The findings of the Latin American Water Tribunal established how, by restricting environmental flow of water, the scheme caused damage and negative health, economic and livelihood impacts for upland pastoralist communities, including via drying of pasture and a cycle of ecosystem degradation, which in turn exacerbates erosion, flooding, and drought.[83,84] Despite some efforts to introduce Payment for Ecosystem Services schemes to address these problems, the current study found no evidence that these challenges have been effectively addressed.

c. **Inadequate provision of water supply, sanitation and hygiene in Ica exacerbates the risk of cholera and other water-related disease epidemics in the aftermath of flooding**.

d. **The absence of effective land planning and control has permitted unsustainable expansion of agro-export businesses in Ica, and imposed significant risks of flooding and destructive mudslides** (huaycos). For example, a lack of formal land-use planning has allowed the concentration of informal housing and commercial activity along river channels and floodplains where floods and mudslides are likely to have catastrophic effects.

[79] GORE Ica (2014)
[80] Andres et al. (2014)
[81] CNN (1998)
[82] Hepworth et al. (2010)
[83] OECD (2021)
[84] Climate Diplomacy (2007)

Figure 23. (a) The PETACC inter-basin transfer diverts water from the high Andes to supplement water flows to Ica, but provides no environmental flow to sustain mountain ecosystems and the livelihoods of communities. (b) Vulnerability of pastoralist communities in Huancavelica is exacerbated because of the transfer. (c) Flooding and mudslides in Ica during intense rainfall in March 2023 – caused extensive damage to infrastructure and increased vulnerability to extreme events *(La Lupa (2023)* (d) Floods linked to the 1998 El Nino event – caused extensive devastation in Ica, where flood water reached up to 2 meters in height *(Sotomayor (2023). Original image from GEC Historical Archive.*) (e) A depleted and degraded aquifer will deny Ica a 'buffer' to cope with increased periods of low flow in the Ica River, which in turn will trigger crop failure and prolonged drought.

4.4 WATER, FOOD, AND ECONOMIC INSECURITY

Overexploitation of the Ica-Villacurí aquifer to grow fresh fruit and vegetables for supermarkets in the Global North threatens the health and wellbeing of local people, the collapse of the traditional farm economy, fragile ecosystems, as well as the viability of Ica's agro-export sector and the significant economic benefits it generates for Peru. Beyond Peru, the high volume of produce grown in Ica and its reach into global markets, means that a failure - or escalating cost - of agricultural production due to the water emergency may also have serious repercussions for food security and the cost of living. This is a particular risk in those consumer countries increasingly dependent on Peruvian production for supplies of fresh fruit and vegetables, including the USA, the UK, and the EU27.[85]

Based on available hydrogeological assessments, current rates of aquifer exploitation are unlikely to result in a sudden 'day-zero' for Ica when water supplies are switched off. Instead, the progressive drying and salinisation of the aquifer will drive ever greater conflict and competition between users, restricting and disrupting use and raising the costs of water access, treatment, and crop production such that they become economically non-viable. As this 'race to the bottom of the barrel' speeds up, only the wealthiest and most influential users, the largest agro-export companies, will be able to access water of adequate quality for production. The market – producers, buyers, investors. and consumers – will be faced with higher costs and interrupted supplies, potentially driving them to new production areas where the resource is yet to be overexploited. Local people will pay the highest price of the monopolisation of water by agro-export businesses. Diversified traditional farming will be pushed out, further reducing resilience to climate and economic shocks. Ecosystem services will be lost, and water of poorer quality will be difficult to reach and expensive, with impacts for health, livelihoods, and social cohesion.

Many economies in the Global North are now heavily dependent on fruit and vegetable production in climate vulnerable countries like Peru, including the UK, which imports 84% of its total fruit and 50% of its total vegetable needs.[86] As a significant source of fresh fruit and vegetables for global markets, the failure of production in Ica is likely to affect availability and price in these consuming countries. In turn this has potential to affect dietary intake and health, particularly for older people and lower-income households. Inter-sectoral action across agriculture, health, environment, and trade are therefore critical in both Peru and the countries it exports to, to increase the resilience of the food system, and to support population health.[87]

Multiple studies have attempted to estimate how long Ica can be sustained as a production centre for agro-exports given its dwindling water resources. Exact predictions are difficult because of limited data on the overall rate of over-abstraction. The National Water Authority (ANA) have previously estimated that the lifespan of the aquifer will end between 2023 and 2028.[88,89] More recent modelling has predicted that by 2024, the excessive costs of water access will begin to cause strategic interruptions to production.[90] The Drop-by-Drop study estimated that the strategic water supplies used by Ica would dry by 2035. The current study shows that the predicted effects of salinisation, higher costs, intensifying shortage, social hardship, unrest, and conflict are already upon us. It is reasonable to suggest that the decade ahead is therefore a 'do-or-die' period for Ica's future, its contributions to the Peruvian economy, and the continuity of the fresh fruit and vegetables it provides to consumers in the Global North.

[85] Hess and Sutcliffe (2018)
[86] DEFRA (2023)
[87] Scheelbeek et al. (2020)
[88] ANA (2018)
[89] ANA (2012)
[90] Salmoral et al. (2020)

5. TRANSFORMING WATER USE FOR A SUSTAINABLE FUTURE

Evidence of the unsustainable water use in Ica to supply fresh fruit and vegetables for global markets, and of the need for action is unequivocal. During workshops hosted in Ica and Lima to validate the study findings, stakeholders representing business, government, communities, civil society, academia, and consumer countries agreed on the urgent need to bring water use to within sustainable limits, and to address shared water risks. They put forward recommendations which have informed the priorities for action set out in this Section. They include improved regulation and coordination by government, alongside measures to be taken by agro-export companies, buyers, investors, consumers, civil society, and researchers. To support and strengthen these recommendations, we first review the key lessons which have emerged since 2010.

5.1 EMERGING LESSONS FOR FAIR WATER FOOTPRINTS IN PERU

The 2010 'Drop-by-Drop' report made a series of stakeholder-generated recommendations. In Table 1 these are summarised, and their effectiveness reviewed to flush out key lessons for discussion.

Table 1: How did recommendations made in 2010 measure up?

2010 RECOMMENDATION	WHAT HAPPENED?	WAS IT EFFECTIVE?
Improved scientific understanding and data	Multiple studies have been undertaken on the available water resources and their use. Fewer studies have focused on the implications of climate change and the viability and efficacy of solutions, including aquifer recharge, though some notable and important contributions exist.	**Partially.** New evidence confirms the dramatic unsustainability of water use in Ica and appraise potential solutions for sustainable resource management, but this is yet to be translated into effective action or policy. There is an apparent disconnect between evidence and action: A variety of solutions are being put forward and acted upon with investment despite evidence that they may be ineffective (see **4.1**).
Improved regulation and resource governance	Multiple efforts to strengthen and effectively implement water law and governance mechanisms to bring use within sustainable limits, to control illegal use(water emergency and drilling ban) and to improve catchment management (River Basin Council and MERESE), as initiatives to improve supply through groundwater recharge (Golda Meir etc).	**No.** Government monitoring has reduced, funding for enforcement has been cut, and data is restricted. 'Figures are pulled from the air' and the drilling of new wells continues despite the ban.[91] The establishment of the River Basin Council has floundered due to inter-regional squabbling, and there is no coherent River Basin Plan.[92] ANA has been weakened – the well drilling ban is not respected, and agro-export operations continue to expand. Funding for drones and staff to inspect sites was declined.[93,94] MERESE (PES scheme) is not implemented, and no projects have been funded – though JUASVI are reported to be moving forward.

[91] Pers. Comm. Agro-export Farm Manager (2022)
[92] OECD (2021)
[93] Zegarra (2018)
[94] OECD (2021)

Oversight by civil society and the media	Multiple studies, reports and features have been published to drive transparency and accountability in water management, and incentivise improved performance by government, investors, and the private sector.	**Partially.** These studies are 'keeping the issues alive' although key advocacy messages are yet to be adopted and little change is observed,[95] although Peru is now a Signatory to the Fair Water Footprint Declaration because of NGO engagement.
Improved sustainability standards	A new global water stewardship standard developed by the Alliance for Water Stewardship was adopted by several farms producing in Ica of which three have been independently certified against the AWS standard. Other market standards including Global GAP were revised and strengthened and a further standard – the ANA Blue Certificate was devised and implemented by growers.	**No.** The AWS Standard, whilst successful in engaging some growers in improved water management, has yet to unlock significant change towards sustainable management of the aquifer or closing the WASH gap. The 'Blue Certificate' and Global GAP (incl. SPRING add-on) recognise efficient water use and collective action but do not explicitly drive sustainable resource use. Stakeholders say that standards suffer from weak demand, limited recognition, weak incentives, and limited scale of application. (See **4.2**).
Improved financial due diligence and lending safeguards and engagement with financiers	Significant reforms were implemented by the IFC in response to findings of the World Bank's CAO Ombudsmen. The 2030 Water Resource Group has been at work in Peru since 2014 CDP Water Disclosure Programme has engaged in Peru.	**Partially.** Performance, process, and policy have been reformed within the IFC and further loans enabling water use in Ica cancelled, though this is 'too late' to benefit Ica. 2030 WRG programme established but resulting positive change in Ica as a result of this is unclear or absent. Of 24 companies invited to disclose their water risks in Peru in 2023 by CDP, only four responded but none were in the agriculture sector. Currently, incentives to disclose appear to be weak.
Improved engagement, financial and political support, from governments and retailers of trading partners with Peru	Engagement and communication with UK, Dutch, and Swiss governments led to initiatives including the International Water Stewardship Programme (UK/GIZ) though Peru was not included). Some engagement by Dutch, Swiss and Swedish agencies.	**No.** Engagement by governments and trading partners has not led to any observable or notable change in the situation. Several initiatives have attempted to instigate collective action (CAO Water Working Group; Huancavelica and Ica Water dialogue board; Swedish supermarkets response to 2018 Swedwatch report) but have not been sustained and show no observable impact.

5.1.1 SOLUTIONS MUST BE EVIDENCE-BASED

Since 2010 there has been heavy emphasis on managed aquifer recharge (MAR), the diversion of wet season surface run-off into the ground in order to artificially replenish groundwater resources and increase the available supply. This has resulted in the creation of multiple recharge ponds to capture wet season flow from the Ica River and attempts to percolate water into the ground. Whilst these efforts may have marginally increased annual recharge, such a dominant focus on supply side solutions versus management of water demand is problematic. Multiple studies and peer reviewed journal articles show that it is not feasible to address the unsustainable water balance through MAR. They conclude that there is insufficient excess flow in the Ica River to compensate for the rate of aquifer overexploitation, and that: 'serious demand management measures will inevitably be required to reach a sustainable water resource balance', and that this must be achieved mainly by reducing the area irrigated by groundwater.[96,97]

[95] Pers Comm. Agro-export Grower (2022).
[96] Fernández-Escalante et al. (2020), p. 2607
[97] Ibid., p. 2609

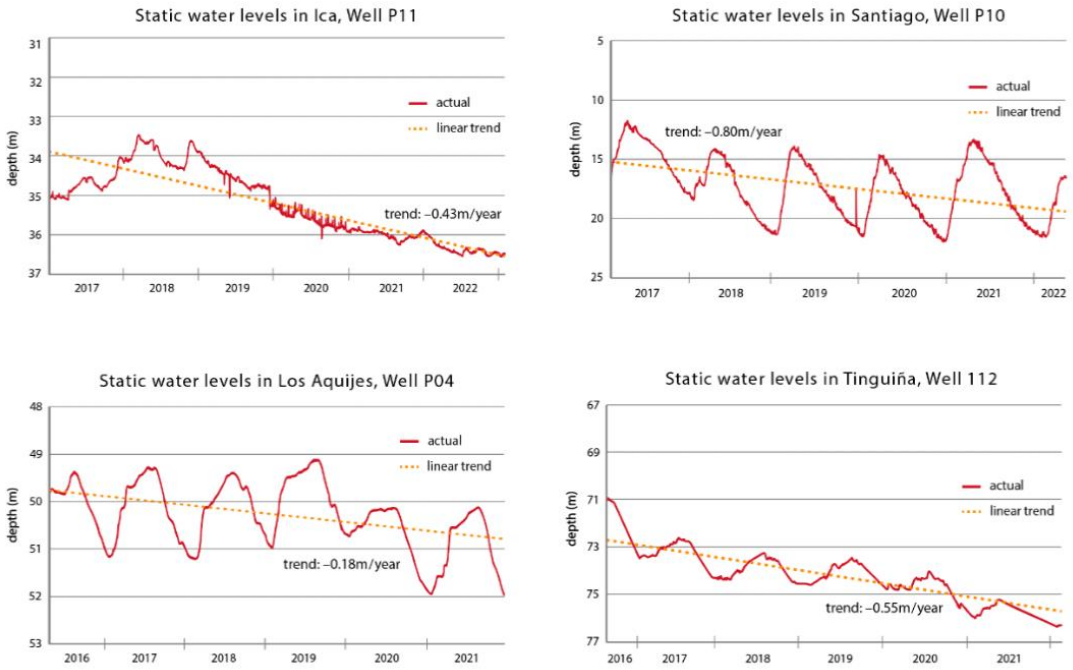


Figure 24. JUASVI groundwater level monitoring records for Ica, Santiago, Los Aquijes, and Tinguiña showing monthly and seasonal variation and linear declining trend since 2016.

These studies very clearly establish the limitations of MAR as a solution to Ica's water emergency. They show that even if the total average annual flow of the Ica River could be captured and diverted into the aquifer (a physically impossible scenario) this would account only for 10-30% of the total aquifer overdraft. A lack of suitable land further limits the feasibility of installing ponds at the scale required to make a meaningful impact. As set out in Section 3.3 MAR techniques also risk groundwater salinisation where evaporites within the soil can be re-mobilised to contaminate the aquifer, and high sediment loads during times of peak run-off tend to rapidly clog infiltration galleries and ponds which further limit the technology.

Recent monitoring data provided by JUASVI, the Board of Groundwater Users, is set out in Figure 24 and shows the influence of seasonal infiltration on groundwater levels at four sites close to pozos. The data suggest that despite the rapid expansion of infiltration ponds since 2015, they have not noticeably slowed the overall trend of aquifer decline.

The prominence of supply side solutions such as MAR in the response to Ica's water emergency despite their limited potential is problematic since it diverts attention from the serious demand management measures which are urgently needed to bring the aquifer exploitation into sustainable balance.

5.1.2 STANDARDS SYSTEMS NEED TO BE STRENGTHENED

The 2010 report emphasised the potential role of voluntary standards in helping to address the water emergency in Ica, and to mitigate against unsustainable water use in global supply chains more widely. The most relevant standards used in Ica are Global GAP, ANA's Blue Certificate, and the AWS International Water Stewardship Standard. The performance of each is reflected on here.

Global GAP

Global GAP provides for the certification of safer and more sustainable farming practices in over 130 countries to contribute to international sustainability goals. Almost 200,000 producers have been certified.[98] Global GAP's Integrated Farm Assurance (IFA) certification is supplemented by a range of 'add-on' standards which can be specified by buyers. For example, they include Risk Assessment on Social Practice (GRASP) and Sustainable Program for Irrigation and Groundwater Use (SPRING).

Within the IFA Principles and Criteria, there are a range of requirements on sustainable water management, including 'major musts' which must be audited against to gain certification – a common pre-requisite for business and trade for producers. These include:

- The requirement for a risk assessment to guide water management on the farm, including impact on water sources.
- A water management plan based on risks identified, which must be reported against annually.
- Regulatory compliance with water permits and their conditions.
- Recommended actions include joint action with stakeholders on off-farm issues.[99]

The Global GAP SPRING add-on goes further, requiring a water management plan based on a comprehensive risk assessment to 'make production activity compatible with the protection of the natural environment and to ensure appropriate and sustainable use of water on the farm', with SMART indicators to be documented and regularly reviewed and actions aligned with sustainable watershed management initiatives.

Based on a review of the Global GAP database, 34 agro-export businesses are certified by independent audit bodies against IFA in Ica, though no records of certification against the SPRING add-on are available on-line.[100] Against the backdrop of accelerating aquifer depletion and degradation this suggests that:

- The current set of water-related principles and criteria and/or the audit and certification process in the GLOBAL GAP IFA are inadequate in identifying and driving appropriate action to address grossly unsustainable resource use.
- There is inadequate demand from buyers to stimulate the uptake of the SPRING add-on and the action it requires, and/or those actions are ineffective.

Certificado Azul (The Blue Certificate)

Certificado Azul was developed by the National Water Authority with support from the 2030 Water Resources Group (2030 WRG) and the Swiss Agency for Development Co-operation (SDC). Its focus is on recognising the efforts of large water users in achieving water use efficiency savings and to engage in collective action to solve shared water challenges. To date 48 businesses participate across Peru and 18 businesses have blue certificates which are renewed every year based on delivery of activities on water efficiency, measuring water footprints, and investment in collective action measures.

It is unclear how many of the businesses certified against the Blue Certificate are based in Ica, however, by prioritising water use efficiency as opposed to water use sustainability, the standard is likely to have limited value in addressing Ica's water emergency and may even drive additional demand. There is now a good deal of global evidence to show that 'higher irrigation efficiency typically contributes to intensification of water scarcity through increased water consumption in the agricultural process'.[101] Efforts towards water use efficiency must therefore also consider the limits of sustainable water use, and

[98] See What is Global GAP?
[99] Global Gap (2022)
[100] https://database.globalgap.org/globalgap/search/SearchMain.faces
[101] Pérez-Blanco et al. (2020)

issues of equitable allocation if they are to avoid the risk of simply accelerating resource depletion and scarcity. Opportunities to evolve the Certificado Azul standard to better reflect the requirement for a fair water footprint were identified by stakeholders.

AWS International Water Stewardship Standard

The Alliance for Water Stewardship's International Water Stewardship Standard (AWS Standard) is a 'globally applicable framework for water users to understand their use and impacts, and to work collaboratively and transparently for sustainable water management within a catchment context'. The Standard is 'intended to drive social, environmental, and economic benefits at the scale of a catchment. It achieves this by engaging water-using sites in understanding and addressing shared catchment water challenges.'[102]

One of five outcomes against which the AWS system seeks to make credible performance claims is 'sustainable water balance', alongside 'good water governance', 'good water quality status', 'important water related areas', and 'safe water sanitation and hygiene for all'.[103] In pursuit of these outcomes, implementation encourages collaborative approaches that involve business, government, and community as well as civil society organisations. The Standard provides definitions, criteria, indicators, and guidance to drive 'sustainable water balance' at site and catchment scale as a key component of water stewardship.

The AWS standard defines a sustainable water balance as follows:

> *An assessment of all water flows and storage volumes of an entity. In the Standard, it is required to be applied to the site, and separately for the catchment. The assessment should measure all water inflows, throughflows, outflows, water storage volume and changes in storage. The first step is to identify and map each component, and then to quantify it. These are combined into the water balance equation, which should balance (at least approximately): {water outflow} = {water inflow} + {change in storage}. Sustainable water balance is the condition whereby ongoing water use in the catchment has no long-term negative impact on the natural environment and legitimate water users. It is typically assessed on an annual timescale. For a sustainable balance, total net water abstractions do not exceed natural replenishment of water bodies, while also ensuring water bodies maintain viable flows and water levels to sustain themselves, and the species that depend on them, in a healthy condition. A condition where outflows are consistently larger than inflows is a non-sustainable water balance.*[104]

Based on this definition, the situation in Ica would clearly be flagged as facing a severe 'non-sustainable' water balance, and the standard should guide and certify meaningful action to address this shared catchment water challenge.

In Ica, three agro-export companies have been certified against the AWS Standard to core level, along with a further four in other areas of Peru. Several companies are registered as seeking certification.

To appraise the performance of the AWS Standard in addressing Ica's priority water challenges, the actions and plans set out by the AWS certified sites in Ica in publicly available AWS Certification reports compiled by AWS auditors were reviewed and the results documented in Appendix B.[105] Considering the priority water challenge of gross aquifer over-abstraction, upon which there is broad consensus, the following concerns are identified.

1. **Over-emphasis on 'supply-side' solutions.** Certified sites promote 'supply-side' solutions to the significant aquifer overdraft, specifically investment in managed aquifer recharge (MAR), which they cite as best practice. This is of concern, since multiple studies and peer-reviewed journal articles make it clear that it is not feasible to address the unsustainable water balance

[102] AWS website https://a4ws.org/about/ accessed 23/5/2023.
[103] See The AWS Standard 2.0
[104] AWS (2014)
[105] Based on certification reports available at List of AWS Certified Sites accessesd 25/4/23.

through MAR alone.[106,107,108] Demand side solutions do not feature prominently in any of the plans and are limited to 'elimination' or 'formalisation' of illegal wells, although formalisation may simply legitimise existing over-abstraction.

2. **Expansion of production and water use by certified sites.** Some certified sites appear to be expanding production and/or obtaining new water abstraction permits despite evidence that the aquifer is already overexploited, and that limiting further groundwater abstraction and consumptive irrigation use are essential to achieving a sustainable water balance in the catchment.[109] This expansion seems incompatible with the ban on new wells in Ica since 2008.[110]

3. **Incongruities within AWS certification reports.** Areas of concern include:

    a. The claim that '*water use by the sites is not impacting on the rights to safe water and sanitation, or traditional access to water for communities'* has been accepted by the auditors for all sites.[111] This is a concern, since evidence suggests that as large water using operations engaged in the over-exploitation of the shared aquifer where traditional and municipal users are no longer able to access water, the sites are indeed impinging on the ability of the community to meet their water needs.

    b. Priority actions include '*setting a time for ending the ban on wells'* although it is not clear how an end to the ban will assist with addressing the water challenges in Ica.

    c. Reference is made to significant water resources being available in the Lanchas aquifer although multiple studies consistently indicate that the Lanchas aquifer is highly saline and unsuitable for use.

    d. Across all sites, reference to nitrate contamination of the aquifer by agricultural runoff was limited or absent, despite well-documented observations of elevated nitrate levels in Ica associated with agricultural production, and the risks these pose to human health.

    e. Stakeholder consultation and engagement at the sites appears to have been limited to internal staff and a committee of eight other agro-exporters, contrary to AWS guidance and criteria, and good practice for integrity in water stewardship. [112] No evidence has been presented to suggest that a more appropriately balanced consultation has taken place.

4. **Absence of transparent complaint and grievance mechanisms.** The standard has not apparently required any mechanism to register grievances or complaints against the certified companies, in relation to their water use, despite this being a basic requirement of the United Nation's Guiding Principles on Business and Human Rights, specifically Principles 30 and 31.[113]

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[106] Fernández-Escalante et al. (2020), p.2607
[107] ANA (2017)
[108] OECD (2021)
[109] Fernández-Escalante et al. (2020), p.2607
[110] Note that in feedback to this report, the agro-export company concerned has stated that the information that expansion was happening in Ica was originally mis-reported to the authors, and that expansion will also include sites in Olmos and Casma, and that in Ica they 'will grow or shift crops while staying in the limits of the permitted water licence, by replacing asparagus with grapes.
[111] This is in respect of AWS indicator 3.6.2. 'Evidence that the site is not impinging on the human right to safe water and sanitation of communities through their operations, and that traditional access rights for Indigenous and local communities are being respected, and that remedial actions are in place where this is not the case, and that these are effective'.
[112] UN Global Compact (2015)
[113] Feedback from one of the companies concerned indicated that grievance mechanisms are in place: '*anonymous suggestion boxes on every farm, health and safety at work committee sexual harassment committee, continuous improvement committee. HR personnel on all estates, public social networks reviewed by HR personnel.'*

The adopters of the AWS standard in Ica represent the most progressive and responsible agro-export producers in Ica, and their leadership efforts, reflected in the AWS certification documents reveal significant effort which is to be commended. However, our research also suggests a worrying mismatch between the actions currently being taken and the evidence-based solutions needed to tackle Ica's water emergency. Stewardship actions focus almost exclusively on supply-side solutions and recharge, rather than on managing demand through allocation reform, joint planning, enforcement, advocacy, and the reduction of irrigated area which commentators agree are needed to bring the aquifer into a sustainable balance. The focus on MAR does not provide a long-term solution to the shared water challenges facing Ica.

The evidence indicates that each of the voluntary standard systems used to guide and recognise responsible water use in Ica are yet to genuinely address the root causes of the water emergency. Of additional concern, by claiming legitimacy for certified sites engaged in operational expansion in one of the planet's most overexploited aquifer systems, these standards, the businesses using them, and their investment and retail partners expose themselves to credibility risks and accusations of greenwashing. They risk maintaining the status quo of unsustainable resource use and enabling certified sites to attract new investment to expand production via increased exploitation of the groundwater resource - the opposite of what is needed to protect the public interest in Ica, Peru and beyond.

In this case, companies claiming sustainable farming practices and water stewardship through 'the use of water that is socially and culturally equitable, environmentally sustainable and economically beneficial' are exposed to accusations of making exaggerated, and misleading claims because the evidence shows that their water use in Ica is neither equitable nor sustainable. Urgent review of these standards systems, and their audit processes are needed to establish how and why multiple sites have been certified based on selectively reported evidence, limited stakeholder engagement and contextually mismatched actions. Reform is needed to ensure that standards incentivise and reward water stewardship which genuinely drives sustainable, resilient, and equitable water use, which aligns with ISEAL's Code of Practice, and which is compliant with the forthcoming EU Green Claims Directive. This work is a strategic priority given that these standards systems are currently considered 'best-in-class' and are increasingly used to guide decision making by investors and buyers.

5.2 EMERGING PRIORITIES FOR A FAIR WATER FOOTPRINT IN ICA AND BEYOND

Our analysis shows that expansion of agro-export crop production in Ica to supply supermarkets in the Global North continues to drive unsustainable water use, a phenomenon first identified 14 years ago, and which ranks as one of the most startling examples of aquifer overexploitation on earth. It sets out the range of negative impacts imposed by the depletion and degradation of groundwater and the wider catchment. It also sets out how these impacts conspire with an absence of investment in water infrastructure to serve the growing population to deny the human right to water to at least 35,000 people. Collectively these issues are driving impacts on the health and wellbeing of communities and ecosystems within and beyond Ica. It goes on to show how the range of interventions to date - from regulatory controls and managed aquifer recharge to market-based standards - are failing to curtail the unsustainable use of Peru's water resources.

Without urgent action, these negative impacts will intensify, with significant consequences for Peru and its trading partners in what threatens to become a totemic example of our generation's failure to match patterns of production and consumption to within the sustainable limits of earth's resources.

To support the change needed, we set out a series of priority actions based on the lessons learned since 2010, and the recommendations of stakeholders in Peru. These are grouped by stakeholder and will be used to constructively engage those with influence over the situation in Ica.

The primary goal is to return the Ica-Villacurí aquifer to a state of hydrological equilibrium so that the volume of water extracted for consumptive use is balanced by the inflow from natural or managed recharge. Whilst investment in storage infrastructure and artificial recharge will play a role, feasibility challenges mean that the majority of the rebalancing, in the region of 200 Mm^3/year, must come from demand-side management and reduced water use. This will require closure of illegal wells, improved licencing and metering, allocation reform, and ultimately, a significant reduction in irrigated land. The alternative is the progressive depletion and abandonment of wells. Some have proposed this as a strategy for the Villacurí aquifer where there are few pre-existing water users beyond the agro-export sector who would be harmed, but Ica's rapidly growing population and pre-existing economy, mean that such a sacrificial strategy would be extremely damaging.[114]

Sustainable resource management and climate resilience must be based on using aquifer storage to balance between high and low river-flow years and to buffer against drought and climate impacts. This will require revision of licensed abstraction rates to bring them into line with available recharge, followed by metering and robust enforcement. Additional goals must include the provision of universal access to water supply sanitation and hygiene for all, and effective pollution control.

[114] Fernández-Escalante et al. (2020)

PRIORITY 1: ACTION BY GOVERNMENT

VOICES FROM PERU

'Investors and clients are sending the signals on water but it's not enough. The government aren't making enough effort to force companies to produce in a sustainable way.'

'The cost of a licence and water is too cheap for us and too expensive for everyone else. It should be very, very expensive to do agro-export without a licence, but businesses can refuse entry to ANA and get a small fine 8 years later. There is illegal water use despite the ban.'

Agro-export business community

'*We need to do the monitoring but it's impossible - we don't have enough funding or staff, and the fines aren't high enough.*

'We want the government to address the problems that face Ica. We have projects without funds or results. We have only 11 staff to manage water across the whole basin.'

Government and Regulatory community

'ANA faces big challenges. They need resources, data, personnel, and authority. It is imperative that authorities close illegal wells, implement a programme of control and raise awareness.'

'Government has so little capacity it can't evaluate or critique EIAs. There is very limited government presence and so there is no defence of common interests on pollution, water and land use.'

NGO community

'Our institutions for water management are not really working…Water regulation is very weak. They don't have the legal instruments needed to ensure that people comply with the law.

'The problem here is ANA. It's part of MIDAGRI so it is a poacher as well as a gamekeeper. In 2009 it was agreed to shift it to work under MINAM, but it has not been done. They are weak – they lack resources, data, personnel, and political authority. There's a real lack of transparency – they either don't have the data or they make it hard to access.'

Research community

''The problem is that there are too many authorities and a lack of accountability – its disorganised. It's difficult to do anything if you don't know who is in charge of moving forward.'

'Stronger regulatory conditions are needed to improve access to safe drinking water and sanitation in urban and rural areas.'

Development partners/Banks

Transform Water Governance and Regulatory Performance

The governance, management, protection, and control of water resources for public benefit, and ensuring access to safe water supply and sanitation are primary functions of the State. The National Water Authority which has delegated powers for water management in Peru, and Ica's water utility are struggling to fulfil these mandates, and the following steps are needed to remedy this:

A. **Reformed policy, law, and regulatory practice to ensure sustainable water resource use.** The severity of the situation warrants a detailed review of the institutional arrangements for water resource management in Peru, so that opportunities for more effective water resource regulation, such as meaningful sanctions, can be identified and acted upon. Reforms must enable the stronger leadership and regulatory power needed to control water use. Criticism has

targeted a strategic conflict of interest between the National Water Authority and its parent Ministry – the Ministry of Agrarian Development and Irrigation - which is responsible for increasing national agricultural productivity. This is not easily compatible with the Authority's core duty to maintain the agricultural sector's water use within sustainable limits, and to ensure equitable use between sectors. Global experience suggests that an autonomous environmental or water resource regulator with full independence from the sectors it controls, with political and legal authority, and adequate resources is a key determinant of sustainable water resource use in the economy. Stakeholders consulted urged a review of the institutional arrangements to identify barriers and opportunities for effective regulation and to guide reform. This is a discussion for Peruvian stakeholders, but given the emerging water disaster in Ica, now may be a good time to reflect on the structural changes needed to secure sustainable water resource use.

BOX 5.

CORE FUNCTIONS, PRIORITY TASKS, AND DUTIES OF WATER RESOURCE REGULATORS IN ICA as suggested by stakeholders

A. Provide a publicly available and detailed understanding of the status of the strategic water resource and current and future water balance across the Ica Basin through effective monitoring, modelling and analysis.

B. Enforces the drilling ban and detects and closes illegal wells and operations based on them.

C. Reforms, rationalises, and progressively revises groundwater use rights, fees, charges and metering to bring down demand in line with water availability.

D. Establish a clear road map to sustainable resource use based on key performance indicators including:

   i. Ratio between recharge and abstraction volume and resultant water-table trends.
   ii. Annual tracking of the area irrigated with groundwater, the number of wells, number of wells closed and compliance against licensed volumes of abstraction.
   iii. Levels of salinity and other priority water quality parameters including nitrate.
   iv. Volumes of successful recharge to the aquifer.

E. Support strategic planning and analysis for resolving water related challenges and supply shortages to water users in Ica (understand and advise on domestic, environmental, commercial and municipal water needs, storage needs, viability and operation of new supply and infrastructure, catchment rehabilitation, conservation agriculture and recharge initiatives).

F. Convene and facilitate joint planning and action by stakeholders.

G. Effective regulation and enforcement to sustain and protect water resources and control of development within limits of sustainable resource use.

B. **A coherent plan for sustainable water management at the basin scale.** The development and delivery of a coherent basin level plan with buy in from all stakeholders is an urgent priority. Such a plan must: provide reliable knowledge on the available resource and its use; set appropriate allocations among stakeholder groups in line with sustainable yield which prioritise the human right to water and environmental flows above commercial use; guide and incentivise investment and demand management; and provide for effective monitoring and enforcement to maintain water use within allocated limits and scale back use during dry periods to mitigate drought. It must also secure nature-based solutions, catchment stewardship, effective control of pollution and salinisation, and establish viable and cost effective targets for increased storage, seasonal surface water use and recharge.

C. **Reliable and adequate financing and human resources for regulatory implementation and enforcement.** The chronic shortage of budgetary and staff resources which has seen water management regulations, plans, and strategies 'left on the shelf' must be addressed. All stakeholders highlighted the limitations in funding, human resources and in turn – the limited

power of water authorities to deliver on their mandate. Senior managers complained that 'projects are never delivered because there are no funds.' For example, plans to enforce the ban on new drilling through deployment of drones were recently shelved due to a decision to re-allocate budgets. There are just 11 staff in the local water authority office with responsibility for managing water across the region. Staff turnover is very high across ANA and alongside the low headcount, and lack of operational budgets, this makes the organisation ineffectual. It is of paramount importance that those tasked with managing Ica's water resources are properly equipped to fulfil their roles.

D. **Policy coherence and complimentary regulation across government.** A requirement to demonstrate legally compliant water use as a pre-requisite to obtaining a business or export licence, or within statutory corporate or financial reporting are needed to bolster regulatory effort and 'lock in' compliance. For example, this could be achieved through reconciling land and water allocation with production volumes to identify anomalies and sanction illegal water use Institutional arrangements for land planning currently permit ever greater agricultural expansion in unsuitable locations and these too require urgent review and reform.

E. **Reform of water use fees and charges to reflect the value of water and to generate revenue for water management.** In addition to enabling funds to be ploughed back into resource management and provision of services, a proper price for bulk water use by farmers will strengthen incentives for prudent use. This reflects recognition by multiple stakeholders that water is significantly undervalued and underpriced in Peru. They highlight the large revenues generated by water use in the fresh fruit and vegetable supply chain, and the concurrent shortfalls in investment for water management and WASH services which threaten these revenues. Additional reform could make a major impact in addressing the shortfalls of reliable water and sanitation services for communities. This is a primary function of government, and stakeholders should be wary of non-statutory or voluntary 'payment for watershed services' initiatives which are unlikely to be able to sustain the collection and redistribution of resource tariffs in an equitable or efficient manner.

F. **Closing the WASH gap**. Action and investment to implement the municipal utility's 'optimised masterplan' to deliver full WASH access to the people of Ica needs to be prioritised. Regulatory and financial reform including introduction of a canon or public works for taxes will be required.

PRIORITY 2: ACTION BY BUSINESS

Prevent, Remedy, and Mitigate Violation of the Human Right to Water and the Impacts of Unsustainable Water Use

The UN's Guiding Principles on Business and Human Rights sets out clear expectations of conduct for corporations regarding their duties and responsibilities for the protection of human rights.[115] They include taking adequate measures for prevention, mitigation and, where appropriate, remediation. This includes respect for the human rights to water and sanitation, applies to all businesses no matter where they operate, and exists as a performance requirement over and above compliance with national laws and regulations.

[115] UN OHCHR (2011)

VOICES FROM PERU

The supermarkets have all the power here – if they say jump, everyone jumps.

Agro-exporter

It would be easy for the supermarkets to make a big difference – they have an opportunity – through making specific requests, they can have a massive impact.

Buyer/Aggregator

We need help and partnerships to solve this problem.

Ministry of Agriculature

Those who have benefited from the over-exploitation of the Ica aquifer and driven the denial of the human right to water must take remedial action to make the situation right.

NGO leader

It's very important that we unveil the situation to buyers so that the same standards they apply for product quality are applied to water use and labour standards. If the agro-exporters misbehave they should stop buying their produce.

Farm Worker

The best way to get change is via money…via commercial preference. Many buyers don't ask or push – they go for price over water performance. If they were to say 'We'll only buy from those who are certified – from responsible businesses' – it would make a big difference. It would help a lot.

Agro-export Business

Agro-export production of fresh fruit and vegetables in Ica for markets in the USA and Europe has been shown to be driving depletion and degradation of the Ica-Villacurí aquifer, alongside inward migration of workers such that the human right to water is being infringed for many thousands of people.

Many of the traders and retailers involved proclaim human rights, water stewardship credentials, and due diligence procedures that, on paper, should prevent harms in their supply chains. But through weak, selective, or at times non-existent implementation, all have apparently failed to either identify, mitigate, or remediate the harms their purchases directly link them to.

These acts of omission mean the traders are failing in their responsibilities under the most authoritative international business and human rights standards: the UN Guiding Principles on Business and Human Rights (UNGPs), the OECD Guidelines for Multinational Enterprises, and the OECD Due Diligence Guidance for Responsible Business Conduct.

Given that these harms were first exposed 14 years ago, the ongoing sourcing of fresh fruit and vegetables produced through unsustainable water resource use, and inaction to address shortfalls in WASH provision represents a knowing violation of these obligations by the businesses involved. By continuing to source from Ica and in the absence of meaningful steps to address the blatantly unsustainable water resource use which their sourcing practices are driving, the traders are contributing to the human rights violations suffered by communities. In turn they are obliged under these international frameworks to proactively provide, or cooperate in the provision of remediation for these harms to effected communities - remedy they have not yet sought to bring about.

While these failings violate prevailing international guidelines and some of the traders' own stated policies, the European Commission is bringing forward legislation on corporate accountability that should mean such failings will soon be sanctionable violations of enforceable EU law.

In response to these findings the following actions are urged:

A. **Remedial action to protect the human right to water.** Substantial investment and collective action by brokers, retailers, agro-export farms, and their financial backers must focus on two areas. Firstly, they must ensure universal access to safe WASH in farms and communities across Ica, in line with global best practice, which includes gendered access for women. Second, they must take steps to end the unsustainable over-exploitation of Ica's shared water resource through action to dramatically reduce agricultural water demand. Given the risks of procedural and policy capture, action must be guided by evidence, in line with good practice as set out in the CEO Water Mandate/Water Integrity Network's Guide for Managing Integrity in Water Stewardship Initiatives.[116]

B. **Responsible procurement to ensure fair water use in supply chains and action to identify, prevent and remedy environmental and human rights abuses.** Weak market and buyer demand for sustainable water use has driven the water emergency in Ica. It is incumbent on responsible businesses to strengthen and implement procurement policies and due diligence processes so that 'drought fruit and vegetables' – those produced through irresponsible or illegal resource use, cannot enter the market. Brokers, retailers, and investors must demand production based on a fair water footprint and be prepared to pay a fair price for this. Going forwards, evidence of responsible and legal production which does not drive resource depletion and degradation, alongside disclosure on levels of WASH access must be preconditions to doing business. The European Union's Corporate Sustainability Due Diligence Directive looks set to make this a legal obligation which will shift sourcing away from catchments where water is used unsustainably, to where water is available within hydrologically sustainable limits. Supermarkets must therefore invest and use their influence to unlock shared water security in sourcing hotspots like Ica. Producers flagged that very few buyers demand evidence or action on water stewardship, and explained how some markets, notably, the US, China and non-supermarket trade to the EU had no, or very few pre-requisites for sustainable resource use. The absence of any collective action initiative to address the over-abstraction in Ica, and the fact that only three sites have become AWS certified in Ica, despite the water emergency being known to buyers as early as 2008 provide clear evidence of the low priority placed on sustainable production and responsible procurement by retailers and traders.

PRIORITY 3: ACTION BY VOLUNTARY STANDARD SYSTEMS

Strengthening and Scaling of Credible Standards

Improved regulation and governance are the top priorities for addressing the egregious water-related harms seen in Ica, and although there remains a dearth of evidence on their role in improving water governance, there are opportunities for voluntary standards to play a supporting role. To realise this opportunity, standards systems need to firstly be strengthened and secondly, be used at a meaningful scale.

[116] CEO Water Mandate/WIN (2015)

VOICES FROM PERU

We have several sites using the standard but is it enough? The groundwater us still going down.

Agro-export Business

Standards could be a way forward. 300 large firms…if they all changed it could be interesting.

Academic

The Alliance for Water Stewardship Standard is the most useful for us. It has brought the concept of looking at the whole watershed. AWS has helped us improve by asking the right questions we never thought to ask before.

A product label for good water stewardship. That would be great for us – we're still fighting for it!

Agro-export Business

A. **Reform of existing standards systems to drive meaningful action.** The mischaracterisation of good practice for water stewardship in lca poses significant risks for water users and the credibility of voluntary standards. We therefore urge an immediate review by the holders of these standards to establish the reasons for their shortcomings and to enable weaknesses to be addressed as a priority. Reform must ensure that site actions respond and are relevant to the risks facing stakeholders, and that they genuinely contribute to the goal of sustainable, socially equitable, and economically beneficial water use. Revision will be required to standard content, stakeholder engagement, the rigor of reporting, assurance processes and impact evaluation. More specifically, to make these standards credible:

- **Global GAP** requires reform so that demonstration of water abstraction within the sustainable limits of the water resource being exploited, zero pollution and universal access to safe water, sanitation and hygiene become 'major musts' and pre-requisites of certification.
- **The AWS Standard** must similarly be revised to unequivocally indicate whether both a site and catchment are managed in a sustainable and equitable manner. It should also require unequivocal indication of whether employees and workers at a site enjoy the human rights to water and sanitation, at work and in their homes. If not, the meaningful steps taken to address these issues, and their efficacy must be reviewed with stakeholders to ensure their relevance and be publicly disclosed.
- **Certificado Azul**'s requirements need to be broadened beyond water use efficiency to include a clear indication of sustainable water use. This should require evidence of zero pollution; sustainable and equitable withdrawal; universal access to WASH; protection of nature and planning for drought and flood events.
- All standards systems require:
    - **Robust audit by professionals** who are technically competent, understand the water context and have the ability to cross check the relevance of actions and legality of water use against available evidence.
    - **Effective sanctions** - such as financial penalties and/or the removal of certification – for use against bad actors and sites behaving inconsistently with sustainability goals.

- **Requirements for grievance mechanisms** with the transparent handling of complaints embedded as a basic requirement in line with United Nation's Guiding Principles on Business and Human Rights.

In response to these findings a wider review of standards to guide and recognise sustainable water use in the global economy is warranted.

B. **Establish credible water stewardship as the business norm.** The credible assurance of responsible water use must be more widely adopted through its requirement as a universal precursor to trade. The purchase of produce from water scarce and stressed locations such as Ica in the absence of accreditation against credible standards for sustainable water use must be considered unethical and avoided by legitimate business entities.

PRIORITY 4: ACTION BY ALL STAKEHOLDERS

Balanced, Multi-Stakeholder Participation in Evidence-Based Collective Action

There is currently no initiative to bring multiple stakeholder groups together to take collective action in response to Ica's water emergency. The creation of an inclusive collective action and dialogue forum will be an important step forwards to exchange knowledge and evidence, agree plans, to track action and hold each other to account.

A. **Establish a collective action forum.** Good practice guidance on collective action and lessons from past initiatives in Ica should be heeded to establish a credible, focused and inclusive forum for debate and action. This must be based on balanced representation and genuine participation by both influential and impacted stakeholder groups and include robust safeguarding measures to protect those who challenge powerful stakeholders against reprisal. Stakeholders suggest establishing an 'aquifer observatory' or 'water tribunal' to track compliance and enforcement. Such approaches have delivered promising results in India and via the 1000 year old Tribunal de las Aguas in Valencia.

B. **Joint planning and action based on credible evidence and mutual accountability**. Important roles of the forum will be to generate credible plans based on reliable evidence to target the root causes of the water emergency; to track action and budgetary expenditure against mutually agreed key performance indicators (KPIs) and to hold partners, including business, government, and regulators, to account. This will require long-term financial support, diplomatic leadership, together with facilitation by a respected and neutral broker.

VOICES FROM PERU

To provide dialogue, to help find a solution, a dialogue platform is vital.

Development Bank

We don't have a multi-stakeholder initiative which could commission research and broker solutions. A multi-stakeholder platform would be useful.

Agro-export Business

The biggest challenge is a lack of cultural awareness of the importance of the water resource – both public and political awareness. How can we change that by working together?

NGO

PRIORITY 5: ACTION BY RESEARCHERS AND CIVIL SOCIETY

Knowledge Generation, Public Engagement, and Oversight

All stakeholders identified an important role for civil society, NGOs, and research bodies, in remedying the water emergency in Ica and preventing similar problems elsewhere, via:

A. **Generation and sharing of reliable knowledge**. Academic research is needed to provide objective information upon which to base decision making. Reliable knowledge is needed on the status of the aquifer, and viability and efficacy of solutions.

B. **Increased public and political awareness**. Communication of reliable knowledge and constructive responses is needed, through advocacy, disclosure, and campaigning within and beyond Ica, directed at decision makers as well as buyers and end consumers of Peruvian fruit and vegetables.

C. **Accountability monitoring**. Civil society can play a key role by calling out bad practice, recognising leadership, and tracking progress against responsibilities and commitments, including by supply chain stakeholders outside Peru.

D. **Mobilising affected communities.** Ensuring that local people have their voices heard and needs responded to, and that they are enabled to participate in decision making is a priority.

VOICES FROM PERU

If there'd been no NGO exposure, it's likely that the situation would be even worse than it is now. There would have been no action. We would have failed to act before it's too late…The AWS standard is used here because of NGO exposure.

Agro-export Business

We need to look at the efficacy of infiltration, whether the aquifer is sustainable…Good solid studies are needed to establish the magnitude of the problem and find solutions…Businesses aren't uniform. Some are good and some are bad. We need to reward the good and sanction the bad.

Agro-export Business

In these contexts, CSOs and NGOs are very important and must have an active role – they need to raise the topic as a political priority. We need more evidence and advocacy…It is still not well known.

Reputational risk is very, very important here, but recognition could be bigger and better.

Development Partners

We need to strengthen participation of communities in the decision-making processes. We've tried tracking finances (for resource management) – it would be good to do more.

NGO

PRIORITY 6: ACTION BY FINANCIAL INSTITUTIONS

Implement Policies and Due Diligence Processes to Avoid Water-Related Harms.

VOICES FROM PERU

We get loans from banks like BCP and Interbank. They'll ask if we have a licence but that's about it. There's no follow up. Banks could take more action.

Agro-export Business

Lima stock market?…perhaps if you want to be listed you should have the Blue Certificate?

Government

Some investors have very high standards. Pension funds are starting to ask about environmental and social governance. Some loans now need very strong sustainability proposals, but not all.

Agro-export Business

Make the central bank accountable for good water stewardship? I see an opportunity to create new due diligence requirements.

NGO

The water disaster unfolding in Ica has been driven by capital investment and revenue generation based on profoundly unsustainable exploitation of natural resources, in the absence of effective financial due diligence and lending safeguards. In particular, we have identified recent and historical investment to increase agricultural production in Ica despite unequivocal evidence of unsustainable groundwater use. This includes investment by commercial banks including Santander, Rabobank, Banco de Crédito del Perú, and Interbank; investors including Metropolitan Life Insurance, Cordiant Capital and RRG; and Multilateral Development Banks including the Inter-American Development Bank (IDB Invest), the Development Bank of Latin America and the Caribbean (CAF), and the International Finance Corporation, the private sector lending arm of the World Bank. This widespread failure to screen, identify and avoid unsustainable resource use suggests that sustainable water use is a systemic blind spot across the finance sector. This demands urgent action, restructuring and reform by regulators, banks, and finance institutions, as well as by those who have profited directly from Ica's water emergency.

A. **Reformed due diligence, disclosure, and investment safeguards.** Decisions to invest in water intensive or water reliant sectors in geographies facing water risk must be supported by much stronger due diligence mechanisms and lending safeguards. Institutional and private financiers alike must be compelled to undertake adequate screening, reporting and disclosure to prevent unsustainable resource use, through new statutory requirements and demand from asset owners.

B. **Proactive divestment and investment.** Alongside screening, reporting and disclosure we now need to see active targeting of investment, and where necessary divestment to drive rapid transition towards sustainable resource use in our supply chains. Safe, water intensive production needs to be driven by much more rigorous investor scrutiny. Those who demonstrably abuse water and fail to prevent, mitigate, and remedy water-related harms such as those seen in Ica should face financial sanctions such as limited credit, and where listed companies are involved, divestment. Screening of current and future investors, and targeted

engagement to drive change. It is essential that private capital investors, equity firms, banks, asset managers and asset owners including pension funds actively divest away from companies which abuse water, and target impact investment towards water stewardship leaders. The metrics and mechanisms for this are increasingly available – for example CDP's disclosure framework on water – but remain in niche rather than mainstream use. This must change.

PRIORITY 7: ACTION BY TRADING PARTNER & CONSUMER GOVERNMENTS

Accountability, reform, and investment

To support delivery of each of these priorities, action is also needed beyond Peru by the trading partner governments whose imports are driving unsustainable water use in Ica. Significant trading partners include the USA, the Netherlands, the UK, Spain, Australia, France, Germany, Italy, Japan, Switzerland, Canada, Sweden, and Denmark, with China an important new actor.

D. **Enactment of trade agreement requirements for sustainable resource use.** Trade between Peru, and the USA, EU and the UK is governed by a powerful set of Trade Agreements, each of which stipulates that trade should be based on the sustainable exploitation of natural resources and should not come at the expense of degradation to the environment or human rights. The evidence set out in this report suggests that all parties are failing to uphold their obligations under these agreements and that the mechanisms put in place for their implementation are currently ineffective. For example, the EU-Andean and UK-Andean Trade Agreements specify that a sub-Committee on Trade and Sustainable Development will be established to review, monitor, and assess the impacts of trade on the environment, with powers to consult widely and to form Expert Groups to make recommendations. Action is therefore needed to activate these safeguard mechanisms, to understand why they have failed to date, and where necessary, to instigate reform to ensure that they adequately drive sustainable resource use in Peru and elsewhere.

E. **Activating the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct.** The nations which lead trade with Peru in fruit and vegetables are members of the OECD and committed to upholding the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct which oblige companies to respect human rights and to contribute to sustainable development. Given the gravity of the situation in Ica, action is needed to activate the guidelines in relation to those multi-national corporations which source in Ica, and to explore the value of the newly revised guidelines of 2023 in remedying the harms identified by this report, and in preventing future impacts. This will require engagement by the National Contact Points in multiple territories who handle complaints against companies alleged not to have met the guidelines standards. Notably, Peru is currently seeking accession to the OECD and this may provide additional leverage for alignment with the Guidelines. Lessons emerging will be valuable for understanding the relevance of the OECD Guidelines in driving sustainable, water use within the global economy.

F. **Commitment and support for Fair Water Footprints.** The study findings suggest deep rooted systemic failures within our globalised supply chains, which permit the unsustainable exploitation of water resources and impose significant risks for people, ecosystems, and economies. Consumer nations of the Global North have an obligation – and an opportunity – to address these failings through concerted action with stakeholders within these supply chains. Joined up action across government is now needed to remedy the situation in places like Ica and to ensure reform and investment to avoid future harms, and to establish Fair Water Footprints as the business norm. This should include sustained co-investment and diplomatic support for collective action to remedy and reverse the water emergency facing Ica, reform of corporate reporting and financial disclosure mechanisms to strengthen statutory drivers for responsible water use in supply chains, oversight of sustainable development criteria in trading agreements, and formal commitment to the Glasgow Declaration for Fair Water Footprints as a vehicle for transformative change. Commitments set out for governments in the Declaration include:

- Strengthen the capacity, investment mechanisms, leadership, inter- and intra-ministerial and cross-sectoral coordination, knowledge, and international collaboration required.
- Enhance water-related data collection and analysis and ensure that farms, factories, and facilities associated with significant water and climate-related risk are subject to effective regulation and enforcement, and publicly disclosed compliance monitoring.
- Review institutional and corporate governance frameworks, and international agreements, and institute appropriate policy, statutory, procedural, and market-based measures, including the strengthening of safeguarding, due diligence, disclosure, and responsible procurement by government, business, and financiers.
- Empower and enable citizens, civil society, women, young people, marginalised groups, and the media to fulfil their key roles, including communication, participation, convening, consumer choice, and accountability monitoring for fair water footprints.

Reflecting on the 14 years of piecemeal and ineffective responses to the unfolding water disaster in Ica, working at these multiple scales through concerted and collective action by all stakeholders now holds the best hope for a fair water footprint in Ica. An outline Theory of Change illustrating the approach proposed here is provided as Figure V. It is hoped that the wider lessons emerging from Ica will trigger the systemic change needed to establish credible water stewardship as the global business norm and to ensure a fairer water future for all.

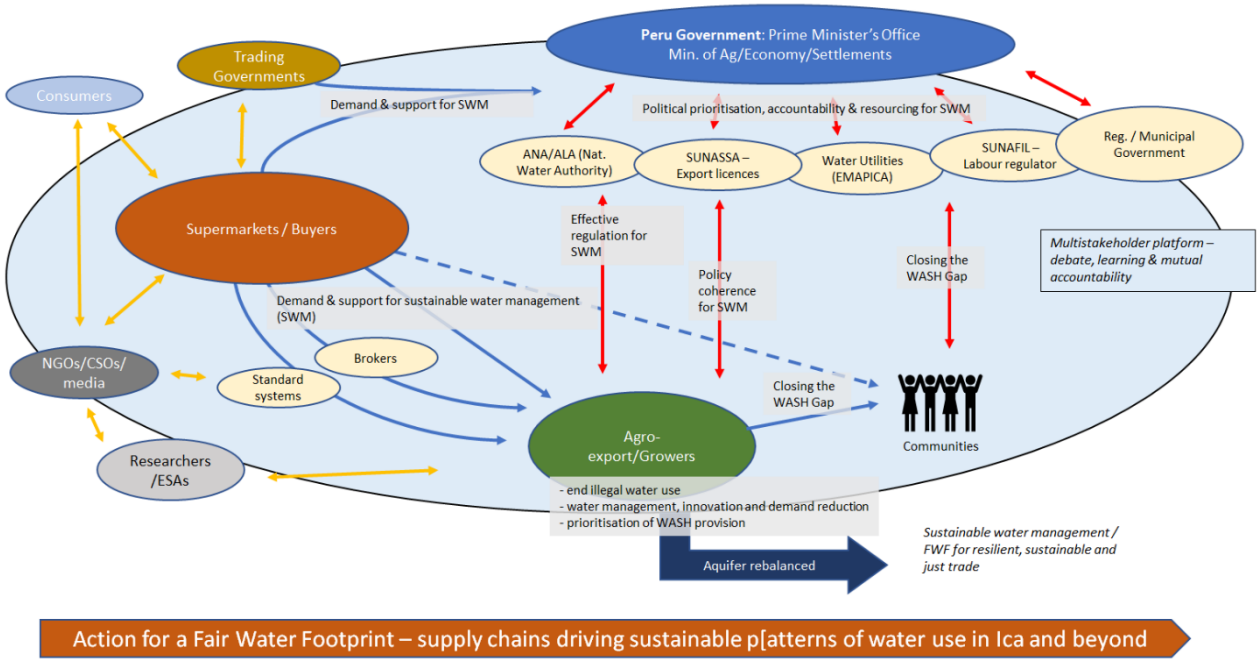

Figure 25. An outline Theory of Change for shared water security in Ica

BIBLIOGRAPHY

50 Años Adex. (2023, March). *En El 2022 Peru Fue el Primer Exportador Mundial de Arandanos*. Retrieved from 50 Años Adex: https://www.adexperu.org.pe/notadeprensa/en-el-2022-peru-fue-el-primer-exportador-mundial-de-arandanos/

Al Jazeera English. (2013, Jan). Asparagus industry starves Peruvians of water. Qatar. Retrieved from https://www.youtube.com/watch?v=1SgYlZJHDv4

Allan, J.A. (1993). Fortunately, there are substitutes for water otherwise our hydro political futures would be impossible. Priorities for Water Resources Allocation and Management, ODA Conference Proceedings

ANA. (2012). *Plan de Gestión del acuífero del valle de Ica y pampas de Villacurí y Lanchas.* Retrieved from Autoridad Nacional del Agua: http://repositorio.ana.gob.pe/handle/20.500.12543/2284

ANA. (2013). *Situación de los Acuíferos Ica, Villacurí y Lanchas.* Retrieved from Autoridad Nacional del Agua: http://www2.congreso.gob.pe/sicr/comisiones/2012/com2012ciencia.nsf/0/1187fd07847ff5bc0

ANA. (2017). *Estudio Hidrológico del Acuífero Ica: Memoria Final*. Retrieved from Autoridad Nacional del Agua.

ANA. (2019). *Administracion Local del Agua Ica*. Retrieved from Autoridad Nacional del Agua: http://www.ana.gob.pe/organos-desconcentrados/aaa-chaparra-chincha/ala-ica

Andres, N., Vegas Galdos, F., Casimiro, L., S., W., & Zappa, M. (2014). Water resources and climate change impact modelling on a daily time scale in the Peruvian Andes. *Hydrological Sciences Journal, 59*(11), 2043-2059. doi:https://doi.org/10.1080/02626667.2013.862336

AWS. (2019). *What is Water Stewardship?* Retrieved from Alliance for Water Stewardship: https://a4ws.org/about/

AWS. (2022). *Performance Monitoring Report.* Retrieved from Alliance for Water Stewardship.

AWS. (2023, Dec). *List of AWS Certified Sites.* Retrieved from Alliance for Water Stewardship: https://a4ws.org/certification/certified-sites/

AWS. (n.d.). *The AWS Standard 2.0.* Retrieved from Alliance for Water Stewardship: https://a4ws.org/the-aws-standard-2-0/

Bullock, J. (2016). Development of Peru's Asparagus Industry. *Stanford Freeman Spogli Institute for International Studies*. Retrieved from https://fsi.stanford.edu/publication/development-perus-asparagus-industry

CAO. (2009, Feb). *Peru: Agrokasa-01/Ica*. Retrieved from Compliance Advisor Ombudsman: https://www.cao-ombudsman.org/cases/peru-agrokasa-01ica

CAO. (2011, July). *IFC Response.* Retrieved from Compliance Advisor Ombudsman: https://www.cao-ombudsman.org/sites/default/files/downloads/IFCResponse_July2011.pdf

CEO Water Mandate / Water Integrity Network (2015). *Guide for Managing Integrity in Water Stewardship Initiatives.* https://ceowatermandate.org/integrity/

Chapagain, A. K., & Mekonnen, M. M. (2023). Understanding the Water Footprints of the Global North and Dependency on Water Use in the Global South. *Water Witness International*.

Climate Diplomacy. (2007). *Water Resources Distribution - Ica River Basin in Peru*. Retrieved from Climate Diplomacy: https://climate-diplomacy.org/case-studies/water-resources-distribution-ica-river-basin-peru

CNN. (1998, Feb). *Mudslide in Peru: The Latest El Niño Disaster*. Retrieved from CNN Interactive: http://edition.cnn.com/WORLD/9802/28/peru.mudslides/

Data Commons. (2021). *World Bank Data*. Retrieved from Data Commons: https://datacommons.org/place/country/PER/

DEFRA. (2023, Oct 5). *Official Statistics - United Kingdom Food Security Report 2021: Theme 2: UK Food Supply Sources*. Retrieved from GOV.UK Department for Environment Food & Rural Affairs: https://www.gov.uk/government/statistics/united-kingdom-food-security-report-2021/united-kingdom-food-security-report-2021-theme-2-uk-food-supply-sources

Fernandez-Escalante, E., Henao Casas, J., Medeiros, A., & Sauto, J. (2020). Regulations and guidelines on water quality requirements for Managed Aquifer Recharge. International comparison. *Acque Sotterranee-Italian Journal of Groundwater, 9*(2). doi:10.7343/as-2020-462

Fernández-Escalante, E., Foster, E., and Navarro-Benegas, R., (2022a). Evolution and sustainability of groundwater use from the Ica aquifers. Hydrogeology Journal (2020) 28:2601–2612. https://www.mdpi.com/2073-4441/14/21/3405

Fernandez-Escalante, E., Henao Casas, J., Sauto, J., & Gil, R. (2022b). Monitored and Intentional Recharge (MIR): A Model for Managed Aquifer Recharge (MAR) Guideline and Regulation Formulation. Retrieved from MDPI: https://www.mdpi.com/2073-4441/14/21/3405

Global GAP. (2022). *Integrated Farm Assurance Smart: Principles and Criteria for Fruit and Vegetables.* Retrieved from Global GAP: https://oc8.globalgap.org/.content/.galleries/documents/220929_IFA_Smart_PCs_FV_v6_0_Sep22_en.pdf

GORE Ica. (2014). *Estrategia Regional de Cambio Climatico de Ica.* Retrieved from Ica Regional Government; GORE Ica: http://www.regionica.gob.pe/pdf/grrnma/2015/ercc_1.pdf

Grey, D. and Sadoff, C.W. (2007). Sink or Swim Water Security for Growth and Development. Water Policy, 9, 545-571.

Hepworth, D. N., Postigo, J. C., Guermes-Delgado, B., & Kjell, P. (2010). *Drop-by-Drop: Understanding the impacts of the UK's water footprint through a case study of Peruvian asparagus.* Progressio, Centro Peruano de Estudios Sociales & Water Witness International Report.

Hepworth, N. D. (2021). Tackling the Global Water Crisis: The Role of Water Footprints and Water Strewardship. *Institute of Development Studies*.

Hepworth, N., Agol, D., Von-Lehr, S., & O'Grady, K. (2011). *AWS Kenya Case Study Technical Report: Exploring the Value of Water Stewardship Standards in Africa.* Retrieved from Alliance for Water Stewardship: https://a4ws.org/wp-content/uploads/2019/02/9-Hepworth-Agol-v-Wiren-Lehr-and-OGrady-2011-Lake-Naivasha-Report.pdf

Hess, T., & Sutcliffe, C. (2018). The exposure of a fresh fruit and vegetable supply chain to global water-related risks. *Water International, 43*(6), 746-761.

Ica Chamber of Commerce. (n.d.). Retrieved from Ica Chamber of Commerce: https://camaraica.org.pe/

Ica Regional Government.(2010). *Ordenanza Regional N.° 024-2010-GORE-ICA.* Ica.

ITA. (n.d.). *ITA: Peru - Agriculture Sectors*. Retrieved from International Trade Administration: https://www.trade.gov/country-commercial-guides/peru-agriculture-sectors

JHU. (2023, Oct). *Mortality Analyses of COVID-19*. Retrieved from JHU Coronavirus Resource Center: https://coronavirus.jhu.edu/data/mortality

JUASVI. (2023). *Sostenibilidad de uso de las Aguas Subterráneas en el Valle de Ica*. Retrieved from Junta de Usuarios de Aguas Subterráneas del Valle de Ica (JUASVI): https://www.juasvi.com/monitoreo.pdf

JustFood. (2023, May). *Peru's Agrícola Chapi expands avocado and table grape production with cash injection*. Retrieved from JustFood: https://www.just-food.com/news/perus-agricola-chapi-expands-avocado-and-table-grape-production-with-cash-injection/

La Lupa. (2023, March). *Ica: Estas son las vías restringidas y bloqueadas por huaicos hoy 17 de marzo*. Retrieved from La Lupa: https://lalupa.pe/ica/ica-estas-son-las-vias-restringidas-y-bloqueadas-por-huaicos-hoy-17-de-marzo-70454/

Latin America Water Tribunal. (2007). Menace to water resources and communities as a result of the construction of the "Ingahuasi" water collecting canal, Provinces of Huancavelica, Castrorreyna and Huaytara, Huancavelica Region, Peru, Fourth. Latin America Water Tribunal.

McShane, G. (2010, Sept). *Concerns raised over Peru's water footprint*. Retrieved from fruitnet.com: https://www.fruitnet.com/eurofruit/concerns-raised-over-peru-water-footprint/8161.article

Montesinos, S, (2020). Satellite imagery showing expansion of agricultural production (in red) across Villacuri between 2002, 2008 and 2020, taken from Vimeo post: https://vimeo.com/423493753

Munoz, I. (2016). Agroexportación y sobrexplotación del acuífero de Ica en Perú. *Anthropologica*. Retrieved from http://www.scielo.org.pe/pdf/anthro/v34n37/a06v34n37.pdf

Navarro R, Fernández E (2017). Implementación de más de 500 pozas de recarga artificial para la sostenibilidad del regadío en el acuífero de Ica-Perú. IMTA Informe 'Manejo de Recarga de Acuíferos: unnfoque hacia Latinoamérica' Capítulo 17 [Implementation of more than 500 artificial recharge ponds for the sustainability of irrigation in the Ica-Peru aquifer]. In: IMTA report 'Management of aquifer recharge: an approach to Latin America', chap 17. https://doi.org/10. 1007/s40899-018-0231-y

OECD. (2013). *Programme for International Student Assessment (PISA) 2012 Results: Ready to Learn (Volume III): Students Engagement, Drive, and Self-Beliefs.* Organisation for Economic Co-operation and Development, OCED Publishing.

OECD. (2021). OECD Studies on Water: Water Governance in Peru. Paris: OECD Publishing. Retrieved from https://doi.org/10.1787/568847b5-en

Ore, M.T., (2005). Agua: bien comun y usos privados. Riego, Estado y conflictos en La Achirana del Inca ("Water: Common good and private uses. Irrigation, Nation and conflicts in La Achirana del Inca"), first ed. Pontificia Universidad Catolica del Peru, Lima.

OTASS. (2018). *Emapica será primera EPS en comercializar aguas residuales crudas*. Retrieved from https://web.otass.gob.pe/noticias/item/579-emapica-sera-primera-eps-en-comercializaraguas-residuales-crudas.html

Pérez-Blanco, Hrast-Essenfelder, & Perry. (2020). Irrigation technology and water conservation: a review of the theory and evidence. *Rev Environ Econ Policy, 14*, 216-239.

Picetti, R., Deeney, M., Pastorino, S., Miller, M., Shah, A., Leon, D., . . . Green, R. (2022). Nitrate and nitrite contamination in drinking water and cancer risk: A systematic review with meta-analysis. *Environ Res.* doi:10.1016/j.envres.2022.112988

RPP Editorial. (2020). *Ica: Protestas de trabajadores agrarios llegan a su tercer día con bloqueos y diálogo frustrado con el Gobierno.* Peru. Retrieved from https://rpp.pe/peru/actualidad/ica-protestas-de-trabajadores-agrarios-llegan-a-su-tercer-dia-con-bloqueos-y-dialogo-frustrado-con-el-gobierno-noticia-1307396

Salmoral, G., Viñarta Carbó, A., Zegarra, E., Knox, J.W., Rey, D., (2020). Reconciling irrigation demands for agricultural expansion with environmental sustainability - A preliminary assessment for the Ica Valley, Peru. J. Clean. Prod. 276, 123544. https://doi.org/10.1016/j.jclepro.2020.123544

Scheelbeek, P., Moss, C., Kastner, T., Alae-Carew, C., Jarmul, S., Green, R., . . . Dangour, A. (2020). UK's fruit and vegetable supply increasingly dependent on imports from climate vulnerable producing countries. *Nat Food*, 705-712.

Sotomayor, R. L. (2023, Jun). *El Niño de 1998: 25 años del fenómeno natural que azotó al Perú*. Retrieved from Gestión: https://gestion.pe/fotogalerias/el-nino-1998-se-cumplen-25-anos-del-fenomeno-natural-que-azoto-al-peru-nndasp-lluvias-lima-ica-noticia/

The Glasgow Declaration for Fair Water Footprints. (2022). The Glasgow Declaration for Fair Water Footprints. *COP26.* Retrieved from https://fairwaterfootprints.org/app/uploads/2022/09/FWF_Glasgow_Declaration_rebrand_proof_01.pdf

Torres, & Ciriaco. (2018). Power and impunity: the companies that control water in the desert. Retrieved from ojo-publico.com

UK Dept. of Business and Trade. (2023). *Peru Factsheet.* Retrieved from UK Department of Business and Trade: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1163423/peru-trade-and-investment-factsheet-2023-06-21.pdf

UN Comtrade. (2022). *International Merchandise Trade Statistics.* Retrieved from http://comtrade.un.org/

UN Comtrade. (2023). *United Kingdom Imports from Peru*. Retrieved from UN Comtrade: https://tradingeconomics.com/united-kingdom/imports/peru

UN Global Compact. (2015). *Guide to Managing Integreity in Water Stewardship Initiatives: A Framework for Improving Effectiveness and Transparency*. Retrieved from UN Global Compact CEO Water Mandate: https://ceowatermandate.org/integrity/

UN ONCHR (2011). *Guiding Principles on Business and Human Rights: Implementing the United Nations 'Protect, Respect and Remedy'* Framework (Guiding Principles), UN Doc. HR/PUB/11/04 (2011), available at www.ohchr. org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf.

UNCHR. (2021, January). *Peru: Police used unnecessary and excessive force when dealing with protests – Bachelet*. Retrieved from United Nations Commission for Human Rights: https://www.ohchr.org/en/press-releases/2021/01/peru-police-used-unnecessary-and-excessive-force-when-dealing-protests

Wåhlin. (2018). To the last drop: Water and human rights impacts of the agro export industry in Ica, Peru: the responsibility of buyers. *Report 92, Swedwatch*.

WHO. (1998). *Guidelines for Drinking Water Quality (2nd Ed., Addendum to Vol. 2) - Health Criteria and Other Supporting Information.* Retrieved from World Health Organisation.

Williams, P., & Murray, W. E. (2019). Behind the 'Miracle': Non-Traditional Agro-Exports and Water Stress in Marginalised Areas of Ica, Peru. *Bull Lat Am Res*(38), 591-606.

WWF; AfDB. (2012). *Africa Ecological Footprint Report: Green Infrastructure for Africa's Ecological Security.*

Zegarra, L. F. (2018). Reconstruction of Export Series for Peru Before the Great Depression. *Journal of Peruvian and Latin American Economic History*.

Zeisser, M., & Gilvono, A. (2016). Gestión del Agua en la Cuenca del Río Tambo Santiago Ica–Pampas. *Cooperacción*.

APPENDIX A

ANALYSIS OF STAKEHOLDERS ENGAGED IN ICA'S FRUIT AND VEGETABLE TRADE

Investors	*Owners*	*Growers*	*Products*	*Linked to..brokers*	*Standards*	*Linked to…Retailers*	*Destination Markets*
	Corporación Cervesur[117]	PROCESOS AGROINDUSTRIALES SA (PROAGRO)	Asparagus, Pecans, hybrid seeds (melon, watermelon, tomato, pepper), corn and cotton[118]		EUREP-GAP[119]		(United States, Holland, Belgium, England, Spain, Italy, Sweden, Japan, Argentina and Brazil)[120]
	Vanguard International (USA)[121]	VANGUARD PERU	Grapes plus[122]		AWS[123], GLOBAL GAP[124]		Global
		SANTIAGO QUIEROLO	Wine and Pisco[1]			Corney & Barrow wine merchants and Hic![125]	(US, China, Canada, France, UK, Spain, Benelux, Italy, Brasil, Chile, Colombia, Costa Rica and Panama)[126]
		CAMPOS DEL SUR	Grapes		AWS[127]	Walmart [128]	United States, Canada, China[128]
Cordiant Capital[129] Banco Santander Peru, Banco de Crédito del Perú, BD Capital[130] and Rabobank (historical investors)		AGRICOLA CHAPI	Avocado, table grapes, and asparagus[131]		AWS[132] Cordiant Capital publicly touts the environmental credentials of the project, stating that Agrícola Chapi is the first avocado & grape producer to be certified as a sustainable water manager by the AWS.	Sainsbury's[133], Walmart, Costco, Kroger, and Tesco[134]	(US, UK, China, Italy, Chile and the Netherland) [135]

[117] Corporacion Cervesur https://corporacioncervesur.com.pe/
[118] Corporacion Cervesur, Proagro https://corporacioncervesur.com.pe/proagro/
[119] Corporacion Cervesur, Proagro https://corporacioncervesur.com.pe/proagro/
[120] Corporaction Cervesur, Proagro https://corporacioncervesur.com.pe/proagro/
[121] Vanguard International, Vanguard Peru https://www.vanguardteam.com/en/growers/peru
[122] Vanguard International, Vanguard Peru https://www.vanguardteam.com/en/growers/peru
[123] Vanguard International, Sustainable Water Management https://www.vanguardteam.com/en/sustainable-water-management ; Alliance for Water Stewardship Assessment Report https://a4ws.org/wp-content/uploads/2022/04/AWS-000203-206-Vanguard-Peru-2021-Certification-Re.pdf
[124] Vanguard International, Vanguard Peru https://www.vanguardteam.com/en/growers/peru
[125] Corney & Barrow, Viñas Quierolo https://www.corneyandbarrow.com/our-producers/vinas-queirolo.html ; Hic! Wine Merchants, Viñas Queirolo Intipalka | Ica Valley https://hic-winemerchants.com/collections/vinas-queirolo-intipalka-ica-valley
[126] Santiago Quierolo Powerpoint presentation https://www.prowein.de/vis-content/event-prowein2022/exh-prowein2022.2688643/ProWein-2022-Santiago-Queirolo-SAC-Paper-prowein2022.2688643-kHBuQDv5Qvmblo65mmd8zg.pdf
[127] Alliance for Water Stewardship, Registered Sites https://a4ws.org/certification/registered-sites/
[128] Pers comm. Site staff, 1/10/2022
[129] Cordiant Capital extends $130m credit facility to Agrícola Chapi', Agri Investor, May 25 2023 https://www.agriinvestor.com/cordiant-capital-extends-130m-credit-facility-to-agricola-chapi/
[130] 'Peru's Agrícola Chapi secures $60m loan', June 22 2021 https://www.leadersleague.com/en/news/peru-s-agricola-chapi-secures-60m-loan ; 'Garrigues advises Agrícola Chapí on $60m loan', The Latin American Lawyer, 7 June 2021 https://thelatinamericanlawyer.com/garrigues-advises-agricola-chapi-on-60m-loan/
[131] Peru Marketplace (presumably taken directly from Agricola Chapi's website) https://www.perumarketplace.com/showroom-main/chapi
[132] 'Agricultural Company Uses AWS Certification to Lead Regional Water Stewardship: Agricola Chapi', Alliance for Water Stewardship https://a4ws.org/download/agricultural-company-uses-aws-certification-to-lead-regional-water-stewardship-agricola-chapi/
[133] 'Protecting and restoring nature in Peruvian agriculture', Sainbsurys https://www.about.sainsburys.co.uk/sustainability/plan-for-better/our-stories/2017/in-deserts-of-peru-we-help-put-down-roots
[134] 'Cordiant Capital extends $130m credit facility to Agrícola Chapi', Agri Investor, May 25 2023 https://www.agriinvestor.com/cordiant-capital-extends-130m-credit-facility-to-agricola-chapi/
[135] Peru Marketplace (presumably taken directly from Agricola Chapi's website) https://www.perumarketplace.com/showroom-main/chapi

Investors	*Owners*	*Growers*	*Products*	*Linked to..brokers*	*Standards*	*Linked to…Retailers*	*Destination Markets*
Metropolitican Life Insurance[136]		AGRICOLA ANDREA	Citrus and Grape[137]			Tesco[138]	UK
		AGROVICTORIA		Cool Fresh Int'l[139]			
			avocados, mangoes, kiwis, papayas and plums[140]	Nature's Pride		Co-op (Netherlands)[141], ASDA[142] (NB Trial batch)	UK
		TA EXPORT SAC	asparagus[143]	Barfoots of Botley		Asda[144], Lidl[145] Sainsbury's[146], Tesco[147]	UK
		AGRO PARACAS SA	asparagus[148]	Barfoots		Asda[149], Lidl[150], Sainsbury's[151], Tesco[152]	UK
		CORPORACION AGROEXPORTICA SAC	asparagus[153]	Barfoots		Asda[154], Lidl[155], Sainsbury's[156], Tesco[157]	UK
		DANPER TRUJILLO SAC	asparagus[158]	Barfoots, Everyday Produce Ltd., Fruco PLC		Asda[159], Lidl[160], Sainsbury's[161], Tesco[162]	UK
		WESTFALIA FRUIT PERU SAC	avocados[163]	Westfalia Fruit Ltd.		Lidl[164], Tesco[165], Waitrose[166]	UK
		LOS OLIVOS DE VILLACURÍ SAC	grapes[167]	Int'l Procurement & Logistics Ltd.			

[136] 'Agrícola Andrea y Ozblu Perú firmaron un convenio de financiamiento con Metropolitan Life Insurance Company' Rebaza, Alcazar & De Las Casas, January 20 2020 https://rebaza-alcazar.com/agricola-andrea-y-ozblu-peru-reciben-prestamo-de-metropolitan-life-insurance-company-rebaza-alcazar-de-las-casas-advises-agricola-andrea-y-ozblu-peru-53-1-million-facility-metropolitan/

[137] Agricola Andrea, Our DNA https://agricolaandrea.com/en/our-dna/

[138] Joy Produce, About Us https://joyproduce.com/about-us/

[139] Alta Grazia: a direct link between small Peruvian fruit and vegetable farmers and the world market. PSI application Peru tender https://english.rvo.nl/sites/default/files/2013/11/Alta%20Grazia%20-%20Peru.pdf

[140] Nature's Pride, Unique Ripening Program https://www.naturespride.eu/en/about-us/our-expertise ; 'Nature's Pride takes consumers on Avocado Tour', Fruitnet, 1 July 2022

[141] https://twitter.com/NaturesPride_/status/1377185268499800072

[142] https://www.foodnavigator.com/Article/2022/02/25/Apeel-rolls-out-in-Asda-to-extend-shelf-life-It-works-by-sealing-moisture-in-and-keeping-oxygen-out

[143] Veritrade (Peru customs data) https://www.veritradecorp.com/en

[144] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf

[145] https://www.barfoots.com/sustainability/

[146] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf

[147] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf

[148] Veritrade (Peru customs data) https://www.veritradecorp.com/en

[149] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf

[150] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf

[151] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf

[152] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf

[153] Veritrade (Peru customs data) https://www.veritradecorp.com/en

[154] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf

[155] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf

[156] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf

[157] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf

[158] Veritrade (Peru customs data) https://www.veritradecorp.com/en

[159] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf

[160] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf

[161] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf

[162] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf

[163] Veritrade (Peru customs data) https://www.veritradecorp.com/en

[164] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf

[165] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf

[166] Wealmoor https://www.wealmoor.co.uk/accreditation

[167] Veritrade (Peru customs data) https://www.veritradecorp.com/en

Investors	*Owners*	*Growers*	*Products*	*Linked to..brokers*	*Standards*	*Linked to…Retailers*	*Destination Markets*
RRG – Sustainable Water Impact fund[168]		AGRICOLA DON RICARDO SAC - FRUTERA	grapes[169]	Int'l Procurement and Logistics, APG Produce Ltd., AMT Fresh Ltd., AM Fresh UK Ltd., Parallel UK Ltd		Tesco[170], Co-op[171], Asda[172] M&S [173]	UK
		SOCIEDAD AGRICOLA DROKASA SA	grapes, avocados, asparagus[174]	AMT Fresh, Int'l Procurement & Logistics, Flamingo Produce Ltd., Minor, Weir & Willis Ltd., Wealmoor Ltd., Westfalia Fruit		Asda[175], Aldi[176] Lidl[177], Morrisons[178], Sainsbury's[179], Tesco[180], Waitrose[181]	UK
		FLORIDABLANCA SAC	asparagus[182]	Wealmoor, Barfoots, Flamingo, Minor, Weir & Willis, Dole		Asda[183], Aldi[184], Lidl[185], Morrisons[186], Sainsbury's[187], Tesco[188], Waitrose[189]	UK
		COMPLEJO AGROINDUSTRIAL BETA SA	asparagus[190] grapes	AM Fresh, Flamingo, Westfalia, Worldwide Fruit Ltd., Minor, Weir & Willis		Asda[191], Aldi[192], Lidl[193], Morrisons[194], Sainsbury's[195], Tesco[196], Waitrose[197]	UK

[168] RRG, 2021 Sustainable Water Impact fund, - Impact Report https://www.nature.org/content/dam/tnc/nature/en/documents/SWIF_Impact_Report_2021.pdf
[169] Veritrade (Peru customs data) https://www.veritradecorp.com/en
[170] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf
[171] Co-op Supplier List https://assets.ctfassets.net/bffxiku554r1/2aPERfUjew9bRkWNsfypQ1/3332ce86fc074d5076051716b03a82cf/2021_Tier_1_and_Worker_Profile_Data-1-.pdf
[172] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf
[173] Pers comm. Anonymous broker
[174] Veritrade (Peru customs data) https://www.veritradecorp.com/en
[175] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf
[176] Wealmoor https://www.wealmoor.co.uk/accreditation
[177] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf
[178] Wealmoor https://www.wealmoor.co.uk/accreditation
[179] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf
[180] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf
[181] Wealmoor https://www.wealmoor.co.uk/accreditation
[182] Veritrade (Peru customs data) https://www.veritradecorp.com/en
[183] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf
[184] Wealmoor https://www.wealmoor.co.uk/accreditation
[185] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf
[186] Wealmoor https://www.wealmoor.co.uk/accreditation
[187] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf
[188] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf
[189] Wealmoor https://www.wealmoor.co.uk/accreditation
[190] Veritrade (Peru customs data) https://www.veritradecorp.com/en
[191] Asda Supplier List https://asdasupplier.com/file-download/Tier%201%20Food%20NEG%20Produce%20and%20GM%20facilities_1.pdf
[192] Wealmoor https://www.wealmoor.co.uk/accreditation
[193] Lidl Supplier List https://corporate.lidl.co.uk/content/download/25746/fileupload/Lidl%20Food,%20Fruit%20%26%20Veg%20Supplier%20List%202023.pdf
[194] Wealmoor https://www.wealmoor.co.uk/accreditation
[195] Sainsbury's Supplier List https://www.about.sainsburys.co.uk/~/media/Files/S/Sainsburys/CRS%20Policies%20and%20Reports/Food%20Supplier%20List%20Tier%201%202022.pdf
[196] Tesco Supplier List https://www.tescoplc.com/media/758347/primary-supplier-list_jan-2022.pdf
[197] Wealmoor https://www.wealmoor.co.uk/accreditation

Investors	*Owners*	*Growers*	*Products*	*Linked to..brokers*	*Standards*	*Linked to…Retailers*	*Destination Markets*
		EL PEDREGAL SA	grapes[198]	AM Fresh		Co-op[199] M&S[200]	UK
IDB Invest[201]		Agricola Athos			GLOBAL GAP	Tesco[202]	UK
CAF[203]		2016 agreement with ITP (Ica Technical Institute of Production to promote the execution of entrepreneurial innovation projects in the agro-industry of Ica					
Banco de Crédito del Perú Interbank[204]		Sunfruits	Grapes, avocado, blueberry, citrus		Global Gap, AWS?	Walmart?, Costco?	¿
		La Calera	Citrus, pomeegranates, blueberries, avocado[205]			USA?	
			Mango, pomegranates, blueberries	DPS		Tesco, M&S, others[206]	UK

APPENDIX B

ANALYSIS OF AWS CERTIFICATION OF SITES EXPLOITING THE ICA-VILLACURI AQUIFER

[198] Veritrade (Peru customs data) https://www.veritradecorp.com/en
[199] Co-op Supplier List
https://assets.ctfassets.net/bffxiku554r1/2aPERfUjew9bRkWNsfypQ1/3332ce86fc074d5076051716b03a82cf/2021_Tier_1_and_Worker_Profile_Data-1-.pdf
[200] Pers comm. Anonymous broker
[201] https://idbinvest.org/en/projects/ica-pacific-sa. 7/2010 loan of $2.5M for sowing of pmegrantaes and asparagus purchase of land and machinery
[202] http://www.athos.com.pe/
[203] https://www.caf.com/en/currently/news/2016/02/support-for-the-agro-industrial-and-social-development-of-the-ica-region/
[204] Pers comm, Sunfruits, 2022
[205]Pers comm, anon. broker 2023
[206] Pers comm, anon, broker 2023

COMPANY DETAILS	SHARED WATER CHALLENGES & PRIORITY ACTIONS[207]	NON-CONFORMITIES[208]	NOTES, CONCERNS, & OBSERVATIONS	RELEVANCE OF ACTIONS TO ICA WATER EMERGENCY
COMPANY 1				
Certification Core AWS certification (Sept 2020) No.: SGS2020_AWS0015 **Farm(s)** Ica & Villacurí **Water Source** groundwater pumped from Ica & Villacurí aquifers **Crops** grapes asparagus avocados **Export Markets** Sainsbury's PLC Barfoots **Area** 1100 ha **Workers** 2000 pax	• Increase recharge. • Modernise the Water User Boards. • Search for and get new water sources. • Set end time to the ban on wells. • Improve drinking water & sanitation situation. • Formalise & eliminate illegal wells. • Study problems. • Clear garbage from river.	Water stewardship plan, water related compliance or performance against targets not published.	Announcement in May 2023 of $130M investment by private capital investor to expand production of avocados & grapes to 2100 ha in Ica. i.e. an additional 1000 ha.[209] Certification by AWS cited as a factor in decision making.[210] Query whether non-disclosure of legal compliance is a minor non-conformity?	Figures from ANA on the aquifer overdraft & Fernandez et al. (2020) are selectively cited by the company, yet no mention is made of the limited efficacy of aquifer recharge as concluded by the studies referenced. Site actions target recharge and new supplies rather than the control and reduction of demand which is prioritised within all credible publications on the topic. It is not made clear how ending the ban on wells will reduce rather than exacerbate the overdraft. Expansion of production to almost double the current land holding and the associated increase in water use seem incompatible with attaining sustainable water balance, legal compliance with the ongoing ban on new wells (since 2008), and credible water stewardship.
COMPANY 2				
Certification Core AWS certification (Jan 2020) No.: SGS2020_AWS0022 **Farm(s)** Ica and Vilacuri **Water Source** groundwater pumped from Villacurí aquifer **Crops** grapes **Export Markets** global market **Area** 420 ha 370 ha in production **Workers** headcount not reported	• Modernise the Water User Boards. • Search for new water sources. • Set an end time to the ban on wells. • Improve drinking water & sanitation situation. • Formalise & eliminate illegal wells. • Study scarcity and salinity for Lanchas. • Increase water recharge to Villacurí from Ica.	A mismatch was identified between mitigation actions and the water related risks facing the site and catchment.[211] No publication or disclosure of water management plan, objectives, or summary of results.	The stakeholders met by auditors appear to be internal to company. Those consulted appear to be South Committee of 8 agro-export producers. CEO won the 2023 AWS Global Water Stewardship award 2023 for 'inspiring work to address shared water challenges in the Ica… exemplary of AWS's mission.' Osmosis plant in place. 'Seek & propose measures to ensure basin water balance' is a goal in the strategy, but little detail provided on how this will be achieved. No mechanism to receive or respond to complaints or grievances.	Figures from ANA on the aquifer overdraft & Fernandez et al. (2020) are selectively cited by the company, yet no mention is made of the limited efficacy of aquifer recharge as concluded by the studies referenced. Site actions target recharge and new supplies rather than the control and reduction of demand which is prioritised within all credible publications on the topic. No mention of elevated Nitrates in groundwater. Plans prioritise Golda Meir recharge scheme as a 'key project', but at 1.15 Mm3/yr, this shows limited potential to address aquifer overdraft of 108-262 Mm3/yr. Expansion of production via a new farm at Aranal and increasing abstractions seems incompatible with seeking a sustainable water balance for the aquifer, compliance with the ban on new wells since 2008 and credible water stewardship. p.34. The assumption that ANA licence protects the water rights of others and communities appears to be misplaced given the total overdraft on aquifer.

COMPANY DETAILS	SHARED WATER CHALLENGES & PRIORITY ACTIONS	NON-CONFORMITIES	NOTES, CONCERNS, & OBSERVATIONS	RELEVANCE OF ACTIONS TO ICA WATER EMERGENCY
COMPANY 3				

[207] As cited in AWS Certification Report
[208] As noted by auditors
[209] https://www.just-food.com/news/perus-agricola-chapi-expands-avocado-and-table-grape-production-with-cash-injection
[210] https://www.cordiantcap.com/cordiant-capital-signs-usd130-million-credit-facility/
[211] Certification Report p.45

Certification Core AWS certification (Oct 2021) No.: SGS2021_AWS0016 **Farm(s)** Ica and Villacuri **Water Source** groundwater pumped from Ica & Villacurí aquifers **Crops** grapes **Export Markets** global market – unspecified **Area** 170 ha in production **Workers** headcount not reported	• Significantly increase induced recharge, • Integrate & modernise the boards, • 'Set closing time for the closure'. • Improve water supply & sanitation. • Eliminate / formalise illegal wells and disseminate information. • Mitigate waste from Ica river. • Increase surface water use. • Find new sources of water. • Study the water problem.	None.	Lack of clarity on stakeholders engaged. Appears to be restricted to 'Southern Committee' which is comprised solely of agro-export companies. High Nitrate noted. Initiatives focus on aquifer recharge and finding new sources. 'High priority' shared challenges include well production reduction, increased salinity, and drought. No mechanism to receive or respond to complaints or grievances.	Figures from ANA on the aquifer overdraft & Fernandez et al. (2020) are selectively cited by the company, yet no mention is made of the limited efficacy of aquifer recharge as concluded by the studies referenced. Site actions target recharge and new supplies rather than the control and reduction of demand which all credible publications on the topic prioritise. Site goal includes 'contributing to the improvement of the water balance of the basin' but little detail on how this will be done. The highest risk facing the site (1.7.1) is identified as the 'extension of the ban on new drilling' which appears counter-intuitive for good water stewardship. Best practice put forward as 'reducing deficit through induced recharge' (1.8.2) despite findings of Fernandez et al. (3.3.3) Indicates that a new well permit is in process, despite the ban on new wells. The assumption that ANA licence protects the water rights of others and communities appears to be misplaced given the total overdraft on aquifer. (3.6.2)

APPENDIX C

TRADE AGREEMENTS RELEVANT TO THE ICA WATER EMERGENCY

The United States-Peru Free Trade Agreement (PTPA)[212]

The Agreement commits Parties to effectively enforce their own domestic environmental laws, as well as adopt, maintain, and implement laws, regulations, and all other measures to fulfil those obligations. It focuses predominantly on trade in timber and forest products, and includes provisions recognising the importance of conserving and protecting biodiversity. It creates a public submissions process with an independent secretariat for environmental matters to ensure that views of civil society are appropriately considered.

Under the Environment Chapter (18) of the PTPA, **Article 18.3: *Enforcement of Environmental Laws*** requires that, "each Party shall not fail to effectively enforce its environmental laws, and its laws, regulations, and other measures to fulfil its obligations under the covered agreements, through a sustained or recurring course of action or inaction, in a manner affecting trade or investment between the Parties."

It establishes an Environmental Affairs Council between the two parties responsible for oversight and implementation of these requirements, and invites notification of when such requirements are believed to have been breached, though is silent on any form of sanction or reparative justice requirements.

EU-Andean and UK-Andean Trade Agreements[213]

Following Brexit, the UK 'rolled over' the EU-Andean trade agreement as a 'short form' agreement, meaning that the provisions in the EU agreement still apply to the UK thanks to a shorter trade agreement between the UK, Peru, Ecuador, and Colombia. **Title IX** covers ***Trade and Sustainable Development*** (TSD) and specifies provisions for environmental protection and sustainable resource use (p. 321). Water is not explicitly referenced but its sustainable management is in keeping with the spirit of the title, which is to cooperate as trading partners to ensure trade does not come at the expense of environmental or labour degradation, and to harness trade as a tool for promoting sustainable development.

Specifically, **Article 267** commits all parties towards the objectives of:

> (a) strengthening compliance with the labour and environmental legislation … as an important element to enhance the contribution of trade to sustainable development,
>
> (b) strengthen the role of trade and trade policy in the promotion of the conservation and sustainable use of biological diversity and of natural resources, as well as in the reduction of pollution in accordance with the objective of sustainable development,
>
> (c) strengthen the commitment to labour principles and rights in accordance with the provisions of this Title, as an important element to enhance the contribution of trade to sustainable development,
>
> (d) promote public participation in the matters covered.

The Agreement provides for the formation of a committee to oversee implementation of the agreement with specific responsibility for review, monitoring, and assessment of the impact of the agreement on labour and the environment.

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[212] https://www.ustr.gov/trade-agreements/free-trade-agreements/peru-tpa/final-text
[213] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22012A1221(01)


WATER
WITNESS