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Ecuador, Factor 7: Animal Agriculture

## **Ecuador**

The Republic of Ecuador is both geographically and demographically diverse. Located on the equator, it is commonly broken into three micro climates: the Costa (coastal lowlands), the Sierra (Andes mountains) and the Oriente (Amazon jungle)<sup>1</sup>. In addition, the Galapagos, islands are a part of Ecuador. This high diversity is condensed in a relatively small space: 283,561 sq kilometers, an area slightly smaller than the state of Nevada. Ecuador's population of over 16 million<sup>3</sup> is 72% Mestizo, whom have a mixed background including Spanish colonists and the Amerindian people. The remaining population is split almost evenly between Montibio, Afroecuadorian, Amerindian and white ethnicities<sup>4</sup>.

A typical household in Ecuador is comprised of a husband, wife, and their children. The fertility rate, or average live births per woman is 2.6<sup>5</sup>. It is also common for the elderly to live with one of their (now adult) children. Couples can be bound in one of two ways: Civil Marriage or Free Union. Civil marriage is what we have in the US and Free Union is very similar, only without an official ceremony. Couples in Free Union are given the same rights as those traditionally married. Daily life is tough for most residents of Ecuador, with long hours and low pay. Children are often left alone and may drop out of school to work.

Education is free and required through ninth grade. Enrollment in primary schools exceeds 95%, however over one quarter of those students drop out before fifth grade<sup>6</sup>. Though public school is free until 10th grade, students have to pay for transportation. High school enrollment rates are low. Schools are both private and public, and both have large class sizes. The national literacy rate is high at 91%, though for rural or indigenous women that drops to 64%<sup>7</sup>.

Health care is inexpensive. Cities have hospitals with state of the art equipment, and costs are typically 10-30% of those in the US<sup>8</sup>. However, rural and indigenous populations can have trouble finding adequate care<sup>9</sup>. All considered Ecuador's health system is efficient, earning it a global ranking of 20 compared the US's 46th<sup>10</sup>.

Ecuador has had a long history of corrupt governments. Militaristic governments ran the country in the 1970s. It was a land of conflict for much of the time before then. Now the representative democracy spends money improving education and infrastructure. The president, Rafael Correa, is trying to keep the country sustainable and lower poverty rates. In his six years as president the country has made great progress towards his goals.

The poverty rate was 36% in 2009 but fell to 25.5% by 2012<sup>11</sup>, though in rural areas that number grows to 42%<sup>12</sup>. If you widen the definition of poverty to lack of access to basic needs the percentage grows further to 61%<sup>13</sup>. The workforce is slightly biased towards men, although throughout the country women are making strides towards equality. 4.30% of men are unemployed compared to 5.25% of females. This equates to 4.68% total unemployment, a good rate for a developing nation<sup>14</sup>.

Ecuador is currently in a recession. In the 1960s, after the discovery of oil, the economy boomed. Access to healthcare, education, housing, and food rapidly expanded. Currently however, due to falling oil prices and the El Nino weather pattern, the country is facing economic trouble. The falling price of oil is the biggest problem. Of the government's revenue, 30% comes from oil, and oil accounts for a large portion of the country's exports. In August of 2014 there were 27 rigs drilling. With the oil prices less than a

third of what they were then, many rigs could not afford to stay in business and now there is only one rig functioning<sup>15</sup>. Due to the recession many families cannot afford fruits, vegetables and the food required for a balanced diet. This leads to high malnutrition rates, especially in kids. In turn this leads to high rates of disease<sup>16</sup>.

Three fourths of agricultural production units are small farms of 6-10 acres, so it is not uncommon for a household to own a small farm. These small farms only account for 17% of the total agricultural land<sup>17</sup>. Working on a farm is also common, as agriculture employs just over a quarter of the population at 27.80%. Urban areas (where 63.5% of the population lives<sup>15</sup>) have grocery stores, and food can additionally be purchased from restaurants. Most rural areas also have grocery stores but others face long drives and limited accessibility.

The country is highly dependent on imports and exports. Petroleum makes up around half of Ecuador's exports, with agricultural coming in second at about 20%<sup>9</sup>. Broken down farther crude oil exports gain Ecuador \$13.70 billion USD, bananas \$3.05 billion, crustaceans \$1.78 billion, and fish 1.43 billion<sup>13</sup>. The bananas exported make up roughly 30% of the global market<sup>14</sup>. Imports are made up of mainly raw materials (25%) and capital goods (19%)<sup>16</sup>.

Ecuador faces many sustainability issues in their animal supply. Shrimp are the main animal export, and traditionally reared livestock is grown to support the local population. Both kinds of livestock currently face issues and will continue to run into problems unless something is done. The livestock industry is also damaging Ecuador's environment and leading to deforestation.

Climate change is a problem and will become a larger hindrance in the near future for the residents of Ecuador. The effects of desertification, erosion and El Nino events, such as floods and landslides, are heightened due to global warming, and are problematic to agriculture. Soil erosion affects around 50% of the country and in the Sierra region the number grows to 70%<sup>17</sup>.

The 1.2 billion USD and over 100,000 jobs that come from shrimp farming are important to Ecuador's economy, yet have destroyed  $\frac{2}{3}$  of the mangrove swamps<sup>18</sup>. Mangroves reduce erosion and buffer storms, including flooding. These disasters can now devastate the shrimp farms and inlands. Mangroves also remove a plethora of greenhouse gases, reducing global warming<sup>19</sup>. Global warming could disrupt the shrimp industry by causing water temperatures to rise, equating to above optimal temperature for the shrimp. Organizations like the Aquaculture Stewardship Council are working for more legislation on the shrimp farms, to preserve the mangrove swamps<sup>18</sup>. National and international authorities should aid these organizations and help protect these diverse ecosystems from destruction.

Other issues that may cause problems in the shrimp farming of Ecuador include pathogens and feed unsustainability. Fish are used in making shrimp feed, commercial shrimp feed is about 25% fishmeal<sup>20</sup>. This translates to about 1-1.7 pounds of fish being used as feed to harvest one pound of shrimp<sup>21</sup>. Some kinds of these fish are now being overfished. Almost all of the shrimp farmed in Ecuador commercially are *penaeus vannamei* and *penaeus monodon*. These monocultures leave shrimp farming vulnerable to a catastrophic disease. White spot syndrome is a viral disease that has historically wreaked havoc on Ecuador's shrimp, and still continues to be a hindrance. There is no cure but prevention measures such as disinfectants are used. Sick shrimp also float to the top of the tanks, leaving them open for birds to eat. This spreads pathogens to the native ecosystem, with unintended harmful results. Shrimp farming also has chemical runoff and biological byproducts, which can be harmful to the surrounding waters and ecosystem.

To solve these problems I would recommend regulation for the protection of overfished creatures, and regulation for sanitary measures, as well as more research into shrimp diseases. These could be

implemented across all levels of government. Sanitary measures would include keeping sick shrimp off the surface of the water, or at least birds out. This could be done with automated machines that collected sick shrimp, or an aerial net. Other measures could include water purification. Technologically advanced filtration systems are costly and still somewhat experimental, however a network of ponds, including settlement and integrated secondary ponds could greatly decrease levels of pollutants<sup>22</sup>.

Diversification of the shrimp types would protect populations from a single plague wiping out massive amounts of shrimp. Yet the shrimp currently raised are optimized for their environment and marketability (both quantity and quality). Due to economics it may not make sense to try to implement complete diversification. My recommendation is for disease prevention techniques being implemented and more research on diseases that can affect the shrimp.

An alternative to farming shrimp is catching wild shrimp. This method, though occasionally used outside Ecuador, is economically and possibly environmentally worse for the country. The large, and rising, cost of fuel for fishing boats is the main reason wild caught shrimp are more expensive than farm raised shrimp<sup>23</sup>. Due to Ecuador's location it may also struggle finding large enough schools of shrimp to make fishing trips profitable. The most common fishing method is trawling; pulling a net behind boats. The net entraps anything in its path, this leads to bycatch; unwanted captured marine life. Bycatch rarely survives its trip. Shrimp has a high rate of bycatch at about six parts discarded mass per one pound shrimp<sup>24</sup>. Due the economic and environmental effects of fishing it is abandoned in favor of farming. I would not recommend encouraging shrimp fisheries as opposed to shrimp farms.

Recently Ecuador encountered another hurdle in its struggling economy. On April 16th, a large 7.8 magnitude earthquake struck near a town called Muisne. The catastrophe caused an estimated three billion dollars damages to the infrastructure, and killed at least 654 people<sup>25</sup>. Another 27,732 were injured and over 28,000 are now homeless<sup>26, 27</sup>. There is also damage in the shrimp sector. The central pacific coast housed about 10% of Ecuador's shrimp production and all of the production in the region is affected. As much as 80% is devastated, with 15,000 hectares of shrimp deaths/minor damage and 6,000 hectares of property destroyed beyond use. A processing plant and shipping routes were also damaged in the earthquake<sup>28</sup>.

In reaction to the earthquake a national state of emergency was called. Military personnel (10,000) and police officers (3,500) were deployed to aid the disaster area. To recover, the president implemented a 2% sales tax, docked the pay of some governmental employees, charged a one-time millionaire tax and secured a loan of \$364 million from the International Monetary Fund<sup>29</sup>. Due to the damage to the shrimp farms, another byproduct of the earthquake was shrimp costs rising. The price jumped 8% immediately after the quake and prices are still rising.

Shrimp, although a valuable export, is too expensive to feed workers in Ecuador. Traditional livestock such as cows, pigs and sheep take this role. Cattle and other large livestock possess many problems. The large need for pasture and cropland for feed drives deforestation of inland forests. Deforestation causes between 5 and 20% of human caused carbon emissions, further leading to global warming<sup>30</sup>. The livestock industry itself is also a huge contributor to global warming. It is the number two emitter of greenhouse gasses, behind only energy production<sup>31</sup>. Current livestock is also wasteful. Of a 1,200 lb steer only about 490 lbs can be eaten<sup>32</sup>. Traditional livestock also requires an excess of land and resources.

To combat this I recommend Ecuador take up mainstream entomophagy as a long term solution. Entomophagy is the eating of insects. Though not aiding the export business it would keep the citizens healthier and provide much more food. Insects are superior to traditional livestock in almost every way. Insects produce no methane and very small amounts of carbon dioxide, two of the largest greenhouse

gasses. Crickets also require about one gallon of water per pound of protein. Cows on the other hand require closer to 2,500 gallons<sup>33</sup>. Cows also require almost 900% more food compared to crickets for the same edible mass<sup>34</sup>. Not only that but the mass consumed is made up of things that we can eat, whereas many insects can survive entirely off our scraps. Insects additionally use very little space and reproduce rapidly. They do not require pasture or grazing land, allowing the land to be used for growing other crops and slowing deforestation. Because of these factors they can be grown almost anywhere. Local communities everywhere should be able to support themselves if they have proper installation of insect raising facilities, which have a low initial cost. The price for protein will also be lowered drastically in rural communities. The UN predicts that the global food price could be lowered by an average of 33%<sup>35</sup>. Insects are also very comparable by nutritional standards, having much more iron and calcium than traditional livestock, and a similar percentage of protein<sup>34</sup>.

Communities will have to take the first steps to put entomophagy into action. It needs to be accepted into society. Although this is a large hurdle, it will be easier to overcome in a developing nation struggling with hunger like Ecuador rather than a developed nation. Nonprofit, philanthropist and other charity organizations should spread knowledge about insect farming. They should also help set up some small scale, expandable farms in rural communities with little access to traditional markets. These should catch on in popularity and feed the rural community. This transition may take years but could be worth it.

Ecuador is in a tough position. Even in an economic recession there is a high employment rate. Low wages and isolation from clean water and healthy food lead to a high poverty rate and high rates of malnutrition. Standards of living can be raised through increasing the value or quantity of exports, and/or through internal reforms. The reforms should include increasing legislation on many practices. Deforestation, especially in mangrove swamps, should be severely discouraged, and shrimp farms should be held to higher standards of cleanliness. The reforms should also consist of a shift away from traditional livestock, which harms the environment, towards cheaper insect protein, for everyday consumption. This will send Ecuador into prosperity.

Ecuador's positive features shine through its recession. A high literacy rate, and low unemployment rate make it a promising developing country. Warm beaches and an amazing biodiversity make it a tourists and scientists dream. Falling oil prices, unsustainable agriculture and natural disasters are enough to put a dent in any economy. Ecuador will recover and prosper with good leadership.

#### Citations

1. "Jungles, Coastal Plains and Highlands - The Diverse Geography of Ecuador." *Geography of Ecuador*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.ecuador.com/geography/>>
2. "Ecuador." *Compare The United States To*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.ifitweremyhome.com/compare/US/EC>>
3. "Ecuador - Population 2016." *Countryeconomy.com*. N.p., n.d. Web. 08 Apr. 2016. <<http://countryeconomy.com/demography/population/ecuador>>
4. "Ecuador Demographics Profile 2014." *Ecuador Demographics Profile 2014*. N.p., n.d. Web. 08 Apr. 2016. <[http://www.indexmundi.com/ecuador/demographics\\_profile.html](http://www.indexmundi.com/ecuador/demographics_profile.html)>
5. "Ecuador." *UNdata*. N.p., n.d. Web. 08 Apr. 2016. <<http://data.un.org/CountryProfile.aspx?crName=ECUADOR>'>
6. "Education System in Ecuador." *Ecuador Education System*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.classbase.com/countries/Ecuador/Education-System>>
7. "World Food Programme." *Ecuador*. N.p., n.d. Web. 08 Apr. 2016. <<https://www.wfp.org/countries/ecuador/overview>>
8. "Health Care and Health Insurance in Ecuador: Big Improvements in Quality and Changes in Insurance Options Are Good News for Expats | CuencaHighLife." *CuencaHighLife*. N.p., 25 May

2015. Web. 08 Apr. 2016. <<https://www.cuencahighlife.com/health-care-and-health-insurance-for-ecuador-expats-big-improvements-and-big-changes-change-the-landscape/>>
9. "Health Care in Ecuador | Your Escape to Ecuador." *Your Escape to Ecuador*. N.p., n.d. Web. 08 Apr. 2016. <<http://yourescapetoecuador.com/health-care/>>
  10. "Ecuador." *World Vision*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.worldvision.org/our-impact/country-profiles/ecuador>>
  11. "Rural Poverty Portal." *Rural Poverty Portal*. N.p., n.d. Web. 20 July 2016. <<http://www.ruralpovertyportal.org/country/home/tags/ecuador>>.
  12. "Rural Poverty Portal." *Rural Poverty Portal*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.ruralpovertyportal.org/country/home/tags/ecuador>>
  13. "World Food Programme." *Ecuador*. N.p., n.d. Web. 08 Apr. 2016. <<https://www.wfp.org/countries/ecuador/overview>>
  14. "Ecuador - Unemployment Data - Data from Quandl." *Ecuador - Unemployment Data - Data from Quandl*. N.p., n.d. Web. 08 Apr.
  15. Report, SRS Rocco. "Ecuador Gutted By Low Oil Prices: Rig Count Down To One." *OilPrice.com*. N.p., 11 Feb. 2016. Web. 20 July 2016. <<http://oilprice.com/Energy/General/Ecuador-Gutted-By-Low-Oil-Prices-Rig-Count-Down-To-One.html>>.
  16. "Ecuador." *Freedom from Hunger*. N.p., 07 Aug. 2012. Web. 08 Apr. 2016. <<https://www.freedomfromhunger.org/ecuador>>
  17. "FAO.org." *ECU / FAO*. N.p., n.d. Web. 08 Apr. 2016. <<http://www.fao.org/family-farming/countries/ecu/en/>>
  18. <[http://e360.yale.edu/feature/shrimp\\_farms\\_tainted\\_legacy\\_is\\_target\\_of\\_certification\\_drive/2558/](http://e360.yale.edu/feature/shrimp_farms_tainted_legacy_is_target_of_certification_drive/2558/)>
  19. "What Shrimp Is Sustainable?" *PCC Natural Markets*. N.p., n.d. Web. 20 July 2016. <[http://www.pccnaturalmarkets.com/sc/1306/sustainable\\_shrimp.html](http://www.pccnaturalmarkets.com/sc/1306/sustainable_shrimp.html)>.
  20. "Indian White Prawn - Feed Formulation." *FAO: Feed Formulation*. N.p., n.d. Web. 20 July 2016. <<http://www.fao.org/fishery/affris/species-profiles/indian-white-prawn/feed-formulation/en/>>.
  21. "Shrimp Farms' Tainted Legacy Is Target of Certification Drive." *Yale Environment 360*. N.p., n.d. Web. 20 July 2016. <[http://e360.yale.edu/feature/shrimp\\_farms\\_tainted\\_legacy\\_is\\_target\\_of\\_certification\\_drive/2558/](http://e360.yale.edu/feature/shrimp_farms_tainted_legacy_is_target_of_certification_drive/2558/)>.
  22. Karin.lee. *Sustainable Alternatives of Shrimp Aquaculture* (n.d.): n. pag. Web. <<https://www.cbd.int/doc/case-studies/tttc/tttc-00155-en.pdf>>.
  23. "Global Study of Shrimp Fisheries." *FAO*. N.p., n.d. Web. 20 July 2016. <<http://www.fao.org/fishery/nems/38698/en>>.
  24. "Wild Seafood." *Effects of Bycatch from Fishing for from the Seafood Watch Program at the Monterey Bay Aquarium*. N.p., n.d. Web. 20 July 2016. <<https://www.seafoodwatch.org/ocean-issues/wild-seafood/bycatch>>.
  25. "Death Toll from Ecuador Earthquake Surpasses 650." *Reuters*. Thomson Reuters, 23 Apr. 2016. Web. 20 July 2016. <<http://www.reuters.com/article/us-ecuador-quake-idUSKCN0XK0GQ>>.
  26. News, Breaking. "Breaking News on Ecuador Earthquakes 2016." *Breakingnews.com*. N.p., n.d. Web. 20 July 2016. <<http://www.breakingnews.com/topic/ecuador-earthquake-april-16-2016/>>.
  27. "Ecuador Earthquake Hits Pacific Coast Region Slammed by April Quake." *CBSNews*. CBS Interactive, n.d. Web. 20 July 2016. <<http://www.cbsnews.com/news/ecuador-earthquake-hits-pacific-coast-region-slammed-april-quake/>>.
  28. "Ecuador Shrimp Farmers Mostly Escape Damage in Deadly Earthquake." *Undercurrent News*. N.p., n.d. Web. 20 July 2016. <<https://www.undercurrentnews.com/2016/04/19/ecuador-shrimp-farmers-mostly-escape-damage-in-deadly-earthquake/>>.
  29. "IMF Approves \$364 Million Post-quake Ecuador Loan." *Reuters*. Thomson Reuters, 09 July 2016. Web. 20 July 2016. <<http://www.reuters.com/article/us-ecuador-imf-idUSKCN0ZP0M4>>.

30. "Reducing Emissions from Deforestation | The Nature Conservancy." *Reducing Emissions from Deforestation | The Nature Conservancy*. N.p., n.d. Web. 08 Mar. 2016.
31. "Sources of Greenhouse Gas Emissions." *Agriculture Sector Emissions*. N.p., n.d. Web. 08 Mar. 2016.
32. "How Much Meat Can You Expect from a Fed Steer?" *IGrow*. N.p., n.d. Web. 08 Mar. 2016.
33. "Bitty Foods." *Bitty*. N.p., n.d. Web. 08 Apr. 2016. <<http://bittyfoods.com/>>
34. N.p., n.d. Web. <[www.littleherds.org](http://www.littleherds.org)>.
35. User, Windows. *POST-HARVEST FOOD LOSSES ESTIMATION- DEVELOPMENT OF CONSISTENT METHODOLOGY* (n.d.): n. pag. Web.

#### Sources

Riós, Iván. "My Home in Ecuador." Personal interview. 2015.  
N.p., n.d. Web

. <<http://www.fao.org/ag/agp/agpc/doc/counprof/ecuador/ecuador.htm>>.