While Peru offers various seafood commodities, the aquaculture sectors of scallop, shrimp, trout and paiche are the most promising in terms of their current state and/or future potential as export products. With the Peruvian government’s willingness to promote the sustainable growth of their aquaculture sector as well as attracting foreign investors, the importance of these species as seafood sourcing products is only going to increase. For you as an importer, this is the time to start keeping an eye on Peru and to assess whether business opportunities are arising. As such, this section is focused on providing intelligence and relevant insights on these four commodities in the Peruvian context.

1. **Scallops in Peru**

Only one species of scallop is being cultured in Peru, namely the Peruvian Calico Scallop (*Argopecten purpuratus*). Peruvian scallop is a popular and expensive product that is only produced and exported by a limited number of countries besides Peru. Over the last 30 years, scallop has become the most important cultured species in Peru in terms of its export value, although export volumes are not that high compared to Peru’s other seafood exports.

The majority of scallops are produced by small and medium-scale farmers in central and northern Peru. In 2015, which was a historically bad year for Peruvian scallop, almost 6,000 tonnes found its way to, mainly, France, the United States and Belgium. Next to the lack of larvae, other scallop-producing countries like Japan, Canada and Scotland also had additional problems with farming. Consequently, demand was high and availability low.

Lots of Peruvian exporters decided to focus on their actual customers and to refuse new contacts. Others started to expand their product range by making value-added products to increase their sales. Larger Peruvian processing plants like *Iprisco* are even being used by Argentinian companies for cutting and treating Argentinian red shrimp. Scallop availability is slowly growing again, which in Peru is strongly related to El Niño effects and climatic changes.
Data from 2005 to 2014 was gathered from the Food and Agriculture Organisation (FAO), while data from 2015 was provided by the Peruvian Ministry of Production.

Production volumes fluctuate strongly due to El Niño effects and climatic changes, as scallops are very sensitive to changes in ocean temperature, oxygen levels and currents. El Niño events happen at irregular intervals of two to nine years and can last for nine months to two years. Events have been recorded for 2004–2005, 2006–2007, 2009–2010 and 2014–2016. While it is difficult to make out the effects for the other years, the impact of El Niño event in 2009–10 and 2014–16 can be seen by the heavy drop in production volumes in 2012 and 2015.

Production figures for 2016 show a small increase in production due to a higher availability of larvae, but 2017 has started with problems. In the Sechura Bay, a short-term increase of the seawater temperature has caused some mortality again. Prices of Peruvian scallops were very high in 2016 and will probably remain on a high level in 2017. Some companies, like Acuapesca are reluctant to accept new customers as they can barely serve their existing clients. To be competitive, you need to be willing to pay the right price – which depends on the availability and season – and engage in long term partnerships. Spot market buying is likely to be difficult as long as production does not increase significantly.

In 2016, a total 15,625.37 hectares were used for scallop production. Ancash and Piura, which are located respectively in central and northern Peru, are the main production areas. The warming effect of El Niño is favourable for the scallop production in central and southern regions of Peru and detrimental in northern Peru. Vice versa, scallop production in northern Peru is better during cold years (Mendo et al., 2016). The Ancash region is less affected by scallop mortality, as the scallops are cultured using suspended systems. Suspended systems allow for better management of changes in the water properties, because the scallops, and therefore also the risks, are distributed throughout the water column, whereas with bottom farming all scallops are concentrated at the ocean floor. In Piura, located more to the north, over 90% of scallops are bottom farmed. The huge drop in production in Piura is therefore likely caused by the onset of the most recent El Niño event of 2014–16. In 2016, production levels in Piura and Ancash increased a bit due to the increased availability of larvae, although official figures have yet to be released. However, 2017 started with some mortality in the Bay of Sechura due to higher seawater temperatures, the impact of which is to be verified shortly.
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Scallop exports fluctuate as much as production does, and the export volume fluctuated between almost 15,000 tonnes in 2013 and 4,400 tonnes in 2016. Although there are exceptions – such as in 2013, when the United States was the largest market – usually, France is the most important market for Peruvian scallops. The French market is also relatively stable. Although exports to France fluctuate according to availability of the product, this fluctuation is less severe than it is in other markets such as the United States. The ban placed on fresh chilled scallops from Peru by the European Union in 2008 has not yet been lifted. This ban was put in place after a Hepatitis A outbreak among European consumers, which could be traced back to eating bivalve molluscs from Peru. While the outbreak was not caused by scallops (Donax clams (Donax spp.) were found responsible), the virus was likely contracted through contaminated waters. As a result, export of fresh and chilled scallops from Peru to the European Union has been banned, unless they have eviscerated or undergone heat treatment.

On the French market, Peru’s main competitors are the United Kingdom, Argentina, the United States and Canada. In years that Peru has abundant product, it is structurally the largest supplier of frozen scallops to France. In years with fewer products available, such as 2012, 2015 and 2016, the United Kingdom takes over the pole position in France. French scallop imports seem to have declined in recent years, dropping from 28,000 tonnes at its peak in 2010 to only 13,000 tonnes in 2016 due to lack of availability and price (Undercurrent News, 2017a).

The European Union – the largest market for scallops, with an average of 40,000 tonnes and 15 percent higher prices than the United States – has re-approved China for scallop exports to the EU, from which it had been banned since 2007 (Undercurrent News, 2016). While at the moment only one company has received approval, it is likely that China will increase its scallop exports to the EU significantly, meaning Chinese products will compete with those from other scallop suppliers. However, currently no scallops have yet been exported to the EU (Undercurrent News, 2017b). With every scallop origin having its own unique selling points (size, wild versus cultured, species etc.), it is likely that Peru will remain competitive for the time being, especially as global demand for scallop is increasing. Peruvian scallops differ from other scallops by being intermediate in size, averaging around 20 to 40 scallops per kg; they are larger than the Argentinean scallop and smaller than European and North American sizes (Undercurrent News, 2017c). However, the unsteady supply of scallops from Peru makes it more important for buyers to have access to other sources as well.
Exports from Peru consist almost entirely of frozen scallops. Although some of the largest exporters have started to invest in value-addition – think ready-made products, for instance – to compensate for the lower margins on frozen scallop products, so far these investments have not been reflected in trade statistics. The 2008 EU regulation will remain in place at least until 30 November 2017. After that, the European Commission will review the situation in Peru, to see whether the Peruvian competent authority can provide satisfactory assurance that the deficiencies identified in the control system of virus detection in live bivalve molluscs have been corrected (EUR-Lex, 2015). At this time, there is no indication as to whether the ban will be lifted. The EU regulation has resulted in a drop from 700 tonnes of fresh and chilled scallop exports from Peru in 2010 to only 80 tonnes in 2014. Although the fresh and chilled market is relatively small, it is very lucrative. The main suppliers worldwide are the United Kingdom, Canada, the United States and Indonesia.

Certifications of Peruvian scallop farms

Two Peruvian scallop farms are ASC certified. Certification data presented here shows information from 1 January 2017. For the latest certification updates, please visit the sourcing intelligence on Peru of the Seafood Trade Intelligence Portal (STIP):
Production systems
Bottom farming
Bottom farming is the most common way of scallop farming in Peru. Over 80 percent of all scallop farmers use this way of farming in regions like Sechura (Piura) and Pisco. Read more about bottom farming of scallops in Peru on the STIP portal.

Hanging pearl net
About 20 percent of scallop farmers use the method of hanging pearl nets. Acuapesca (Guaynuma region) and Iprisco (Sechura and Pisco regions), two of Peru’s major scallop exporters, use this way of farming. Read more about scallop farming with hanging pearl nets on the STIP portal.

Supply chain (inputs/ farming/ trading/ processing/ exports)
Inputs
Scallop larvae are sourced from either the natural environment or hatcheries. Larvae are sold by several small private hatcheries and the Acuapesca company, which has its own hatchery. The sea takes care of the available feed. Read more about scallop inputs in Peru on the STIP portal.

Farming
Most Peruvian scallop farming occurs in the northern part of the country, in the Bay of Sechura. Here an estimate of 10 big farmers, 30 medium-scale farmers and 150 smaller farmers are operating, using concession holder and sublet systems. Read more about scallop farming in Peru on the STIP portal.

Trading
There are no middlemen active in Peru. The big and medium-sized companies process their harvest at their own plants or use public processing plants. Smaller farmers and some medium-sized ones usually sell their harvest to the larger companies or public processing plants who then become the owner of the product. Read more about scallop trading in Peru on the STIP portal.

Processing
Several farmers have their own private processing plants, while others use or sell their scallops to private plants owners that do not have farms, or make use of public plants. The processing plants do the primary (cleaning of the shells and cutting) and/or secondary (cutting (roe off), if necessary heat treatment, frozen IQF, etcetera) processing depending on the facilities and making the product ready for export. The use of chemical additives to prevent spoilage is becoming more common Peru’s scallop processing. Read more about scallop processing in Peru on the STIP portal.

Export
After processing according to the customers’ requirements, the goods are packed in master cartons, put in containers, accompanied by documents and transported to the Paita harbour. Importers can do business with the processing exporters, but also with the merchant exporters (in case the farm exports its own products). Customers can buy Free on Board (FOB) or Cost and Freight (CFR)/Cost, Insurance and Freight (CIF) at Paita, to whatever international harbour. Read
Risks

While Peruvian scallop is a popular product, there are environmental, social and quality and supply chain risks that come with their production. Such risks must be taken into account when choosing to do business in Peru. The Peruvian government is currently trying to mitigate these risks with the 2016 General Law on Aquaculture, which aims to stimulate, guide and regulate sustainable aquaculture in Peru.

Environmental risks

- Susceptibility to diseases and waste from the sea. As the farming takes place at open sea, there are no barriers for diseases, alga, bacteria, which might cause high mortality.
- Entry of diseases and waste from rivers. Due to the lack of an adequate system of waste reduction and cleaning, all waste from inland villages end up in the sea.
- Global climate changes. Scallops are very sensitive to changes of temperature of the seawater.
- Submarine currents. Climate occurrences like ‘El Niño’ can cause submarine currents with or without changes of temperature. Bottom farming, in particular, can be affected by these submarine currents.
- Overfishing of natural areas where the larvae come from.

Social risks

- Workers safety and rights in production plants and farms.
- Criminality (theft of scallops).
- Informality, corruption by part of governmental institutions, lack of association.
- Neighbourhood conflicts (for example, difference in the adequacy of waste reduction systems and the cleaning performed by authorities between neighbourhoods).

Quality and supply chain risks

- Climate changes influencing product quality.
- Lack of international certifications like Global Good Aquacultural Practices (Global G.A.P.), Aquaculture Stewardship Council (ASC), British Retail Consortium (BRC) and International Featured Standards (IFS).
- Slow governmental process at all stages (documents, permits, inspections, export certificate, etc.).

2. Shrimp in Peru

After scallops, shrimp are Peru’s most important aquaculture export commodity. El Niño effects in 1998, white spot outbreaks in 1999 and reduced profitability due to a drop in international prices in the 2000s inflicted massive blows to the Peruvian shrimp sector. Nevertheless, the sector recovered and experienced a tremendous growth between 2005 and 2014, with exports increasing from 35.4 million US dollars to 162.6 million US dollars (Oxford Business Group, 2017). During this recovery, producers intensified and modernised their production systems and invested in aspects such as infrastructure, technology and management to reduce their risks. Nowadays, Peru’s production has stabilised, but the sector still doesn’t have the massive production capacity of Ecuador. Further increase is hampered by limited available space as well as environmental and sustainability legislation that limits the expansions of production areas. Large companies like Marinazul are therefore running trials and converting to intensive culture systems to boost production.

Most of the cultured shrimp gets exported, and only 10 percent is sold on the domestic market. The lines between exporters and importers are quite short, and there are normally no commercial agents involved. 22 medium-sized and large corporate farms are responsible for the majority of the exports, while 50 small-scale farmers are the main suppliers for the local market. In March 2016, the Peruvian government has issued a new General Law on Aquaculture, which aims to further stimulate, guide, and regulate sustainable aquaculture. The new governmental law on aquaculture will likely increase the sustainability and traceability of shrimp farming, protect the environment, increase productivity per hectare, improve processing methods and defend workers’ safety and
Production figures from 2011 to 2014 were provided by FAO, the 2015 figures were provided by Ministry of Production of Peru.

Litopenaeus vannamei (whiteleg shrimp) is the main cultured shrimp species in Peru. Shrimp production increased tremendously since 2003, after being seriously damaged by turbulent years with El Niño effects, disease and reduced profitability. In the last few years, production has stabilised. The production increase, which is visible in the graph above, is largely due to increased efficiency through technological advances and has less to do with expansion of the sector. Environmental and sustainability rules make it difficult for farmers to expand their production area. Farmers are not allowed to increase the amount of land used for aquaculture due to regulations protecting the biosphere. Scarcity of water available for agricultural use is another factor limiting sector growth.
In 2016, the total shrimp production area in Peru was 6,852.32 hectares. Almost all shrimp production takes place along the coastal districts in the most north-western departments - Tumbes and, to a lesser extent, Piura. Shrimp culture is clustered here due to the warmer climate that is needed for shrimp cultivation. Over half of the production area is used for larger-scale aquaculture, which can be mostly found in the districts of Zarumilla and Tumbes in the Tumbes region. Shrimp produced in the Tumbes region is farmed in seawater and the production area covers over 6,000 hectares. Farmers harvest ‘Head-on Shell-on’ (HOSO) sizes of 50-60, 60-70 and onward. Some important companies in this area are Atisa Perú and Marinazul.

Production in the Piura department is concentrated in the Castilla district, and covers an area of 500 hectares. Here, shrimp are cultured in fresh water rivers and the lower temperatures allow for only one grow-out season. Companies like Ecosac harvest only once per year and especially for tails and peeled un-deveined/peeled deveined (PUD/PD), which they stock for year-round sales. Piura farmers try to reach HOSO sizes of 20-30 and 30-40 at the end of April, as it makes their sole annual harvest more profitable. However, some years it is necessary to already harvest everything in February, at 50-60 and smaller, due to a lack of water.
Total shrimp export value reached 155 million US Dollars in 2016. While export in terms of volume showed an increase the last couple of years, export value decreased with 11 percent from 2014 to 2015, but slowly rose again (7 percent) from 2015 to 2016. The lower value of shrimp products is likely a result of recovering shrimp industries in other shrimp exporting countries like Vietnam, Mexico and Thailand, who had been suffering from Early Mortality Syndrome (EMS). EMS has so far not been reported from Peru (or its neighbour Ecuador). It might therefore be interesting to establish business relationships with some of Peru’s shrimp exporters.

Around 90 percent of the shrimp export volume is exported to just three countries: the United States, Spain and France. However, export to the United States, which is the principal buyer of Peruvian shrimp, has decreased both in terms of volume and value. Asociación de Exportadores (ADEX) suspects that large availability of shrimp product stocks in the United States might be reason for the recent decline in exports (FIS, 2015). Approximately 2,000 tonnes of exported shrimp originate from wild fisheries in Argentina. These shrimp are exported to Peru to be reprocessed and are mainly re-exported to the United States and Canada.

Besides the United States, Spain and France are also prominent buyers, both showing a large increase in exports the last few years. Frozen raw HOSO shrimp primarily serve the cooking industry in these southern European countries. The remaining exports go to other importing countries like Canada, Korea and Japan.
Almost all shrimp from Peru are exported as a frozen raw product and often serve as a cheap raw material for further processing, intended for the cooking industry in southern Europe, for instance. Peruvian shrimp have a slightly redder colour than the ones from Ecuador, reaching an A2-A3, due to less intensive farming. In addition, once it’s cooked, its shell is harder than that of the Ecuadorian L. vannamei. ‘Headless Shell-On’ (HLSO) is the most popular export product at the moment, but according to business insiders, there has been a growing demand for HOSO and larger shrimp. The growing demand for larger shrimp, in particular, has boosted the Peruvian exports in terms of volume.

Certifications of Peruvian shrimp farms
A couple of Peruvian shrimp farms are ASC, BAP or Naturland certified. Certification data presented here shows information from 1 January 2017. For the latest certification updates, please visit the sourcing intelligence on Peru of the Seafood Trade Intelligence Portal (STIP).

Aquaculture Stewardship Council (ASC)

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**Best Aquaculture Practices (BAP)**

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**Naturland**

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Production systems

Semi-intensive pond
Semi-intensive pond farming is the most common way of farming in Peru, covering a total area of over 6,500 hectares. The majority of farming takes place in Tumbes. Read more about semi-intensive pond farming of shrimp in Peru on the STIP portal.

Intensive pond
Intensive shrimp farming hasn’t really developed in Peru. There are some tests going on for intensive farming, but so far it is only one company that is involved in intensive shrimp farming, using around 67 hectares. Read more about intensive pond farming of shrimp in Peru on the STIP portal.

Supply chain (inputs/ farming/ trading/ processing/ exports)

Inputs
A major disadvantage in the Peruvian shrimp sector is the lack of national hatcheries. All larvae must be imported from Ecuadorian hatcheries. Feed is provided by the bigger feed mills that have stores in the important shrimp farming areas. Neither chemicals nor medicines are used, but probiotics are a regular input. Read more about shrimp inputs in Peru on the STIP portal.

Farming
All farming of Peruvian shrimp occurs in the northern part of Peru. There are about 2 large-scale farmers, 20 medium-scale farmers and about 50 small-scale farmers. The biggest volumes for export purposes are produced by the 22 large and medium-scale farmers. No farmer associations exist. Read more about shrimp farming in Peru on the STIP portal.

Trading
There are no middlemen active in Peru. The big and medium sized company process their harvest at their own plant or use public processing plants. Smaller farmers and some medium-sized ones usually sell their harvest to the larger companies or public processing plants who then become the owner of the product. Read more about shrimp trading in Peru on the STIP portal.

Processing
Shrimp are processed in either private or public processing plants. There are 6 plants specialised in shrimp processing, of which 5 are in Tumbes and 1 is in Piura. In the private processing plants shrimp are processed immediately at arrival, while in public plants there is a 'first come first serve' principle. Read more about shrimp processing in Peru on the STIP portal.
Exports

Normally, companies try to sell their shrimp to international markets even before harvesting, which makes it possible to process and pack per importers’ requirements. The main export harbour is Paita. Customers can buy Free on Board (FOB) or Cost and Freight (CFR)/Cost, Insurance and Freight (CIF) at Paita, and have their order shipped to any international harbour. Read more about exports of shrimp from Peru on the STIP portal.

Risks

After scallops, shrimp are Peru’s most important aquaculture export commodity. The production of shrimp does come with a number of environmental, social and quality and supply chain risks that one should take into account when choosing to do business in Peru. The Peruvian government is currently trying to mitigate these risks with the 2016 General Law on Aquaculture, which aims to stimulate, guide and regulate sustainable aquaculture in Peru.

Environmental risks

- Water pollution. The Peruvian institutions control the pollution of the water quite intensively but the smaller farmers are particularly difficult to control.
- Entry of diseases from the sea or the Piura River.

Social risks

- Workers safety and rights in production plants and farms.
- Criminality (theft of shrimp).
- Informality, corruption by part of governmental institutions, lack of association.
- Neighbourhood conflicts.

Quality and supply chain risks

- Climate influence, especially in the Piura river region.
- Lack of production capacity during high seasons (for example before Christmas).
- Lack of international certifications like Global Good Aquacultural Practices (Global G.A.P.), Aquaculture Stewardship Council (ASC), British Retail Consortium (BRC) and International Featured Standards (IFS).
- Slow governmental process at all stages (documents, permits, export certificate, etc.).

3. Trout in Peru

Trout production, which takes place in lakes and rivers in the Andes Mountains, is responsible for one quarter of Peru’s total aquaculture production. Production has shown a tremendous growth of almost 600 percent in less than ten years, from 5,475 tonnes in 2005 to 32,527 tonnes in 2014, with the potential to grow even further under the right conditions (Oxford Business Group, 2017). The main trout producers are large-scale enterprises, but hundreds of small unregistered farmers also exist. There are currently only two large companies that are exporting trout, with export volumes that are less than 5 percent of the national production. Other farmers and companies solely produce for the domestic market.

Peru still doesn’t have a massive farming and production capacity like Chile or Turkey. Moreover, Chile is much more advanced regarding processing. Nevertheless, as Peru is producing smaller quantities they are more flexible towards customers’ requirements than their Chilean and Turkish counterparts. For example, butterfly cut fillets (pin bones out) or mixed containers are hard to find in Chile and/or Turkey, but Peru can do it.

The majority of production occurs on Lake Titicaca, which borders with Bolivia. Due to the immense surface of Lake Titicaca, illegal trade of trout occurs between Peru and Bolivia, as the Health Department of Peru is much more demanding than their Bolivian colleagues. In addition, social protest are emerging against aquaculture activities on the lake in regard to environmental and visual pollution negatively affecting tourism, which have led to revoking trout farming concessions on the lake in 2015.
Production figures from 2011 to 2014 were provided by FAO, the 2015 figures were provided by Ministry of Production of Peru.

Trout was introduced to Peru in the 1930s and has thrived in Andean lakes and rivers. Both rainbow trout and steelhead trout are cultured in Peru. Genetically there is no difference between rainbow and steelhead trout, both of which belong to the species ‘Oncorhynchus mykiss’. Steelhead trout grows out in saltwater and in a later stage in life returns to fresh water to spawn, while rainbow trout spends its entire live in fresh water. Commercially, these species are branded as two different products. This page focuses on the rainbow trout only.

Trout production continues to show a steady growth curve. The Peruvian government is set on reducing the country’s dependence on its national fishery and has turned its focus to aquaculture. In March 2016 the Peruvian government issued a new General Law on Aquaculture, which aims to further stimulate, guide, and regulate sustainable aquaculture. Trout production is therefore expected to increase the coming years. For production to expand on Lake Titicaca however, producers need to find a way to balance their own interest with the interest of the tourism and the environmental conservation sector.
Trout culture is scattered throughout 17 regions, most of them located in the mountainous area of the Andes. The majority of the trout production takes place in Puno, Hauncavélica and Junín. Puno, adjacent to Lake Titicaca, is by far the largest production area in both production volume and area. However, further expansion on the lake could be met with opposition. Production in the region Hauncavélica more than doubled from 2014 to 2015, while production increase was minimal in previous years. Cuzco production recovered after a year of low production figures. A total of 2,284 farmers and 4,750 hectare were registered for trout production in 2016, but as a lot of unregistered farmers are also active the real number is expected to be much higher. The majority of farmers engaged in trout farming operate on a minor scale.

The majority of the trout production is used for domestic consumption, less than 5 percent is exported. According to Trademap, total export volume reached 2,523 MT in 2016 with a value of 19.8 million US Dollars. Export markets of Peruvian trout are quite dynamic. While there were hardly any exports in 2011, the EU (Germany) and Norway were the primary buyers the following two years. In 2014 and 2015 however, the United States became the largest importer, after it had already been the principal customer of trout from Peru before 2011. In 2016, the United States was surpassed by Russia in terms of quantity, but not in export value. China, who had been the third largest buyer in 2015, did not import any trout in 2016. This dynamic market can be explained by the fact that the producers engaged in exports are quite flexible and have the ability to react to relative price changes. This enables them to switch to more profitable markets and opportunities.

Chile and Turkey are important competitors for the Russian market, and Peru export volumes currently only add a fraction to Russian trout imports. Overall exports are expected to increase in the coming years as a result of the government’s new Law on Aquaculture. Besides stimulating aquaculture production, the export of aquaculture products is high on the agenda.

ADEX uses a different system of classification, which states that 75 percent of the exports in 2015 consisted of frozen trout products (1,289 tonnes), 24 percent fresh products and 1 percent vacuum-sealed products. Fillets fall in these three categories and form the largest share. Frozen whole fish is mostly exported to Russia, China and Japan. Fresh and frozen fillets mostly go the United States,
Certifications of Peruvian trout farms

A couple of Peruvian rainbow trout farms and feed mills are BAP certified. Certification data presented here shows information from January 1st, 2017. For the latest certification updates, please visit the sourcing intelligence on Peru of the Seafood Trade Intelligence Portal (STIP).

Best Aquaculture Practices (BAP)

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Production systems

Intensive pond

In the Andes Mountains, farmers use a closed pond system in rivers with water coming in from above and going out below. Due to lots of informal unregistered farmers along the immense Andes region, it is almost impossible to give reliable numbers of farms and hectares involved. Read more about intensive pond farming of trout in Peru on the STIP portal.

Intensive cage

In wide lakes such as Lake Titicaca, farmers use cages that float in the water (like the old fashioned pangasius system in Vietnam). Due to lots of informal unregistered farmers along the immense Andes region, it is almost impossible to give reliable numbers of farms and hectares involved. Read more about intensive cage farming of trout in Peru on the STIP portal.

Supply chain (inputs/ farming/ trading/ processing/ exports)

Inputs

Peru lacks national hatcheries that can supply eggs and/or fingerlings, and eggs have to be imported. Feed is provided by the bigger feed mills that have stores in the important trout farming
areas. A farmer can adjust the colour of the meat by using a more expensive type of feed containing a legal additive. Read more about inputs for trout farming in Peru on the STIP portal.

Farming
Farming of Peruvian trout occurs in lakes and rivers along the entire Andes mountains. Hundreds of small farmers are illegal, informal and unregistered which makes it very difficult to control this sector. In Puno, there are mostly cage farmers, whereas in Huancavelica and Junín, farmers are using closed ponds. Read more about trout farming in Peru on the STIP portal.

Trading
The small-scale farmers sell their harvest to local markets and restaurants. The bigger companies transport their harvest directly to their own or public processing plant. These bigger companies rarely buy raw materials from smaller companies, except if the latter needs a commercial agent to sell their products to the supermarkets in the bigger cities. Read more about trout trading in Peru on the STIP portal.

Processing
The company Piscifactorias de los Andes has its own plant on the spot in Puno. Companies like Patsac and Consorcio Junín need to bring their goods in plastic tubs with ice to public processing plants in Pisco or Lima, both about an 8-hour drive. Many of the Peruvian processors involved in aquaculture focus on one species only. Therefore, the trout processing establishments are most likely not involved in the processing of shrimp, for instance. This is also because a different set up is required for the processing of different species. Most processing plants have Hazardous Analysis and Critical Control Points (HACCP) certification. British Retail Consortium (BRC) is being implemented these days, but International Food Standard (IFS) is still very expensive for lots of companies. Read more about trout processing in Peru on the STIP portal.

Exports
There are 2 important companies exporting worldwide: Piscifactorias de los Andes and Patsac. Consorcio Junín is almost ready to make their first steps in the export business. Read more about exports of Peruvian trout on the STIP portal.

Risks
Trout production has shown a tremendous growth of almost 600 percent in less than ten years and has the potential to grow even further. However, there are a number of environmental, social and quality and supply chain risks involved with production. The Peruvian government is currently trying to mitigate these risks with the 2016 General Law on Aquaculture, which aims to stimulate, guide and regulate sustainable aquaculture in Peru.

Environmental risks
- Loss of biodiversity. As aquaculture in Peru is growing, the number of ponds and cages is increasing the deterioration of the natural surroundings. Even in Puno, tourism is starting to claim that aquaculture is a threat for the open sights of Lake Titicaca.
- Water pollution. The Peruvian institutions control the pollution of the water quite intensively but the smaller farmers are particularly difficult to control. Especially in Lake Titicaca, it is obvious that aquaculture is a threat for its crystal waters which will also affect tourism.
- Entry of diseases and waste from upstream villages (especially in Lake Titicaca).
- Erosion caused by trout pond farming.

Social risks
- Workers safety and rights in production plants and farms.
- Oligopoly by some big companies keeping local purchase prices low which depresses the local communities.
- Informality, corruption by part of governmental institutions, lack of association.
- Neighbourhood conflicts.
Quality and supply chain risks

- Lack of production plants in all trout farming areas.
- Slow governmental process at all stages (documents, permits, export certificates, etc.).
- Lack of international certifications like Global Good Aquacultural Practices (Global G.A.P.), Aquaculture Stewardship Council (ASC), British Retail Consortium (BRC) and International Featured Standards (IFS).

4. Amazon fish (paiche) in Peru

Paiche (*Arapaima gigas*) is the largest species of scaled fish living in the Amazon basin. As an aquaculture species and product it has a lot of potential, as it is fast-growing and has firm white meat with few intramuscular bones. In 2016, there were 499 registered, small-scale paiche farmers using extensive cultures in ponds, but a lot of unregistered, informal farmers also exist.

Paiche farming in the Peruvian Amazon is in a very primitive phase and has to overcome a few obstacles before it could be considered a serious aquaculture product. At the moment, farmers know how to breed paiche and grow them up to 10-12 kilos, but lack knowledge on making adjustments to their farming practices regarding water management and environmental impact which are now limited or non-existent. In addition, issues arise after the fish has reached its commercial size, such as: i) lack of refrigerated facilities near the farms, ii) expensive and risky transport from farms to processing plants in Lima and iii) lack of knowledge on microbiological requirements needed for export. Last but not least, fry production fully depends on spontaneous reproduction, making farmers unable to guarantee a stable supply.

Despite these problems however, paiche is a beautiful product for the European market, and will definitely find its way to the higher level markets worldwide (indication of cost price clean fillet: 15 US dollars/kg ex Lima). With the help of many public and private institutions, both national and international, to help the sector mature in the coming years, paiche is a fish for the future.

Paiche production levels are still low and erratic. Production was much higher in 2011 and 2012 than it was during the three years afterwards. Low production volumes were probably due to less production activity by the biggest paiche farmer, Acuicola de los Paiches. The bottleneck for paiche production expansion is the unstable supply of fingerlings. Fingerlings can only be acquired through spontaneous natural reproduction, which is a lengthy and uncertain process involving several years as the species does not have a high fecundity. At the same time, grow-out of paiche often takes over a whole year, and the harvest needs to be sold before ponds can be restocked with new fry. This explains why some years have higher production volumes – when the fish are harvested – and others have low production volumes – when the ponds have been newly stocked and fingerlings are still growing.

Most of the registered production takes place in Loreto, which is the northernmost region. Loreto covers around one-third of Peru and holds a large part of the Peruvian Amazon jungle and river basin. In the last three years other regions started producing (or registering) paiche, as farmers were informed about the potential of this fish. Due to high numbers of unregistered and informal farmers, production figures per region are likely to be higher. However, these unregistered farmers are only producing for local markets.

Export of paiche is minimal. Most of the production ends up at small local markets or restaurants. At the moment, the United States and Hong Kong are the primary buyers of paiche from Peru. The composition of 'Other' countries differs per year. In 2015, these countries included Japan, the Philippines and Norway.

The difference between the amounts of paiche that was produced compared to what was exported in 2013 is likely a result from one the largest paiche farmers, Acuicola de los Paiches. This company only stocks and harvest once a year, and tries to sell its harvest as soon as possible. It is likely that,
in 2013, the company exported its inventory of 2012.

The little amount of paiche that is exported consists of either frozen fillets or live fingerlings (especially to Asia). Due to its size and its firm white meat, paiche is ideal for making portions, slices and big fillets. The export of fingerlings is due to the fact that seed supply still depends on spontaneous reproduction. As having a reproducing pair of paiche takes time and is often uncertain, the ability to produce live fingerlings is quite valuable. In 2015, the price for 24 tonnes of fingerlings was 308,222 US dollars Free On Board (FOB), which comes down to 12.67 US dollars FOB per kilogram.

Certifications of Peruvian paiche farms
There were no certified facilities for paiche on January 1st, 2017. For the latest certification updates, please visit the sourcing intelligence on Peru of the Seafood Trade Intelligence Portal (STIP).

Production systems
Extensive ponds
Paiche are carnivores and need plenty of space to hunt. Therefore, farming is done in large closed ponds in the Amazon area, close to the rivers. Due to lots of informal, unregistered farmers in the immense Amazon region, it is almost impossible to give reliable numbers of farms and hectares involved. Read more about paiche farming in extensive ponds on the STIP portal.

Supply chain (inputs/ farming/ trading/ processing/ exports)
Inputs
There are no hatcheries for paiche in Peru. Fingerling availability depends on the natural reproduction of paiche, which is a lengthy and uncertain process taking at least 4 to 5 years. As paiche are predatory and carnivorous, they are fed small live Amazonian fish, which are bought from local fishermen. Read more about inputs for paiche farming in Peru on the STIP portal.

Farming
Paiche farmers operate along the entire Amazonian region. Hundreds of farmers are illegal, informal and unregistered, making it difficult to control this sector as well as making a reliable estimate of the number of people and hectares involved. Officially there are about 500 farmers with almost 1,000 hectares. Read more about paiche farming in Peru on the STIP portal.

Trading
While small-scale farmers sell their fresh harvest to the local market, medium-sized and large companies freeze their paiche, which they can then sell nationwide. Logistically, however, it is difficult to transport paiche to processing plants and bigger markets due to the lack of solid infrastructure. Read more about paiche trading in Peru on the STIP portal.

Processing
As there are no processing plants in the Amazonian area due to the lack of financial resources, medium and large sized companies have to bring their fish to public processing plants in Lima, like Ransa or Esmeraldas. The big size of the fish makes it ideal for making portions, slices and big fillets. Read more about paiche processing in Peru on the STIP portal.

Exports
Export of paiche is minimal. Companies that do export either harvest on demand, or only stock and harvest once a year to make sure they are able to sell their entire product. The goods are packed in master boxes, put in containers, accompanied by documents and transported to the Lima harbour or airport. Read more about exports of paiche from Peru on the STIP portal.
Risks

Paiche is a beautiful product for the European market, and will definitely find its way to the higher level markets worldwide. There are a number of environmental, social and quality and supply chain risks involved with its production. The Peruvian government is currently trying to mitigate these risks with the 2016 General Law on Aquaculture, which aims to stimulate, guide and regulate sustainable aquaculture in Peru.

Environmental risks

- Loss of biodiversity. As aquaculture in Peru is growing, the number of ponds is increasing in deterioration of the natural surroundings, especially in the Amazon region.
- Water pollution. The Peruvian institutions control the pollution of the water quite intensively, but especially the smaller farmers are difficult to control.
- Entry of diseases and waste from upstream villages and mining.
- Erosion caused by paiche pond farming.

Social risks

- Workers safety and rights in production plants and farms.
- Informality, corruption by part of governmental institutions, lack of associations.
- Neighbourhood and tribe conflicts.

Quality and supply chain risks

- Lack of production plants in all Amazon farming areas (breaches of cold chain).
- Slow governmental process at all stages (documents, permits, export certificates, etc.).
- Lack of international certifications like Global Good Aquacultural Practices (Global G.A.P.), Aquaculture Stewardship Council (ASC), British Retail Consortium (BRC) and International Featured Standards (IFS).
- Lack of experience in export (short-term minded commercial approach).

For an overview of Peru as a seafood exporter, read the study 'Peru's potential as a seafood exporter'.

5. Bibliography

Second part (Species pages)

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