Assessing Project Piaba's Potential as a Forest Carbon Offset Project

A CarbonCo, LLC Consulting Engagement with Project Piaba

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CarbonCo, LLC

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ACRONYMS

ACR	American Carbon Registry
ANSI	American National Standards Institute
Cal ETS	California Emissions Trading Scheme
CAR	Climate Action Reserve
CARB	California Air Resource Board
CCBA	Climate, Community and Biodiversity Alliance
CCB or CCBS	Climate, Community and Biodiversity Standard
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CMIA	Climate Markets & Investment Association
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EMA	Environmental Markets Association
ETS	Emissions Trading Scheme or Emissions Trading System
EU ETS	European Union Emissions Trading System
FAS	Fundação Amazonas Sustentável (Amazonas Sustainable Foundation)
FVA	Fundação Vitória Amazônica (Vitória Amazônica Foundation)
GCF	Governors' Climate and Forest Task Force
GI	Geographical Indication
ICAO	International Civil Aviation Organization
IETA	International Emissions Trading Association
IMO	International Maritime Organization
INPA	National Institute of Amazonia Research (In English)

IRR	Internal Rate of Return
ISO	International Organization for Standardization
JNR or JNRI	Jurisdictional and Nested REDD+ (Initiative)
MRV	Monitoring (sometimes measurement), Reporting and Verification
$mtCO_2e$	Metric tonnes of Carbon Dioxide Equivalent
$MtCO_2e$	Million tonnes of Carbon Dioxide Equivalent, not to be confused with lowercase "m" $mtCO_2e$ which is one tonne
NPV	Net Present Value
NTFPs	Non-Timber Forest Products
OTC	Over-the-Counter
PD	Project Description
PDD	Project Design Document
POD	Payment on Delivery
PRA	Participatory Rural Assessment, also known as a Participatory Rural Appraisal
REDD / REDD+	Reducing Emissions from Deforestation and Degradation / REDD+ includes REDD along with forest conservation, sustainable forest management and the enhancement of carbon stocks
ROW	REDD Offset Working Group
SEMA	Secretaria de Estado do Meio Ambiente (State Secretary of Environmental Affairs)
SES	Social and Environmental Safeguards
tCO_2e	tonne of Carbon Dioxide Equivalent, sometimes referred to as $mtCO_2e$ (metric ton of Carbon Dioxide Equivalent)
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard

VCSA	Verified Carbon Standard Association ((recently changed their name to "Verra")
VCUs	Verified Carbon Units
VERPA	Verified Emissions Reduction Purchase Agreement, similar to an ERPA (Emissions Reduction Purchase Agreement)
VERs	Verified Emission Reductions
VVB	Validation / Verification Body
WRC	Wetlands Restoration and Conservation

EXECUTIVE SUMMARY

CarbonCo, LLC ("CarbonCo") performed a director-level, rapid assessment of Project Piaba's potential Reducing Emissions from Deforestation and forest Degradation (REDD+) project ("Project") in the Rio Negro Basin of Amazonas State, Brazil. This assessment included a visit to the region between the dates of January 18 to February 3, 2018 to meet with local communities, representatives from Project Piaba, and other relevant stakeholders.

In summary, Project Piaba has three potential options to pursue in regard to carbon projects, each increasing in scope and requirements:

1.) Promote the fishery in association with its carbon sequestration and climatic benefits based on the inference that the fishing activity provides an alternative to, for example, timber harvesting, and promote the relationship between healthy floodplain forests and healthy fisheries, without undertaking a certified REDD+ project;

2.) Align work in the municipality with REDD+ work being done at the state-level; and/or

3.) Develop a standalone REDD+ forest carbon offset project.

These three pathways indicate the scalability of carbon-related work based on prioritization and the level of commitment that is decided to be allocated.

The first step would be to promote high-level climate change benefits in marketing schemes and as a basis to procure further support for the initiative, without undertaking a certified REDD+ project. If Project Piaba opts to highlight climate change benefits, without undertaking a certified REDD+ project, CarbonCo advises Project Piaba to be mindful when emphasizing topics such as the quantity of carbon dioxide stored in the forests and CarbonCo has some ideas to help Project Piaba with this in the body of this document.

The second step would be for Project Piaba to progress over time and with additional resources to align its work with the local municipalities of Barcelos and Santa Isabel do Rio Negro to pursue an integrated carbon program. The State of Amazonas is one of the leading jurisdictions in the world working on subnational REDD+ issues. While there is no specific program in place as of the moment, the State of Amazonas has passed an environmental services law known as State Law 4.266 12/2015. Furthermore, the State of Amazonas is an active member of the Governors' Climate and Forest (GCF) Task Force and there are a few voluntary REDD+ projects underway in the State. More specific to Project Piaba, the State's unique stock-flow-risk approach (if formally adopted) will reward remote locations for their conservation and stewardship of natural resources which could directly benefit Project Piaba's work, along with the local communities and host municipalities. At this stage, Project Piaba should consider:

- 1. Obtaining an informal letter followed by a formal, officially signed agreement with the mayor of Barcelos to collaborate on aligning the municipality's work with the State.
- 2. Making sure Barcelos has 1.) A municipal secretary of the environment; 2.) An advising body for the environmental council; and 3.) A municipal plan for prevention and

control of deforestation. If these elements are missing, Project Piaba could offer assistance.

- 3. Helping the municipality document and present the project, while incorporating a central role for the aquarium fisheries, and elaborating on the social and environmental safeguards (SES) to be utilized; and
- 4. Offering to assist the municipality with creating annual monitoring plans.[1]

The third and most difficult, costly, and time-consuming phase would be to develop a standalone REDD+ forest carbon project, with the option of aligning the standalone REDD+ project with the State's work at a later date. There are several reasons why this is the most challenging phase including the low regional deforestation rate in the area, the unclear commitment from the municipality to enroll their lands into a minimum 30-year project lifetime, and the relatively high development costs (i.e., particularly the costs of a forest carbon inventory and the costs of modeling a project-specific deforestation baseline). There is no assurance until the work is complete whether or not the costs to complete this work will outweigh the potential revenue, so more assessment is needed before this stage begins.

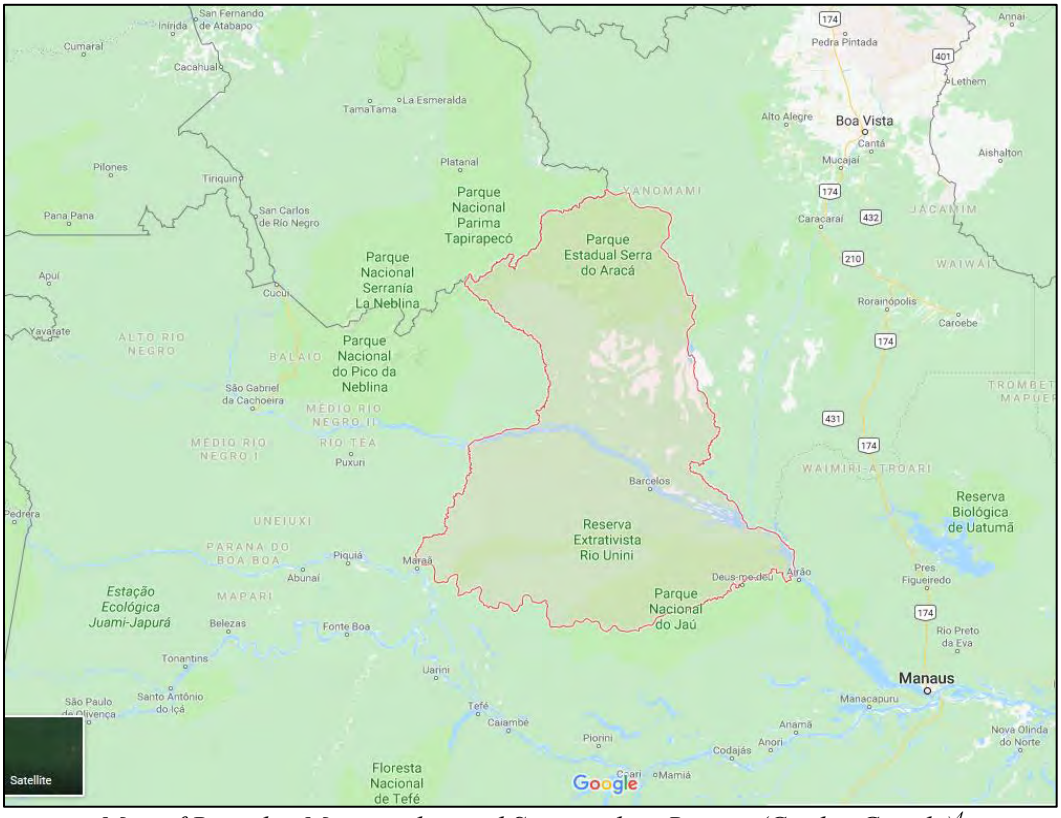
INTRODUCTION

Project Piaba

Led by Scott Dowd and Mari Ines Munari Balsan, Bio-Amazonia Conservation International, Inc. (i.e., doing business as "Project Piaba") is a 501(c)(3) nonprofit organization. The mission of Project Piaba is "to increase the environmental, animal welfare, and social sustainability of the Amazonian aquarium fish trade, to develop and incorporate metrics through which this progress can be assessed, and to provide mechanisms to promote this industry."[2]

Project Piaba's work is focused on an area that "extends from the mouth of the Rio Negro (Manaus) to Tapuruquara (600 km up river), including the lower Rio Branco and Rio Demini in the municipality of Barcelos, an area approximately the size of the State of Pennsylvania."[3] The two main protected areas in the municipality of Barcelos are the Reserva Extrativista Rio Unini and the Parque Estadual Serra do Araca. Barcelos, which is located approximately 300 miles North of Manaus, is home to an estimated 30,000 people. Since 1994, the Festival of Ornamental Fish – which pits a cardinal tetra team versus a discus team – is held annually to celebrate the fisheries' importance for the region.

[1] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 44.
[2] Project Piaba, "Mission and Objectives," Available: http://projectpiaba.org/what-we-do/objectives/
[3] Project Piaba, "Brazil/Amazon," Available: http://projectpiaba.org/where-we-work/brazilamazon/



Map of Barcelos Municipality and Surrounding Region (Credit: Google)[4]

Project Piaba is also working in the adjacent municipality of Santa Isabel do Rio Negro. Collectively, this area has earned Geographical Indication (GI) status for cardinal tetras (*Paracheirodon axelrodi*), which is the leading aquarium fish caught throughout the region.

With the slogan, "Buy a fish, save a tree," Project Piaba hired CarbonCo, LLC to assess the area as a potential Reducing Emissions from Deforestation and forest Degradation (REDD+) project.

About Carbonfund.org Foundation, Inc. and CarbonCo, LLC
Carbonfund.org Foundation, Inc. ("Carbonfund.org") was founded in 2003 and is now a leading US-based 501(c)(3) nonprofit carbon reduction and climate solutions organization with over 750,000 individual supporters and over 2,000 business and nonprofit partners including Dell, Discovery, Motorola, National Geographic and Samsung. In addition, Carbonfund.org has funded over 175 carbon reduction and tree-planting projects across 40+ states and 20+ countries.

Carbonfund.org's wholly-owned subsidiary CarbonCo, LLC ("CarbonCo") is now responsible for the origination of Carbonfund.org's projects, particularly forest conservation projects (known as Reducing Emissions from Deforestation and forest Degradation or REDD+ projects) throughout Brazil and mainly in the State of Acre. CarbonCo's Purus Project was officially the

[4] Google Maps, "Barcelos Municipality, Amazonas, Brazil," Available: https://www.google.com/maps/place/Barcelos+-+State+of+Amazonas,+69700-000,+Brazil/@0.3039886,-63.6203435,7z/data=!4m5!3m4!1s0x920950d5bbbcd477:0x83d52f6d04bfca90!8m2!3d-0.2674076!4d-63.2032151

first-ever REDD+ project in the State of Acre, Brazil to achieve dual-validation and verification to the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity Standard (CCBS) with Gold Distinction. CarbonCo also provides consulting services for select clients.

Technical and Commercialization Consultants
Brian McFarland is Carbonfund.org's Project Portfolio Director where he identifies, conducts due diligence, and structures the financial support for a multi-million portfolio consisting of projects in the energy efficiency, renewable energy, and forestry sectors. Brian is also the Director of Project Origination for CarbonCo, where he is responsible for identifying and developing early stage REDD+ projects. Brian also leads CarbonCo's consulting engagements.

Brian earned a dual graduate degree in Business Administration and Global Environmental Policy from American University. His thesis was entitled, The Origins, Development and Potential of the International REDD+ Market. Brian has published 22 articles, co-authored a book chapter, and wrote two books including *Conservation of Tropical Rainforests: A Review of Financial and Strategic Solutions*, which included a case study on Project Piaba.

Brian is a certified Project Management Professional (PMP) from the Project Management Institute and a Certified Sustainability Professional by the International Society of Sustainability Professionals.

Brian conducted background research, participated in the site visit, and wrote this deliverable.

Jarett Emert is the Global Carbon Project Manager in charge of project finance, investments, and commercialization at Carbonfund.org and CarbonCo, LLC.

Jarett is an industry veteran with vast expertise in REDD+ and the Environmental Markets. Previous to his current position, Jarett served as the Global Portfolio Manager for Carbon Projects at Cantor Fitzgerald where he personally managed and commercialized a diverse portfolio of emission reduction projects in six countries for the international carbon compliance markets.

Jarett has a Master of Studies in Environmental Law and Policy from Vermont Law School and a Master of Arts in Education from the University of Vermont. Jarett has also written on environmental policy and sustainability topics for both national and regional magazines.

Jarett conducted a desk review and edited this deliverable.

PHASE I: HIGH-LEVEL CLIMATE CHANGE MESSAGING

The first step would be to promote high-level climate change benefits in marketing schemes and as a basis to procure further support for Project Piaba's initiative, without undertaking a certified REDD+ project. More specifically, Project Piaba can promote the fishery in association its carbon sequestration and climatic benefits based on the inference that the fishing activity

provides an alternative to, for example, timber harvesting, and promote the relationship between healthy floodplain forests and healthy fisheries.

If Project Piaba opts to highlight climate change benefits, without undertaking a certified REDD+ project, there are several high-level messaging points that can be communicated with the larger audience and CarbonCo advises Project Piaba to be mindful when emphasizing topics such as the quantity of carbon dioxide.

High-Level Messaging of Carbon Sequestration
The forests in the municipality of Barcelos have sequestered approximately 4.82 billion tonnes of carbon dioxide equivalent emissions (4,821,018,395 $mtCO_2e$ = 9,938,195 hectares of forest in 2014 x 485.1 $mtCO_2e$ per hectare).[5] Similarly, the forests in the municipality of Santa Isabel do Rio Negro have sequestered approximately 2.87 billion tonnes of carbon dioxide equivalent emissions (2,868,306,557 $mtCO_2e$ = 5,912,815 hectares of forest in 2014 x 485.1 $mtCO_2e$ per hectare).[6]

Collectively, this 7,689,324,951 metric tonnes of CO_2e sequestered in the forests of Barcelos and Santa Isabel do Rio Negro are equivalent to:

- GHG emissions from 1.6 billion (1,646,536,392) passenger vehicles driven for one year;
- GHG emissions from 18 trillion (18,846,384,683,824) miles driven by an average passenger vehicle;
- CO_2 emissions from 865 billion (865,232,918,983) gallons of gasoline consumed
- CO_2 emissions from 8.4 trillion (8,412,828,173,961) pounds of coal burned;
- CO_2 emissions from 830 million (830,291,000) homes' energy use for one year
- CO_2 emissions from 1.2 billion (1,152,476,761) homes' electricity use for one year;
- CO_2 emissions from 17.8 billion (17,802,412,800) barrels of oil consumed;
- CO_2 emissions from 314 billion (314,337,374,892) propane cylinders used for home barbeques; or
- Carbon sequestered by 199 billion (199,277,654,111) tree seedlings grown for 10 years.[7]

According to the American Pet Products Association, an estimated 15 million US households had an aquarium in 2016 which was divided amongst 12.5 freshwater aquariums and 2.5 million saltwater aquariums.[8] According to ALGONE's calculations:

> Based on a freshwater fish only aquarium at about 72° F, the total consumption for a small tank (10 Gallons) is about 150 kWh a year. A medium tank (30 Gallons) will run between 150 – 200

[5] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 14.
[6] Ibid.
[7] US Environmental Protection Agency, "Greenhouse Gas Equivalencies Calculator," Available: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
[8] American Pet Productions Association, "APPA National Pet Owners The 2017-2018 APPA National Pet Owners Survey," Available: http://americanpetproducts.org/Uploads/MemServices/GPE2017_NPOS_Seminar.pdf, page 9.

kWh per year, while a large aquarium (55 Gallons) needs 200 – 400 kWh per year. These values are calculated while considering the basic equipment required and serve as an average only.[9]

If an average of 275 kilowatt hours (kWh)[10] is consumed per aquarium per year amongst 15 million households, this would equate to 4,125,000,000 kWh or 4,125,000 megawatt hours (MWh).[11]

The latest calculations by the US Environmental Protection Agency (EPA) for the average carbon dioxide equivalent emissions (CO_2e) for the US electric grid is 1,130.2 pounds of CO_2e emissions per MWh.[12]

Thus: 4,125,000 MWh x 1,130.2 pounds of CO_2e = 4,662,075,000 pounds of CO_2e emissions per year or 2,114,703 metric tonnes of CO_2e emissions per year.

This 2,114,703 metric tonnes of CO_2e emissions per year is equivalent to:

- GHG emissions from 452,827 Passenger vehicles driven for one year;
- GHG emissions from 5.2 billion (5,183,095,588) miles driven by an average passenger vehicle;
- CO_2 emissions from 238 million (237,954,653) gallons of gasoline consumed
- CO_2 emissions from 2.3 billion (2,313,679,431) pounds of coal burned;
- CO_2 emissions from 228,345 homes' energy use for one year
- CO_2 emissions from 316,952 homes' electricity use for one year;
- CO_2 emissions from 4.9 million (4,895,984) barrels of oil consumed;
- CO_2 emissions from 86 million (86,448,446) propane cylinders used for home barbeques; or
- Carbon sequestered by 55 million (54,804,948) tree seedlings grown for 10 years.[13]

Comparisons of Other Industries' Climate Change Messaging

Companies around their world are taking action to mitigate global climate change. Such actions range from companies reducing their internal energy usage, to companies requiring suppliers to reduce their carbon footprints, to companies offsetting their GHG emissions. A few of the many examples of companies marketing their carbon offset initiatives include:

- 1. FIFA and Offsetting World Cup in Brazil: https://www.treehugger.com/corporate-responsibility/fifa-world-cup-to-go-carbon-neutral.html
- 2. Microsoft and Its Internal Carbon Price: https://www.greenbiz.com/article/how-microsofts-internal-price-carbon-saved-it-10-million-year
- 3. Carbon Neutral Baseball: https://www.nbcnewyork.com/news/green/Marlins-Rays_Game_First_in_Southeast_to_Go_Green_All__National_.html
- Dell's Carbon Neutrality: https://www.wsj.com/articles/SB123059880241541259

[9] ALGONE, "Aquarium power consumption. Energy cost of a fish tank," Available: https://www.algone.com/the-aquarium-and-energy-consumption

[10] Average of 150 kWh on the low end and 400 kWh on the high end.

[11] There are 1,000 kWh in 1 MWh.

[12] US Environmental Protection Agency, "eGRID2014 v2, Summary Tables," Available: https://www.epa.gov/sites/production/files/2017-02/documents/egrid2014_summarytables_v2.pdf

[13] US Environmental Protection Agency, "Greenhouse Gas Equivalencies Calculator," Available: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

- UPS and Carbon Neutral Shipping: https://www.carbonneutral.com/page/ups/

A few more examples of companies messaging around climate change, rainforest conservation, and non-timber forest products (NTFPs) are:

- Coffee
  - Starbucks:
    - https://www.starbucks.com/responsibility/environment/climate-change
    - https://www.starbucks.com/responsibility/environment/climate-change/greenhouse-gas-emissions
  - Dunkin' Donuts: http://www.dunkinbrands.com/responsibility/our-planet
  - Also see: http://www.tradeforum.org/Climate-Change-and-the-Coffee-Industry/
- Pet Industry:
  - Petco:
    - https://www.cdp.net/en/responses?utf8=%E2%9C%93&queries%5Bname%5D=petco
    - https://about.petco.com/2017-03-13-Petco-Recognized-as-a-Worlds-Most-Ethical-Company-for-6th-Consecutive-Year
  - PetSmart
    - https://www.cdp.net/en/responses/40372?back_to=https%3A%2F%2Fwww.cdp.net%2Fen%2Fresponses%3Futf8%3D%25E2%259C%2593%26queries%255Bname%255D%3Dpetsmart&queries%5Bname%5D=petsmart
- Rainforest Crunch has been retired as an official ice cream flavor of Ben & Jerry's.[14]

Historically, Carbonfund.org's largest partners tended to be concentered in the consumer electronics industry (e.g., Dell, LG, Motorola, Samsung, etc.) and in the transportation sector, including airlines (e.g., Amtrak, JetBlue, Virgin America, Volkswagen, etc.). Carbonfund.org has also offset numerous events including the 2014 FIFA World Cup in Brazil (see above) and the Consumer Electronics Show (CES) in Las Vegas.[15]

In addition to high-level messaging on climate change, Project Piaba could also explore alternative, non-carbon related financing such as biodiversity offsets or pursue an adopt-an-acre approach that would be comparable to the New England Aquarium's live blue initiative.[16]

Overall Suggestions on High-Level Climate Change Messaging
If Project Piaba prefers to initiate the first phase and highlight climate change benefits associated with the fishery without undertaking a certified REDD+ project, CarbonCo advises Project Piaba to be careful of overstating and any false claims when emphasizing topics such as the quantity of carbon dioxide stored in the forests. CarbonCo would be more than happy to further refine the messaging and review any language proposed by Project Piaba.

[14] Ben & Jerry's, "Rainforest Crunch," Available: https://www.benjerry.com/flavors/flavor-graveyard/rainforest-crunch
[15] Carbonfund.org, "Carbonfund.org and CEA Partner to Offset World's Largest Consumer Technology Tradeshow," Available: https://carbonfund.org/2011/09/20/carbonfundorg-and-cea-partner-to-offset-worlds-largest-consumer-technology-tradeshow/
[16] New England Aquarium, "Live Blue Initiative," Available: http://liveblueinitiative.org/

PHASE II: ALIGNING WORK WITH STATE OF AMAZONAS

The second phase for Project Piaba, beyond high-level climate change messaging, would be to progress over time and with additional resources to align its work with the local municipalities of Barcelos and Santa Isabel do Rio Negro to pursue an integrated REDD+ carbon program. REDD stands for Reducing Emissions from Deforestation and forest Degradation. The "+" includes REDD along with forest conservation, sustainable forest management, and the enhancement of carbon stocks (e.g., afforestation or reforestation activities). To understand this potential opportunity, it is important to assess, in particular, land tenure, carbon rights, and the policies being developed at the State and Federal level.

One way to frame this opportunity is that the "total emission reduction from gross deforestation in the Amazon biome, from 2011 to 2015, was equal to the sum of the emission reduction results achieved for each in the period, i.e., 3,154,501,728 tCO2."[17] The forest reference emission level (FREL) for reducing emission from deforestation in the Brazilian Amazon basin that "will be used for results-based payments for the period 2016-2020 is 750,234,379.99 tCO2e. This value is conservative."[18] This said, the Brazilian Federal Government has asserted 3.15 billion emission reductions from 2011-2015 and another 750 million emission reductions are estimated for the time period of 2016-2020. The Brazilian Federal Government has been compensated for some of these reductions,[19] and as time unfolds, the Brazilian Federal Government will need to determine how these emission reductions will be distributed between the federal government, the state governments, and other groups with land rights (e.g., private landowners, communities, and Indigenous Peoples).

According to analysis done by IDESAM and its collaborators, "the potential for generating resources from UREDD+ allocations to the State Government {of Amazonas} would be quite reasonable, and may range from US$224,319,682 (US$20,392,698 per year) to US$3,140,475,549.82 (USD$285,497,777 per year)."[20] Of the six different scenarios considered, IDESAM considers "the most appropriate scenario would be SCENARIO 3, with a 15% allocation of UREDD for the State. In this scenario, considering the most conservative price for a UREDD ($3.00), it would be possible to estimate an increase of more than 290% in the State budget for the environmental agency (on average, an additional $61,178,095 per year).[21]

The report by Carbon Decisions International, IDESAM, and Forest Trends recommends a stock-flow-risk weighting of: 30% stocks, 30% deforestation reduction, and 40% projected

[17] Federative Republic of Brazil. "Second Biennial Update Report of Brazil." Available: http://redd.mma.gov.br/images/publicacoes/secondbur_brazil.pdf, 49.
[18] Federative Republic of Brazil. "Second Biennial Update Report of Brazil." Available: http://redd.mma.gov.br/images/publicacoes/secondbur_brazil.pdf, 55.
[19] Such as Norway's support for the Amazon Fund and from Germany's REDD Early Movers
[20] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 35.
[21] Ibid, 38.

deforestation.[22] Thus, on a high-level, here are the calculations for roughly how much the municipality of Barcelos could benefit:

- As a rough proxy of carbon stocks: Take the total forest area of Barcelos (as of 2014) which was 9,938,195 hectares,[23] and divide by 140,184,087 hectares of total forest area in Amazonas (as of 2014) and this equals 7.09%. Thus, 7.09% of the State of Amazonas' forest cover (which is a rough proxy of carbon stocks) is in the municipality of Barcelos.
- As a rough calculation of historical deforestation reduction and assuming the same weight of projected deforestation: Take the total deforestation in Barcelos from 2006 – 2016 (without data for the year 2015) which was 1,410 hectares[24] and divide by 503,400 hectares which was the total deforestation in Amazonas from 2007-2015.[25] This equals 0.28%. Thus, 0.28% is the historical percentage of Amazonas' deforestation attributed to Barcelos municipality.
- Finally: (30% stocks x 7.09%) x (30% deforestation reduction x 0.28%) x (40% projected deforestation x 0.28%) = 4.09%. Thus, 4.09% is the approximate share of total emission reductions claimed by the State of Amazonas that could be received by the municipality of Barcelos.
- Using the additional $61,178,095 per year figure (i.e., IDESAM's most appropriate scenario), 4.09% could result in approximately $2,502,184 per year in additional revenue for the municipality of Barcelos.

For municipal governments, such as Barcelos and/or Santa Isabel do Rio Negro, the requirements to access this future UREDD, would be:

> i. Project Proponents: Mayors; municipality Secretaries of Environment; other organizations registered through UGMUC {Management Unit on Climate Change and Protected Areas};
>
> ii. Pre-requisites: Must have a municipal secretary of the environment; must have an advising body for the environmental council; must have a municipal plan for prevention and control of deforestation;
>
> iii. Documentation and Presentation of the Project (DAP): Should present a model of DAP through Registration System for municipality governors; should have a Plan of Activities beyond the U-REDD Strategy and available sources. Also, municipal projects should be complete with safeguards defined for Amazonas;
>
> ix. Create monitoring plans annually.[26]

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[22] Ibid, 46.
[23] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction
[24] Ibid.
[25] GCF Impact, "Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states
[26] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 44.

Land Tenure

An important component of the validation assessment for a standalone REDD+ project, along with aligning Project Piaba's work with the State of Amazonas' work, is to ensure the Project has proper project and/or program ownership (formerly known as "proof of title" and "right of use") and that proper agreements are in place between all of the Project Proponents. CarbonCo advises Project Piaba to consult a legal professional; especially, if Project Piaba decides to move forward with the financing and development of a forest carbon project and/or to integrate its work with the State of Amazonas.

The VCS Standard, Version 3.7, defines project and program ownership as:

> The project description shall be accompanied by one or more of the following types of evidence establishing project ownership accorded to the project proponent(s), or program ownership accorded to the jurisdictional proponent(s), as the case may be (see VCS document Program Definitions for definitions of project ownership and program ownership). To aid the readability of this section, the term project ownership is used below, but should be substituted by the term program ownership, as appropriate:
> 1) Project ownership arising or granted under statute, regulation or decree by a competent authority.
>
> 2) Project ownership arising under law.
>
> 3) Project ownership arising by virtue of a statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals (where the project proponent has not been divested of such project ownership).
>
> 4) Project ownership arising by virtue of a statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions and/or removals (where the project proponent has not been divested of such project ownership).
>
> 5) An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals which vests project ownership in the project proponent.
>
> 6) An enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the land, vegetation or conservational or management process that generates GHG emission reductions or removals which vests project ownership in the project proponent.
>
> 7) Project ownership arising from the implementation[27]or enforcement of laws, statutes or regulatory frameworks that require activities be undertaken or incentivize activities that generate GHG emission reductions or removals.[28]

[27] Further clarification from VCS: "Implemented in the context of this paragraph means enacted or introduced, consistent with use of the term under the CDM rules on so-called Type E+ and Type E- policies."
[28] VCS, "VCS Standard: VCS Version 3," Available: http://database.v-c-s.org/sites/vcs.benfredaconsulting.com/files/VCS_Standard_v3.7.pdf, 18.

Presumably, there is some municipal law that delineates municipal owned land and this would be sufficient to meet the VCS requirements (specifically #1 or #2 above) and would likely be sufficient to register with the State of Amazonas.

Agreements Between Project Proponents
If Project Piaba decides to move forward with a standalone REDD+ project or align its work with the State of Amazonas, CarbonCo would advise Project Piaba to clarify the following questions prior to developing the content for an agreement between the Project Proponents:

- Can the mayor commit municipal lands to a forest carbon / conservation project with a minimum 30-year project lifetime?
- Is the mayor the sole authority who could sign off on such an agreement? If not, who else would need to co-sign such an agreement?
- Are there any special requirements to make an agreement with a municipality legally binding? For instance, would a solicitation need to be announced?
- Who is responsible for unintentional reversals? For example, what happens if a forest fire or pest infestation reduces the overall number of offsets to be issued to the Project? Will this reduced quantity be equally split? Will the reduced quantity only come from Project Piaba's share of the offsets?
- What are the ramifications of an intentional reversal? For example, what happens if say in ten years the mayor at the time decides to approve a commercial agricultural zone which leads to extensive deforestation and reduces the overall number of offsets?

Ultimately, if Project Piaba decides to move forward, an agreement will need to be established between the Project Proponents. The jurisdictions of these agreements between the Project Proponents would presumably be Massachusetts and Amazonas, Brazil. CarbonCo would advise Project Piaba to contact the Consulate General of Brazil in Boston to determine what is required to make such agreements legally-binding in both Brazil and Massachusetts:

Consulate General of Brazil in Boston
Address: 175 Purchase St, Boston, MA 02110
Phone: (617) 542-4004
Website: http://boston.itamaraty.gov.br/en-us/

The reason CarbonCo advises this action is because for its agreements between the Acre REDD+ Project Proponents to be legally-binding in both Brazil and the United States of America, CarbonCo undertook the following steps:

- Counterparties in Brazil signed a Tri-Party Agreement and had their signatures notarized;
- The Chief Executive Officer of CarbonCo signed the Tri-Party Agreement, with original signatures of our counterparties, and the CEO's signature was also notarized;
- The fully-signed Agreement was brought to the Office of the Clerk of the Circuit Court for Montgomery County (note: CarbonCo was based in Bethesda, Maryland of Montgomery County) to certify that notarizer of CarbonCo's CEO "is a commissioned/appointed and qualified notary public."

- The Agreement was next sent to the Office of the Secretary of State for Maryland to provide a statement declaring the Clerk of the Circuit Court is "the duly elected and qualified Clerk of the Circuit Court for Montgomery County whose official acts as such should be given full faith and credit in all Courts of Justice and elsewhere."
- The Agreement was then brought to the General Consulate of Brazil in Washington for the legalization and authentication of the Agreement to be used in both Brazil and the United States.

Project Piaba, assuming it chooses to open an IHS Markit Environmental Registry account, will need to enter into an agreement between Project Piaba and IHS Markit. Even if Project Piaba decides to forego developing a standalone REDD+ project, it is likely the State of Amazonas will utilize IHS Markit for its state-wide program. This said, the State of Acre is currently using the IHS Markit Environmental Registry for its state-wide program (see here: https://mer.markit.com/br-reg/public/project.jsp?project_id=103000000005599).

In addition to this Agreement between Project Piaba and IHS Markit, there is also an IHS Markit Communications Agreement and a VCS Issuance Representation that will need to be completed. These Agreements are standard and essentially give a firm the right to request issuance of VERs for a given project.

Carbon Rights

An important component of a standalone REDD+ project, along with aligning the Project with the State of Amazonas' work, is to ensure the Project has clear rights to the carbon assets. As described below, the Brazilian Federal Government and the State of Amazonas have several different policies, but most notable is the State of Amazonas' State Law 4.266 12/2015 which establishes the State Policy on Environmental Services and appears to allow for municipalities to claim carbon rights on municipal lands.

Policy Assessment

While standalone REDD+ projects must abide by all local, state and federal laws, it is particularly important for Project Piaba to thoroughly assess the State of Amazonas' policies if it seeks to align its work with the State.

The Governors' Climate and Forest Task Force highlights the following Laws, Policies and Strategies for Amazonas:

> **Policies and Strategies**
> *Plan for Deforestation Prevention and Control (PPCD)* - Amazonas has completed phase two of its PPCD, covering the period of 2012-2015. The strategies outlines in the PPCD focus on spatial planning, monitoring and enforcement, and property regularization through the Rural Environmental Registry (CAR).
>
> **Laws and Regulations**
> *Law No. 4406 of 12/28/2016*- Establishes the State Policy for Environmental Regularization, provides for the Rural Environmental Registry - CAR, the Rural Environmental Cadastre System - SISCAR-AM, the Environmental Regulation Program - PRA, in the State of Amazonas and makes other provisions.

State Law 4.266 12/2015 - Establishes the State Policy on Environmental Services (including REDD+) and creates the State Fund for Climate Change, Environmental Conservation and Environmental Services. The law which clarifies institutional arrangements and support for REDD+ management and implementation.

State Law 3.635 7/6/2011- Creates the legal basis for the Rural Environmental Registry (CAR), which regulates the environmental liabilities of rural properties in the State of Amazonas. The Rural Environmental Land Registry is a federally-mandated, satellite-based land registry system for rural properties which is required for environmental licensing, monitoring and enforcement.

Law 3527, 07/28/2010- Regulates forest concessions in designated sustainable use areas, with the aim of promoting multiple use of forest resources and environmental services provision - Being implemented.

Law 3244, 04/04/2008 - Creates the Unit Manager for the State Climate Change Center and the State Center for Protected Areas (UGMUC) - Fully functional.

Law 3.244 4/2008 - Created the State Center for Climate Change (Ceclima) - fully functional.

Delegated Law 66, 05/06/2007 - Defines regulations for the State Secretariat for Environment and Sustainable Development - Fully functional.

State Law of Climate Change 3135, 06/05/2007 - Institutes the State Policy for Climate Change, Environmental Conservation, and Sustainable Development - Fully functional.

CEMAAM Law 2985, 10/18/2005 - Institutes the Amazonas State Council for the Environment (CEMAAM) - Fully functional.[29]

The Governors' Climate and Forest Task Force also outlines the institutional framework in place for the State of Amazonas:

Secretary of Environment (SEMA) - Responsible for:
I - formulation, coordination and implementation of state policy on the environment, water resources, fishing resources, solid waste, wildlife protection, forestry, combating illegal logging and fires. II - coordination of state environmental protection and conservation policies for the management of protected areas. III - formulation, coordination and implementation of state policies for territorial and environmental planning.

Institute for Agriculture and Sustainable Forest Development (IDAM) – Technical assistance and rural training activities related to forest management and agriculture in municipalities.

Sustainable Development Agency (ADS) – Helps with commercialization of products from sustainable income-generating activities.

[29] Governors' Climate and Forest Task Force, "Amazonas, Brazil: Laws, Policies, and Strategies," Available: http://www.gcftaskforce-database.org/Frameworks/brazil.amazonas

State Secretariat for Forests and Extractivism SEAFE – Creates policies that promote the sustainable use of forest resources.

State Secretariat for Rural Production (SEPRO) - Technical assistance and product commercialization.

Amazon State Institute for Environmental Protection (IPAAM) – carries out daily analysis of satellite imagery focused on detection of fires and/or deforestation, and enforcement activities to control illegal on the ground illegal logging.

The Amazon Forum on Climate Change, Biodiversity, Environmental Services and Energy (FAMC) - coordinates input on climate change, energy, biodiversity, forests and environmental services

State Center for Protected Areas (CEUC) - Manages development, creation, and implementation of state protected areas.

State Center for Climate Change - (CECLIMA) - responsible for implementing policies and programs related to climate change in the State of Amazonas, in Brazil. It focuses mainly, in three areas: forest, energy and education for climate change.

Secretariat of the Environment and Sustainable Development (SDS) - responsible for coordinating the Amazonas Forum on Climate Change, Biodiversity, Environmental Services and Energy

Instituto de Terras do Amazonas (ITEAM) - Formalization of land rights Zoning and Spatial Planning

Ecological and Economic Zoning (*Zoneamento Ecológico-Econômico – ZEE)* is required by the Federal Government to designate areas for economic and conservation activities within each state's territory. Amazonas completed a statewide master ZEE in 2009 and has since begun developing region specific ZEEs for Madeira and Purus. The macro plan was normalized through state law nº 3.417 (2009), while the Purus plan was normalized through state law 3.645 (2011) and both have been approved federally. The Madeira plan is still in process. State decree nº 24.048 instituted a state commission on ZEE. In 2016 Amazonas received funding from KfW to implement the Madeira zoning plan.[30]

The most relevant laws to further assess is State Law 4.266 12/2015 which establishes the State Policy on Environmental Services (including REDD+). Per conversations with IDESAM, while the State of Amazonas as passed this state law, there is currently no specific program or infrastructure established to carry out the law. In addition, due to a new gubernatorial administration in the State of Amazonas, there is no expectation of the program being operational until late 2018, at the earliest.

[30] Governors' Climate and Forest Task Force, "Amazonas, Brazil: Laws, Policies, and Strategies," Available: http://www.gcftaskforce-database.org/Frameworks/brazil.amazonas

The most relevant institution in Amazonas to further contact is the Secretário Executivo Adjunto da Secretaria de Estado do Meio Ambiente (SEMA). Furthermore, the National REDD+ Commission will play an important role. See Appendix C for relevant contact information.

Overall Suggestions on Aligning Work with State of Amazonas

The State of Amazonas is one of the leading jurisdictions in the world working on subnational REDD+ issues. While there is no specific program in place, the State of Amazonas has passed State Law 4.266 12/2015. Furthermore, the State of Amazonas is a member of the Governors' Climate and Forest (GCF) Task Force and there are a few voluntary REDD+ projects underway in the State. More specific to Project Piaba, the State's unique stock-flow-risk approach (if formally adopted) will reward remote locations for their conservation and stewardship of natural resources which could directly benefit Project Piaba's work, along with the local communities and host municipalities. In this second phase, Project Piaba should consider:

- 1.) Obtaining an informal letter followed by a formal, officially signed agreement with the mayor of Barcelos to collaborate on aligning the municipality's work with the State of Amazonas.
- 2.) Making sure Barcelos has a municipal secretary of the environment, has an advising body for the environmental council, and has a municipal plan for prevention and control of deforestation.
- 3.) Helping the municipality document and present the project, while incorporating a central role for the aquarium fisheries, and elaborating on the social and environmental safeguards (SES) to be utilized; and
- 4.) Offering to assist the municipality with creating annual monitoring plans.[31]

If the State of Amazonas formalizes its REDD+ program and the aforementioned conditions are met by Project Piaba and the municipalities, then substantial, additional funding may become available.

PHASE III: STANDALONE REDD+ PROJECT ASSESSMENT

The third and most difficult, costly, and time-consuming phase would be to develop a standalone REDD+ forest carbon project, with the option of aligning the standalone REDD+ project with the State's work at a later date. The reason project developers initiate their own standalone REDD+ projects with a goal of aligning with the jurisdiction's work at a later date, is because it can take a long time for the host jurisdiction to finalize its program design.

There are also a few ways to categorize REDD+ projects. First, there are avoided unplanned deforestation projects and there are avoided planned deforestation projects. An avoided planned deforestation REDD+ project is essentially when the landowner has met all the requirements (e.g., legal permissibility, intent, and ability) to demonstrate they would have deforested their land if it was not for the REDD+ forest carbon offset project. In contrast, an avoided unplanned deforestation project is when someone other than the landowner – such as local communities or

[31] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 44.

illegal loggers – is responsible for the deforestation. If Project Piaba were to qualify as a REDD+ project, it would be more likely within the avoided unplanned deforestation category.

Another way to categorize REDD+ projects is mosaic versus frontier deforestation. These types of deforestation can be defined as: "frontier deforestation is forest destruction that occurs along a discernible frontier, such as a new road cut into a forest. Mosaic deforestation, in contrast, occurs in patches across a forested area. However, in many areas deforestation can exhibit both frontier and mosaic patterns of development."[32] REDD+ projects targeting frontier deforestation are often located in marginal forest, and these projects often seek to incorporate sustainable, commercial agriculture. This is because there is already infrastructure (i.e., roads, ports, etc.) presumably in place to help the project access nearby commodity markets. In contrast, REDD+ projects targeting mosaic deforestation tend to be projects in more pristine areas (i.e., often with high conservation values such as protecting Indigenous Peoples and conserving wildlife) and are often too remote for sustainable, commercial agriculture.[33] Project Piaba appears to have more mosaic deforestation as opposed to a pattern of frontier deforestation.

Project Development Process

While payments for performance have been made to a few select countries and subnational jurisdictions (e.g., Acre, Brazil), payments for REDD+ performance are often for voluntary forest carbon projects. These voluntary forest carbon projects must follow the same general steps from initial project idea through project implementation and ending with the issuance of verified emission reductions (VERs, also known as certified carbon offset credits). This process is similar whether the project is being designed and implemented against a compliance carbon standard such as the Clean Development Mechanism (CDM), or against a voluntary carbon standard such as the Verified Carbon Standard (VCS).

1. Due Diligence and Assessment of Project Potential

Similar to any other type of project, it is very important to undertake an initial assessment of the project potential and conduct sufficient due diligence. Some aspects that CarbonCo reviewed as part of the due diligence and rapid assessment for Project Piaba include:

- Review of stakeholders and evaluation of potential partners;
- Hold initial meetings with stakeholders and potential partners including, but not limited to local communities and community leaders; local, state, and/or federal government officials; and strategic partners such as:
    - Universities (e.g., professors, graduate students, and/or academic institutes);
    - Nonprofit organizations (e.g., land trusts and/or conservation organizations);
    - Subject matter experts (e.g., biologists, community specialists, forestry firms, and/or mapping firms);

[32] Verified Carbon Standard Association, "VCS Approves New REDD Methodology to Avoid Unplanned Deforestation," Available: http://www.v-c-s.org/vcs-approves-new-redd-methodology-avoid-unplanned-deforestation/

[33] Korchinsky, Mike. Interviewed by Brian McFarland. March 2017.

- Conduct financial calculations (essentially how much potential revenue and costs are involved). More complex calculations such as Net Present Value (NPV), Internal Rate of Return (IRR), Payback Periods, and Sensitivity Analyses can also be performed;
- Risk assessment, legal analysis, and potentially drafting of contracts;
- Analysis of landownership and carbon ownership; and
- Review of safety issues.

Two of the most important aspects of tropical forestry carbon projects involve the analysis of landownership titles to ensure no overlapping title claims exist and to ensure clear carbon ownership is, or can be, granted to the Project Proponents. It is important to note that State Law 4.266 12/2015 allows for private REDD+ projects, voluntary REDD+ projects are already underway in the State of Amazonas, and if Project Piaba aims to work on municipal land, there is likely a municipal decree delineating the boundaries.

2. Selection of Certification Standard and Methodology

All compliance forest carbon projects and more than 99% of voluntary forest carbon projects are designed and audited against third-party certification standards.

The leading forest carbon certification standard in the compliance market is the Climate Action Reserve (CAR), followed by the American Carbon Registry (ACR). The European Union Emissions Trading System (EU ETS), which is the world's largest carbon market, currently does not allow REDD+ projects, and its rules are very restrictive to afforestation and reforestation projects under the Clean Development Mechanism (CDM).

The leading forest carbon certification standard in the voluntary carbon market is the Verified Carbon Standard (VCS)[34] which is often coupled with the Climate, Community & Biodiversity Standard (CCBS) to demonstrate net positive community and biodiversity benefits. Additional voluntary carbon certification standards that accept forest carbon projects are the Gold Standard (due to its acquisition of the CarbonFix Standard), ACR, and Plan Vivo. There is a future possibility the projects designed to, and verified to, a voluntary carbon certification standard (i.e., the VCS) may be eligible for future compliance markets.

Here are the most frequently used carbon certification standards:

- ACR: http://americancarbonregistry.org/;
- CAR: http://www.climateactionreserve.org/;
- CCBS: http://www.climate-standards.org/;
- CDM: https://cdm.unfccc.int/about/index.html;
- Gold Standard: http://www.goldstandard.org/;
- Plan Vivo: http://www.planvivo.org/; and
- VCS: http://www.v-c-s.org/ and http://verra.org/.

A methodology, also known as a protocol, is essentially the blueprint for how various parameters of a project are calculated and/or determined. This includes guidance on how to design the forest

[34] As of February 15, 2018, the VCS is now known as Verra.

carbon inventory, how to determine the project's start date and longevity, and how to develop a project-level deforestation baseline. Each carbon certification standard – whether it is a compliance or voluntary standard – will have a wide variety of approved methodologies for use under the given standard. This includes methodologies for livestock methane projects, tropical forest conservation projects, and/or improved forestry management projects.

Here are links for some of the approved methodologies and protocols under the CDM and the VCS:

- CDM Methodologies: http://cdm.unfccc.int/methodologies/index.html
- VCS Methodologies: http://database.v-c-s.org/methodologies/find

The most suitable VCS methodologies for Project Piaba, based on the methodologies used by other projects in Amazonas and nearby Acre, is VM0007 or VM0015. This assumes, per communication with ICMBio and Project Piaba staff, that the proposed Project Area is not comprised of peat soils. According to the VCS, peat soils are defined as "organic soils with at least 65% organic matter and a minimum thickness of 50 centimeters."[35] Please see Appendix B for the applicability conditions of each of these two methodologies.

If Project Piaba, or its affiliates, do not possess all of the technical skills required to undertake a REDD+ project – particularly designing and implementing a forest carbon inventory or modeling deforestation - some of the technical forestry firms capable of working through these complex methodologies or protocols include:

- Carbon Decisions International: http://carbondecisions.com/;
- Climate Focus: http://www.climatefocus.com/;
- Finite Carbon: http://www.finitecarbon.com/;
- Ostrya Conservation: https://www.ostryaconservation.com/;
- Silvestrum: http://www.silvestrum.com/;
- TerraCarbon: http://terracarbon.com/;
- Terra Global Capital: http://www.terraglobalcapital.com/;
- Wildlife Works Carbon: http://www.wildlifeworks.com/; and
- Winrock International: https://www.winrock.org/.

CarbonCo believes, based off years of collaboration, that TerraCarbon or Ostrya Conservation are best suited to assist Project Piaba. It is also important to note that Carbon Decisions International has been working with the State of Amazonas on formulating their approach to jurisdictional accounting of deforestation. In contrast, Finite Carbon is more focused on US forestry projects, while Wildlife Works Carbon is more focused on REDD+ in Africa and Southeast Asia.

[35] VCS, "VM0015, Methodology for Avoided Unplanned Deforestation, v1.1," Available: http://database.v-c-s.org/methodologies/methodology-avoided-unplanned-deforestation-v11

3. Selection of Independent Auditors

The next step is to choose independent auditors, which are also known as validation / verification bodies (VVBs). The auditors are subject matter experts. For example, forest carbon projects are often audited by professional foresters, agriculturalists, or community development experts.

Auditors are often accredited to the American National Standards Institute (ANSI), which is the US representative of the International Organization for Standardization (ISO). This accreditation helps to ensure auditors have proper management systems in place including a conflict of interest policy and proper document version control.

Auditors then must be formally accepted by the carbon certification standard. This acceptance is based off an application process and possibly includes a more rigorous training specific to the given certification standard. In addition, many auditors are accepted across several carbon certification standards. Environmental Services Inc. (ESI), for instance, is an accepted auditor for ACR, CAR, CCBS, Plan Vivo, and VCS.

Approved VVBs for the VCS and CCB can be found here:

- VCS: http://database.v-c-s.org/verification-validation/find-vvb

Carbonfund.org and CarbonCo have worked on over 15 audits with auditors from ESI, IMAFLORA, Rainforest Alliance, and SCS Global Services. CarbonCo's preferred choice of auditor is ESI and CarbonCo would highly recommend ESI if Project Piaba's project is to undertake an audit. The only Brazil-based auditor, whose accreditation recently expired, is IMAFLORA and is not recommended.

4. Implementation of Project Activities

After a forest carbon project has passed due diligence, chosen a certification standard and a methodology or protocol, and lined up an independent auditor, it is then time to start implementing the on-the-ground activities.

For REDD+ forest conservation projects, the on-the-ground activities include:

- Designing and implementing a forest carbon inventory to determine a statistically significant quantification of the Project Area's biomass and carbon stock;
- Developing a computer model to forecast future deforestation and degradation and to establish a deforestation and degradation baseline;
- Starting to implement the specific activities which will help reduce and stop deforestation and degradation at the project site. This might include the landowner foregoing conversion of the forest to another land use, offering agricultural extension training courses, and developing alternative revenue and/or income activities for local communities.

Critical project activities for Project Piaba are:

- 1. Continue training fishermen on proper fish capture and best handling techniques;
- 2. Continue training throughout the supply chain on acclimating fish including water quality management and the need for better nutrition;

- 3. Installation of a holding facility/station in Barcelos;
- 4. Maintain stockpiling capabilities in Manaus (now being accomplished by Prestige);
- 5. Facilitate a discussion with the airlines to possibly offer direct cargo shipments from Manaus to Miami, as opposed to transiting through São Paulo; and
- 6. Expand marketing the benefits of wild caught aquarium fish (Scott Dowd has numerous ideas on this from Google Flyovers, to inflight videos on American Airline flights to Manaus about the Amazon Rainforest, to leveraging the Geographic Indication status for cardinal tetras).

5. Write Initial Project Documents

While the project activities are being implemented, it is a wise idea to start writing the initial set of project documents. These project documents, particularly for the VCS and CCBS, are comprehensive and require an elaboration on various aspects of the project including:

- Background information on the Project and Project Proponents;
- Incorporation of the technical measurements derived from the chosen methodology;
- Maps of the project location and project activities;
- Demonstration of Free, Prior and Informed Consent and engagement with stakeholders;
- Discussion of all relevant laws and regulations; and a
- Risk assessment of the project.

Many of the carbon certification standards offer templates for developing these project documents. See here for the joint VCS-CCB template:

- VCS (see subsection *Templates & Forms*): http://verra.org/project/vcs-program/rules-and-requirements/

6. Register / List Project; Undertake Validation Audit

The project, upon completion of the draft project documents and after a sufficient amount of project activities are implemented on the ground, will register or list with an approved registry. A registry for carbon projects is somewhat comparable to an online bank account in the sense that you have a username and password, and upon logging in, you can view your current holdings and then either receive a transfer or initiate a transfer of verified emission reductions (VERs, otherwise known as carbon offsets) from your account to another account holder.

Some of the carbon certification standards use one specific registry. For example, the American Carbon Registry (as a voluntary carbon certification standard) uses its own registry. In contrast, some of the carbon certification standards, such as the VCS, have approved a few different registry providers.

Here are the two VCS registry providers:

- APX: http://www.apx.com/
- IHS Markit's Environmental Registry: https://ihsmarkit.com/products/environmental-registry.html

Carbonfund.org Foundation, the parent company of CarbonCo, has both an APX and an HIS Markit account and is equally happy with both providers.

The validation audit is often conducted by the previously secured auditor. The validation audit involves the auditor reading through the initial project documents, checking all calculations, interviewing the Project Proponents and other relevant stakeholders, and visiting the project site.

Upon successful completion of the validation audit, the auditor will issue a validation report and validation statement. These documents essentially confirm that, in the auditor's professional opinion, the project has been designed and thus far implemented in accordance with the chosen carbon certification standard.

7. Conduct Periodic Monitoring, Reporting, and Verification with Issuance of Carbon Offsets

The project, after achieving validation, will continue to implement the on-the-ground project activities and periodically conduct monitoring, reporting, and verification (MRV).

Monitoring involves the monitoring or measurement of certain metrics associated with the project. For a REDD+ project, this mostly involves monitoring deforestation and degradation relative to the established baseline, along with monitoring the project's impact on local communities and biodiversity within the Project Zone (i.e., the project area and its buffer zone).

Reporting involves the preparation of another set of project documents. Whereas the initial set of project documents are more of a forward-looking management plan, this next set of project documents are prepared for a specific, historical time period – usually the previous calendar year.

Verification involves another audit, known as the verification audit. Depending on the rules of the carbon certification standard, this audit can be performed by the same auditor or a different auditor and involves a similar process of the auditor reading through the new project documents, checking all new calculations derived from the monitoring, (re)interviewing the Project Proponents and other relevant stakeholders, and (re)visiting the project site.

Upon successful completion of the verification audit, the auditor will issue a verification report and verification statement. These documents confirm that, in the auditor's professional opinion, the project has mitigated or sequestered a specific quantity of carbon dioxide equivalent emissions (CO_2e), in addition to delivering community and biodiversity benefits. The Project Proponents would then provide the project documents and auditor reports to the registry, and the registry will issue the specific quantity of offsets – each with a distinct serial number - into the Project Proponent's registry account.

8. Sales

Sales should not be left to the very end. Pre-sales (i.e., sales completed before project issues VERs) are rare, but ideal. A more common structure in the forest carbon market is for buyers to only purchase offsets after the Project Proponents have successfully completed the verification audit and are ready to transfer the issued VERs. As of March 2018, there are no compliance markets that accept REDD+ projects from tropical rainforest countries. In contrast, the largest buyers of voluntary REDD+ offsets include Disney and Microsoft. For instance, "the

government of Cambodia, through a partnership with the Wildlife Conservation Society (WCS), has sold several million voluntary carbon credits from a REDD+ project to entertainment giant Disney."[36] Please see Appendix D for potential buyers of Project Piaba's carbon offsets, if the Project is able to successfully complete the aforementioned steps.

Review of Technical Components

The following will review the technical components of Project Piaba's proposed standalone REDD+ project, including whether the Project meets the applicability conditions of two often-used methodologies in the Amazon, along with additionality, permanence, and leakage.

Applicability Conditions of VM0015

Assuming the Project Area does not include peat soils, Project Piaba appears to meet all of the applicability conditions for the VM0015 methodology. Thus:

- The Project would have unplanned deforestation baseline activities (i.e., although at a low rate of deforestation); and
- The Project Area is primary, old-growth forest (including floodplain forests). These forests have been forest for a minimum of ten years prior to the project start date.[37]

Please see Appendix B for the complete applicability conditions of VM0015.

Applicability Conditions of VM0007

Assuming the Project Area does not include peat soils, Project Piaba also appears to meet all of the applicability conditions for the VM0007 methodology. Thus:

- The Project has not been registered under another GHG program such as the Clean Development Mechanism or the American Carbon Registry;
- Activities designed to minimize leakage (see explanation of leakage below) would presumably not include flooded agricultural lands to increase production (e.g., paddy rice) or livestock production through establishing feed-lots and/or manure lagoons; and
- The Project's deforestation baseline agents would be resident community members who do not have documented legal right (i.e., official land title) to deforest the land.[38]

It is also important to note that wetlands restoration and conservation (WRC) is a new, expanded component of VM0007 and it would be possible to delineate wetlands / riparian areas as a different strata. For more details on the applicability conditions of VM0007, please see Appendix B. Although CarbonCo is more familiar with VM0007, CarbonCo would suggest that Project Piaba uses either VM0007 or VM0015.

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[36] Carbon Pulse. "Disney in multi-million REDD+ VER deal Cambodia." Last modified July 25, 2016. http://carbon-pulse.com/22732/?utm_source=CP+Daily&utm_campaign=be99ebd6b0-CPdaily22072016&utm_medium=email&utm_term=0_a9d8834f72-be99ebd6b0-36342993

[37] VCS, "VM0015, Methodology for Avoided Unplanned Deforestation, v1.1," Available: http://database.v-c-s.org/methodologies/methodology-avoided-unplanned-deforestation-v11

[38] VCS, "VM0007: REDD+ Methodology Framework (REDD-MF), v1.5," Available: http://database.v-c-s.org/methodologies/redd-methodology-framework-redd-mf-v15

Additionality

Additionality is essentially a requirement of carbon offset projects to demonstrate that the emission reductions associated with the project go beyond business-as-usual and that the emissions are in fact additional to what would have otherwise happened without carbon finance. This said, each certification standard has an additionality test and there are several types of additionality including legal additionality, financial additionality, and common practice additionality.[39]

The VCS's Additionality Tool (T-ADD) has four steps to assess additionality. Thus, "Project proponent(s) shall apply the following four steps:

> a) STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;
> b) STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or
> c) STEP 3. Barriers analysis; and
> d) STEP 4. Common practice analysis."[40]

Project Piaba will have a challenge meeting the additional requirements under T-ADD. If the essential Project activity is a joint REDD+ and improved fishery management project, then it would be relatively easy to demonstrate Steps 3 and 4. Thus, there are significant barriers (e.g., upfront financial barriers for a validated and verified REDD+ project) and the proposed Project activity is not common practice (e.g., there are fractures in the supply chain, and there are very few REDD+ projects underway in Amazonas).

However, Steps 1 and 2 are difficult to demonstrate. Thus, the most likely, alternative land uses or occupations include:

- Timber harvesting;
- Cattle ranching and agriculture in terra firma regions;
- Sport fishing guide, tourism, and eco-lodges (i.e., limited opportunities in this region);
- Moving to the city of Barcelos or Manaus; and/or
- Mineral and gold mining.

Hypothetically, aquarium fishermen could leave the industry and pursue slash-and-burn agriculture or raise cattle. However, due to the nature of the flooded forest and the remoteness of the Project Area, it does not appear plausible that slash-and-burn agriculture and cattle ranching are likely to dominate land uses.

Permanence

Under the VCS Standard, all forestry projects must assess the likelihood that an intentional or unintentional reversal in the carbon stocks will occur within the Project. This is known as the

[39] Brian McFarland, "Carbon Reduction Projects and the Concept of Additionality," Available: http://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1463&context=sdlp

[40] T-ADD, "VT0001: Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities," http://database.v-c-s.org/sites/vcs.benfredaconsulting.com/files/VT0001%20VCS%20AFOLU%20Additionality%20Tool%20v3.0_0.pdf, 2.

Project's permanence. Essentially, every forest carbon project under the VCS is assigned a risk-adjusted score that corresponds to a specific percentage of VERs that will be withheld and placed into a global insurance buffer to compensate for the reversal of carbon stocks.

To assess the Project's permanence under the VCS Standard, the Project Proponents are required to complete a Non-Permanence Risk Report. These "risk factors are classified into three categories: internal risks, external risks and natural risks, and further into sub-categories such as project management, financial viability and community engagement."[41]

Project Piaba appears to pass the non-permanence risk assessment. It is estimated the risk score for Project Piaba would be approximately 10% (minimum allowed) to 43%, with a likely risk of around 15-20%. This risk score depends on numerous factors such as:

- Project's cash flow breakeven point and how much funding has been / will be secured;
- Whether net-positive community impacts can be demonstrated (likely to be the case);
- Project longevity (i.e., minimum Project Lifetime is 30 years);
- The extent of overlapping ownership and/or resource access/use rights;
- Extent of in-migration and what percentage of communities have been consulted; and
- The likelihood and significance of natural risks (particularly forest fire for Amazonas).

Leakage

Leakage is defined as the offsite impacts (both positive and negative) that are attributable to the Project. The two main types of negative leakage are activity shifting leakage and market leakage. Because the proposed project is considered avoided unplanned deforestation, market leakage is not applicable. Activity shifting leakage could take the form of displacing local cattle ranching, manioc cultivation, or fuelwood collection from within the Project Area to outside of the Project Area. As a result of the minimal deforestation pressure and low population density, activity shifting leakage would be small.

Forest Carbon Inventory

One of the most expensive and time-consuming components of a standalone REDD+ project, is a forest carbon inventory. As a primary, pristine tropical rainforest, the Project Area for Project Piaba's work will likely have a relatively high carbon stock. An onsite, forest carbon inventory would be required and these carbon stock measurements would remain fixed until year 10 when the VCS methodologies (i.e., particularly VM0007 REDD Methodology Modules) require a new forest carbon inventory to be completed.

For comparative purposes, the following seven projects located in Amazonas and nearby Acre had a range of average carbon stocks per hectare of 346.1 $mtCO_2e$ to 677.9 $mtCO_2e$.

[41] VCS, "AFOLU Non-Permanence Risk Tool," http://database.v-c-s.org/sites/vcs.benfredaconsulting.com/files/AFOLU_Non-Permanence_Risk_Tool_v3.3.pdf, 4.

	Project Name	State in Brazil	Average Carbon Stocks (per hectare)	Notes
1	Purus Project	Acre	346.1 $mtCO_2e$	2 vegetative strata
2	Russas Project	Acre	419.9 $mtCO_2e$	Collective inventory with Valparaiso Project; 5 vegetative strata
3	Valparaiso Project	Acre	458.3 $mtCO_2e$	Collective inventory with Russas Project; 5 vegetative strata
4	Envira Amazonia Project	Acre	536.5 $mtCO_2e$	4 vegetative strata
5	Juma Sustainable Development Reserve Project	Amazonas	498.3 to 677.9 $mtCO_2e$	2-3 vegetative strata; carbon stock range based off literature review
6	Fortaleza Ituxi REDD Project	Amazonas	558 $mtCO_2e$	Carbon stock figure is not yet validated and was based off literature review
7	Amazon Rio REDD+ APD Project	Amazonas	248.4 ton/ha of biomass (approximately 455.8 $mtCO_2e$)	3 vegetative strata; aboveground biomass

According to the Governors' Climate and Forest Task Force, there are 118.0 tonnes of carbon per hectare in the municipality of Barcelos, which is equivalent to 432.67 $mtCO_2e$ per hectare.[42]

According to a report prepared by IDESAM, the Brazilian Federal Government stipulates an average 132.3 tonnes of carbon per hectare across the Amazon Biome, which is equivalent to 485.1 $mtCO_2e$ per hectare.[43]

Deforestation Actors, Agents, and Baseline Modeling

The biggest challenge facing Project Piaba with respect to considering a standalone REDD+ project is the very low rate of historical and predicted deforestation.

Deforestation Actors and Agents

According to the State Government of Amazonas' explanation to the Governors' Climate and Forest (GCF) Task Force regarding regional deforestation pressures:

> Expansion of ranching, agriculture and illegal land occupation has increased pressure on forests, particularly in southern Amazonas. In the southeastern counties of Apuí, Manicoré, and Novo Aripuanã, small family agriculture is increasingly being replaced by

[42] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction

[43] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 14.

> cattle ranching in large INCRA settlement projects. At the border with Acre and Rondônia, in the counties of Canutama, Lábrea and Boca do Acre, immigration from the neighboring states via the BR-364 and BR-317 highways is accompanied by the expansion of cattle ranching and logging. Forests in other counties, such as Manicoré, Humaitá, Canutama, and Lábrea, are under pressure from expanding industrial crop production, driven by increased access to financial resources and improved technology.[44]

In and around the municipality of Barcelos, and presumably the same is true with the municipality of Santa Isabel do Rio Negro, there was very little deforestation observed. The primary deforestation actors appear to be small-scale, subsistence farmers growing manioc. There was only one small cattle ranch observed and no signs of legal or illegal logging were observed during several forest hikes. A small amount of forest degradation was observed as a result of the 2015 drought and forest fires.

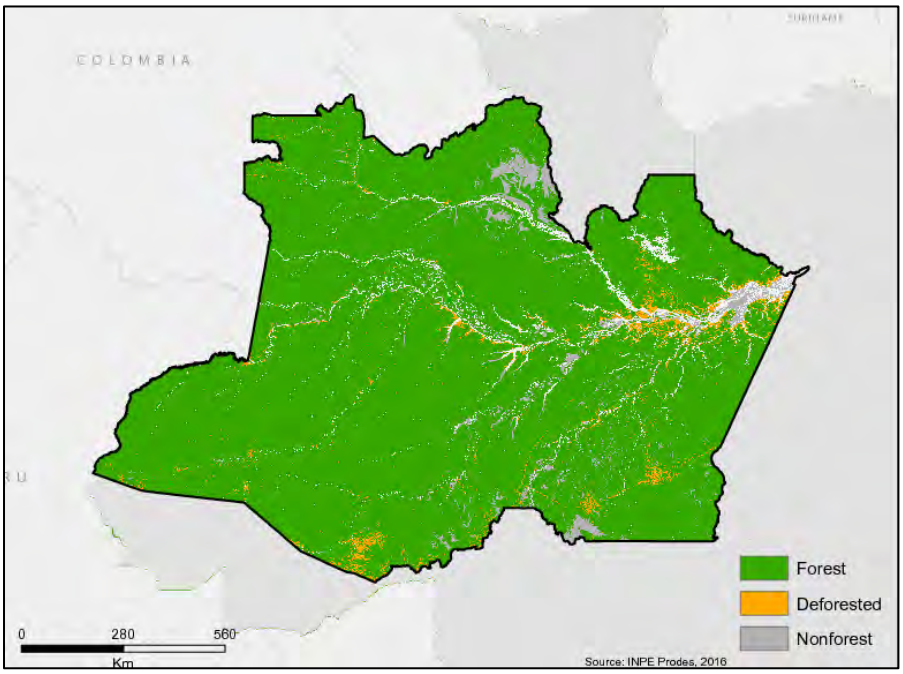
This situation may change in the future as a result of ongoing road construction. For example, BR431 (an offshoot of 174 that runs North out of Manaus) or BR210 appear to enter the municipality of Barcelos:

Map of Roads Near Barcelos (Credit: Google Earth Pro)

[44] GCF, "Amazonas, Brazil: Drivers of Deforestation," Available: http://www.gcftaskforce-database.org/StateOverview/brazil.amazonas

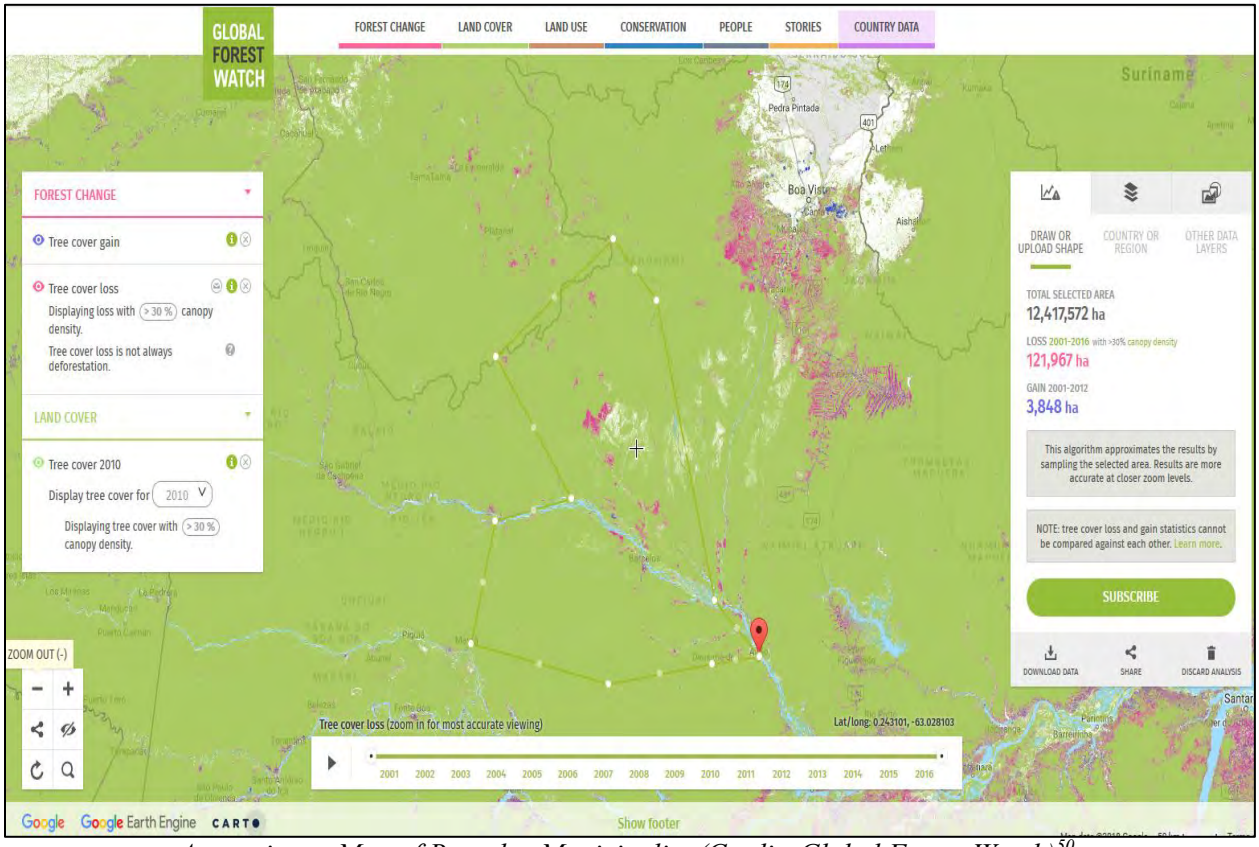
Further evidence of this low deforestation was compiled by the GCF Impact:

	Amazonas Yearly Deforestation (Hectares) [45]	Amazonas Yearly Deforestation Rate (%)[46]		Barcelos Yearly Deforestation (Hectares)[47]	Yearly CO2e Emissions in Barcelos[48]
2005	-	0.05			32,496
2006	-	0.05		70	26,653
2007	61,000	0.04		120	41,772
2008	60,400	0.04		150	57,415
2009	40,500	0.03		50	-
2010	59,500	0.04		350	126,354
2011	50,200	0.04		160	58,531
2012	52,300	0.04		130	55,115
2013	58,300	0.04		90	35,298
2014	50,000	0.04		190	74,876
2015	71,200	0.05		-	-
2016	-	-		100	-
Total	503,400	-		1,410	508,510
Average (For Years with Data)	55,933	0.042		141	56,501



Map of Forest, Non-Forest and Deforested Areas in Amazonas (Credit: GCF Task Force)[49]

[45] GCF Impact, "Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states
[46] GCF Impact, "Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states
[47] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction
[48] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction
[49] GCF Task Force, "Amazonas, Brazil," Available: http://www.gcftaskforce-database.org/StateOverview/brazil.amazonas



Approximate Map of Barcelos Municipality (Credit: Global Forest Watch)[50]

While the municipality of Barcelos has limited deforestation as of today, it is valuable to consider what has happened in the Loreto Region of Peru and particularly the area around the city of Iquitos. The area around Iquitos used to have a neon tetra (*Paracheirodon innesi*) fishery, which is an aquarium fish similar to cardinal tetras. However, the neon tetra fishery collapsed decades ago when the neon tetras became mass produced in ex-situ fish farms and this collapse in the fishery likely had an impact on the subsequent changes in regional land use.

	Loreto Yearly Deforestation (Hectares) [51]	Loreto Yearly Deforestation Rate (%)[52]		Iquitos Yearly Deforestation (Hectares)[53]
2006	12,637	0.04		38
2007	20,056	0.06		61
2008	25,516	0.07		97
2009	28,222	0.08		122
2010	25,197	0.07		86

[50] Global Forest Watch, "Interactive Map," Available: http://www.globalforestwatch.org/map/7/0.24/-63.03/ALL/grayscale/loss,forestgain,forest2010?tab=analysis-tab&geostore=08077d48d75ab05a4fcb6b898aacda04&begin=2001-01-01&end=2017-01-01&threshold=30&dont_analyze=true

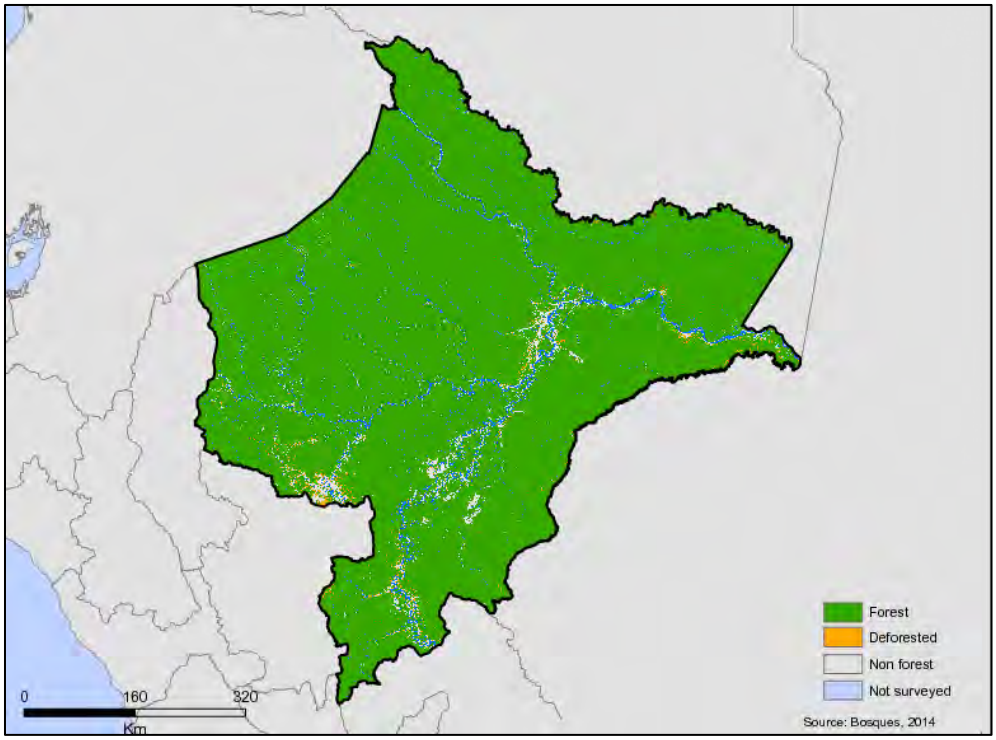
[51] GCF Impact, "Loreto (Peru)," Available: http://gcfimpact.org/states?region=17816,states

[52] GCF Impact, "Loreto (Peru)," Available: http://gcfimpact.org/states?region=17816,states

[53] GCF Impact, "Iquitos, Loreto (Peru)," Available: http://gcfimpact.org/states?region=17816,states#jurisdiction

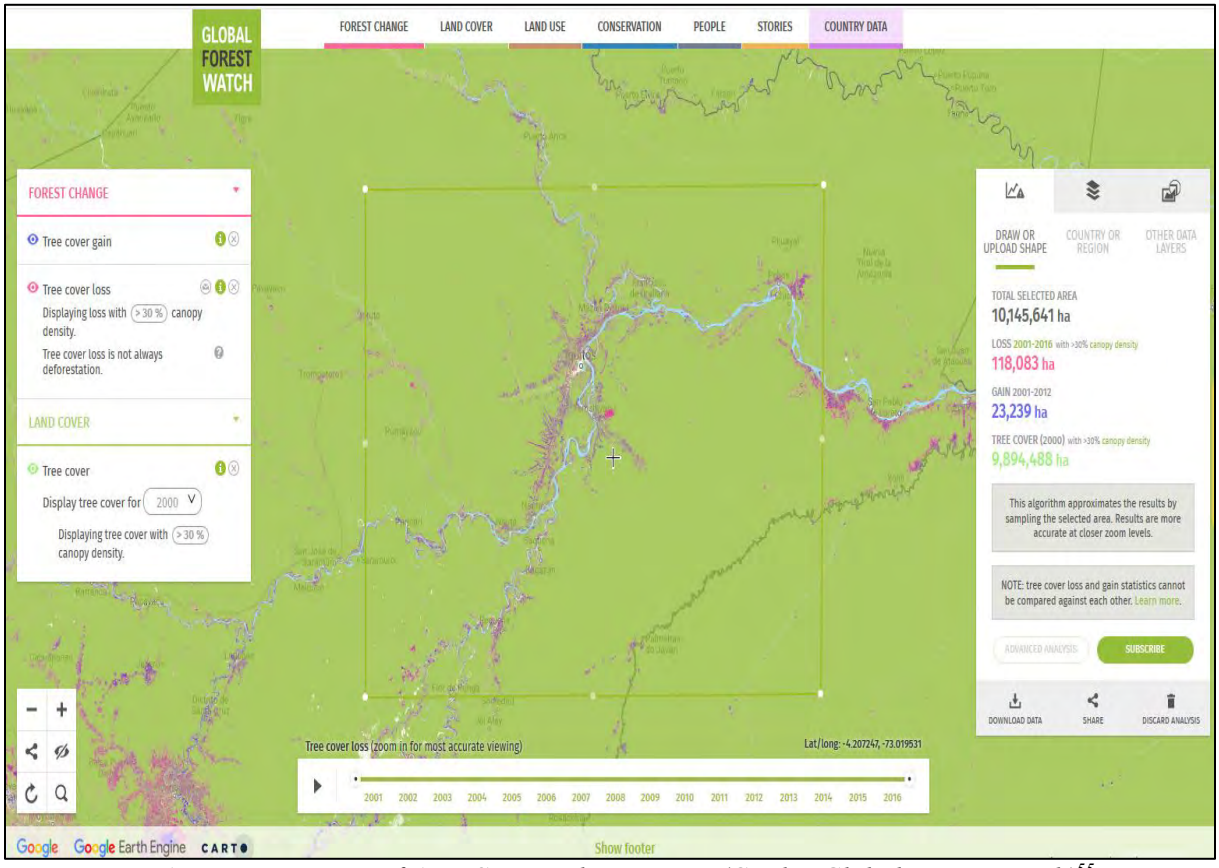
2011	21,287	0.06		96
2012	33,055	0.09		111
2013	28,821	0.08		53
2014	37,564	0.11		108
2015	31,668	0.09		71
2016	37,151	0.11		72
Total	301,174	-		915
Average (For Years with Data)	27,379	0.078		83

Please note, while annual deforestation (in hectares) is less in Loreto than in Amazonas, the deforestation rate in Loreto is nearly twice as high than Amazonas.



Map of Forest, Non-Forest and Deforested Areas in Loreto (Credit: GCF Task Force)[54]

[54] GCF Task Force, "Loreto, Peru," Available: http://www.gcftaskforce-database.org/StateOverview/peru.loreto



Approximate Map of Area Surrounding Iquitos (Credit: Global Forest Watch)[55]

<u>Deforestation Baseline Modeling</u>

Deforestation baseline modeling is a very important component of REDD+ projects in order to accurately predict the future rates and location of deforestation within a given project site. Furthermore, the deforestation baseline modeling provides an understanding of the underlying drivers and agents of deforestation and thus, allows for the Project to implement the necessary activities to mitigate such deforestation for the issuance of VERs.

High-resolution imagery is required for establishing the project-level deforestation baseline and for the ongoing monitoring of deforestation within a standalone REDD+ project. For this reason, using Brazil's PRODES (Programa Despoluição de Bacias Hidrográficas or Basin Restoration Program) would not be sufficient and it does not seem as though SIPAM (Sistema de Vigilância da Amazônia or Amazon Surveillance System) would qualify. CarbonCo's REDD+ projects in the State of Acre frequently use Landsat imagery that is processed by the State of Acre's Climate Change Institute.

[55] Global Forest Watch, "Interactive Map," Available: https://www.globalforestwatch.org/map/8/-4.21/-73.02/ALL/grayscale/loss,forestgain,forest2000?tab=analysis-tab&geostore=d642bbab26e07b5b89f8da58e701fa8b&begin=2001-01-01&end=2017-01-01&threshold=30&dont_analyze=true

Gold Level Distinction for Climate Change Adaptation

The Climate, Community, & Biodiversity Standard (CCBS) awards Gold Level Distinction to projects that demonstrate exceptional climate change adaptation benefits.

Project Piaba appears to have the ability to qualify for Gold Level Distinction for climate change adaptation. The four major aspects a project must address to earn Gold Level Distinction for climate change adaptation are:

- 1. Identify likely regional or sub-national climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land use scenario due to these climate change scenarios in the absence of the project.
- 2. Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions.
- 3. Describe measures needed and taken to assist communities and/or biodiversity to adapt to the probable impacts of climate change based on the causal model that explains how the project activities will achieve the project's predicted adaptation benefits.
- 4. Include indicators for adaptation benefits for communities and/or biodiversity in the monitoring plan. Demonstrate that the project activities assist communities and/or biodiversity to adapt to the probable impacts of climate change. Assessment of impacts of project activities on communities must include an evaluation of the impacts by the affected communities.[56]

In a summary of regional climate change projections for Brazil, the possible impacts include:

> High frequency of dry spells in eastern Amazonia and intense rainfall events in western Amazonia, losses in natural ecosystems, rain forest and biodiversity. Low river levels affecting transportation and commerce. Possible impacts on moisture transport and rainfall in Southeastern South America. Impacts on hydroelectric generation. More favorable conditions for spread of forest fires. Impacts on health and commerce due to smoke.[57]

Thus, if Project Piaba can incorporate climate change adaptation measures (e.g., such as studying how the fishery would be impacted by a changing climate) into the Project based off these regional projections, then Gold Level Distinction can be earned.

Community Activities

The primary implementation activities for a REDD+ project are the social projects and programs which will mitigate the root causes of deforestation and degradation, resulting in the verification and issuance of the underlying VERs.

The goal would be for the proposed REDD+ project to provide enough of a premium price and/or cost reduction for the local aquarium trade to dissuade the fishermen's adoption of

[56] Verified Carbon Standard, "Third Edition: Climate, Community & Biodiversity Standards," Available: http://www.v-c-s.org/wp-content/uploads/2017/12/CCB-Standards-v3.1_ENG.pdf, pages 31-32.
[57] Jose A. Marengo, "Regional Climate Change Scenarios for South America-The CREAS project," Available: https://unstats.un.org/unsd/climate_change/docs/papers/Session3_CCPapers_Marengo_1.pdf

alternative land-use practices such as cattle-ranching and agriculture. As previously mentioned, these specific activities would be to:

- 1. Continue training fishermen on proper fish capture and best handling techniques;
- 2. Continue trainings throughout the supply chain on acclimating fish including water quality management and the need for better nutrition;
- 3. Installation of a holding facility/station in Barcelos;
- 4. Maintain stockpiling capabilities in Manaus (now being accomplished by Prestige);
- 5. Facilitate a discussion with the airlines to possibly offer direct cargo shipments from Manaus to Miami, as opposed to transiting through São Paulo;
- 6. Expand marketing the benefits of wild caught aquarium fish (Scott Dowd has numerous ideas on this from Google Flyovers, to inflight videos on American Airline flights to Manaus about the Amazon Rainforest, to leveraging the Geographic Indication status for cardinal tetras).

It appears as though Manaus has a problem importing good quality fish food and this could be resolved via a joint research program between Dr. Tim Miller-Morgan at Oregon State University and Instituto Nacional de Pesquisas da Amazônia **(**INPA, National Institute of Amazonia Research) in Manaus.

Another issue to help resolve is that many communities are moving to Barcelos due to a lack of schools in the rural, fishing villages. Lastly, it was said that many fishermen are becoming involved in other activities due to lack of consistent and reliable market demand, likely due to poor supply chain structure, primarily at the export level. Nevertheless, the aquarium trade is certainly important for the local communities as evidenced by the annual Festival of Ornamental Fish and the Geographical Indication (GI) status of species legally exported from the municipalities of Barcelos and Santa Isabel for the aquarium trade (i.e., specifically the cultural significance requirement being fulfilled).

An important activity of REDD+ projects is the early detection of deforestation (i.e., such as illegal logging) and to alert the appropriate authorities if such deforestation is detected. However, there is a potential risk that such authorities will not have the capacity (i.e., available funds or staff) to intervene and this would result in less VERs being issued.

<u>Gold Level Distinction for Community Activities</u>
The Climate, Community & Biodiversity Standard (CCBS) also awards Gold Level Distinction to projects that demonstrate exceptional community benefits.

Project Piaba appears to have the ability to qualify for Gold Level Distinction for exceptional community benefits. The major aspects a project must address to earn Gold Level Distinction for exceptional community benefits are:

- 1a.) Demonstrate that smallholders/community members or communities either own or have management rights, statutory or customary, individually or collectively, to land in the project area. The smallholders/community members or communities have rights to claim that their activities will or did generate or cause the project's climate, community and biodiversity benefits. OR

- 1b.) Demonstrate that the project zone is in a low human development country OR in an administrative area of a medium or high human development country in which at least 50% of the households within the communities are below the national poverty line.
- 2. Demonstrate that the project generates short-term and long-term net positive well-being benefits for smallholders / community members. Include indicators of well-being impacts on smallholder / community members in the monitoring plan. The assessment of impacts must include changes in well-being due to project activities and an evaluation of the impacts by the affected smallholders/community members.
- 3. Identify, through a participatory process, risks for the smallholders/community members to participate in the project, including those related to trade-offs with food security, land loss, loss of yields and short-term and long-term climate change adaptation. Explain how the project is designed to avoid such trade-offs and the measures taken to manage the identified risks. Include indicators of risks for smallholders/community members in the monitoring plan.
- 4. Identify community groups that are marginalized and/or vulnerable. Demonstrate that the project generates net positive impacts on the well-being of all identified marginalized and/or vulnerable community groups. Demonstrate that any barriers or risks that might prevent benefits going to marginalized and/or vulnerable smallholder/community members have been identified and addressed. Demonstrate that measures are taken to identify any marginalized and/or vulnerable smallholders/community members, whose well-being may be negatively affected by the project, and that measures are taken to avoid, or when unavoidable to mitigate, any such impacts.
- 5. Demonstrate that the project generates net positive impacts on the well-being of women and that women participate in or influence decision making and include indicators of impacts on women in the monitoring plan.
- 6. Describe the design and implementation of a benefit sharing mechanism, demonstrating that smallholders/community members have fully and effectively participated in defining the decision-making process and the distribution mechanism for benefit sharing; and demonstrating transparency, including on project funding and costs as well as on benefit distribution.
- 7. Explain how relevant and adequate information about predicted and actual benefits, costs and risks has been communicated to smallholders/community members and provide evidence that the information is understood.
- 8. Describe the project's governance and implementation structures, and any relevant self-governance or other structures used for aggregation of smallholders/community members, and demonstrate that they enable full and effective participation of smallholders/community members in project decision-making and implementation.
- 9. Demonstrate how the project is developing the capacity of smallholders/community members, and relevant local organizations or institutions, to participate effectively and actively in project design, implementation and management.[58]

In summary, Project Piaba could likely be scaled up to identify and help marginalized communities, and particularly women, with both short-term and long-term benefits. For example, Project Piaba facilitated the establishment of, and continues to engage, the local fishing cooperative known as ORNAPESCA, and Project Piaba's work directly benefits local communities. Likewise, Project Piaba is a familiar and established entity and has a long history of working in the region, providing good circumstances for further regional partnerships.

[58] Verified Carbon Standard, "Third Edition: Climate, Community & Biodiversity Standards," Available: http://www.v-c-s.org/wp-content/uploads/2017/12/CCB-Standards-v3.1_ENG.pdf, pages 39-40.

Biodiversity Aspects
The forests throughout the Middle and Lower Rio Negro Basin are pristine lowland tropical rainforests that are seasonally flooded with low rates of deforestation and as a result, the forests appear to have an extremely high-level of biodiversity. Four different species of monkeys were observed, along with hundreds of scarlet macaws (*Ara macao*) and blue-and-yellow macaws (*Ara ararauna*), countless fish species, caimans, and two species of Amazon River Dolphins.

The five invasive species present in Amazonas according to the Global Invasive Species Database are:

- 1. Rock dove or rock pigeon (*Columba livia*);
- 2. Shiny cowbird (*Molothrus bonariensis*);
- 3. Guava (*Psidium guajava*);
- 4. Tropical soda apple (*Solanum viarum*); and
- 5. Little fire ant (*Wasmannia auropunctata*).[59]

None of these invasive species were observed throughout the municipality of Barcelos and nor were there any noticeable pest infestations.

Gold Level Distinction of Biodiversity
In addition to climate change adaption and exceptional community activities, the Climate, Community & Biodiversity Standard (CCBS) also awards Gold Level Distinction to projects that demonstrate exceptional biodiversity benefits.

Project Piaba appears to have a relatively easy ability to qualify for Gold Level Distinction for exceptional biodiversity benefits. The major aspects a project must address to earn Gold Level Distinction for exceptional biodiversity benefits are:

- 1. Demonstrate that the project zone includes a site of high biodiversity conservation priority by meeting either the vulnerability or irreplaceability criteria defined below, identifying the 'trigger' species that cause(s) the site to meet any of the following qualifying conditions and providing evidence that the qualifying conditions are met:
    - a) Vulnerability: Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site:
        - Critically Endangered (CR) and Endangered (EN) species - presence of at least a single individual; or
        - Vulnerable species (VU) - presence of at least 30 individuals or 10 pairs. OR
    - b) Irreplaceability: A minimum proportion of a species' global population present at the site at any stage of the species' lifecycle according to the following thresholds:
        - Restricted-range species - species with a global range less than 50,000 km2 and 5% of global population at the site; or
        - Species with large but clumped distributions - 5% of the global population at the site; or
        - Globally significant congregations - 1% of the global population seasonally at the site; or

[59] Global Invasive Species Database, "Search: Amazonas," Available: http://www.iucngisd.org/gisd/search.php

    - Globally significant source populations - 1% of the global population at the site.
- 2. Describe recent population trends of each of the trigger species in the project zone at the start of the project and describe the most likely changes under the without-project land use scenario.
- 3. Describe measures needed and taken to maintain or enhance the population status of each trigger species in the project zone and to reduce the threats to them based on the causal model that identifies threats to trigger species and activities to address them.
- 4. Include indicators of the population trend of each trigger species and/or the threats to them in the monitoring plan and demonstrate the effectiveness of measures needed and taken to maintain or enhance the population status of trigger species.[60]

Cardinal tetras (*Paracheirodon axelrodi*) likely meet the requirements of the irreplaceability category. While the several species of freshwater stingrays and the Amazon River Dolphin are listed as data deficient according to the Red List of the International Union for Conservation of Nature (IUCN),[61] it is likely that critically endangered, endangered, and/or vulnerable species could be identified at the Project. While not observed during the site visit, it is believed that the South American Manatee (*Trichechus inunguis*), which is considered vulnerable,[62] and the Giant Otter (*Pteronura brasiliensis*), which is considered endangered,[63] are present in the municipality of Barcelos.

BUDGET and TIMELINE for STANDALONE REDD+ PROJECT

The following budget and timeline prepared by CarbonCo are to be considered high-level estimates.

Detailed Budget

		Project Piaba Costs (USD)
Site Visit Costs for Project Piaba (2 Trips in 2018-2019)		
Flights, Hotel, Internal Travel, etc.		$10,000
Technical Assistance		
Technical Development Services (Baseline, Inventory Design, Project Documentation, etc.)		$150,000 to $175,000
Validation/Verification Technical Support		$15,000 to $25,000
Travel Expenses for Technical Services		$10,000
Forest Inventory by Local Firm		$40,000 to $75,000
Local Assistance with Modeling and Data Acquisition		$10,000 to $25,000
Community and Biodiversity Work		

[60] Verified Carbon Standard, "Third Edition: Climate, Community & Biodiversity Standards," Available: http://www.v-c-s.org/wp-content/uploads/2017/12/CCB-Standards-v3.1_ENG.pdf, pages 47-48.
[61] IUCN Red List, "Search," Available: http://www.iucnredlist.org/search
[62] IUCN Red List, "*Trichechus inunguis*," Available: http://www.iucnredlist.org/details/22103/0
[63] IUCN Red List, "*Pteronura brasiliensis*," Available: http://www.iucnredlist.org/details/18711/0

Community Monitoring Plan Design and Implementation		$10,000 to $25,000
Biodiversity Monitoring Plan Design and Implementation		$10,000 to $25,000
Travel Costs for Biodiversity and Community Plans		$5,000
Satellite Images		
Images for Validation / Verification (Assumes $0, But Could be $10,000 to $25,000)		$0
Validation and Verification		
Validation and Verification Audit Services (Assumes 2 Separate Audits)		$100,000 to $150,000
Travel Expenses (Flights, Hotels, etc. for Auditors for 2 Separate Audit Trips)		$10,000 to $20,000
Additional Assessment Fees		$5,000
Other Costs		
On-the-Ground Implementation Activities		TBD
Purchase of Supplies (Satellite Phone, Uniforms, Project Signs, etc.)		TBD
Register Tonnes		
Open and Maintain Registry Account		$1,200
$0.19 per carbon offset costs		TBD
Legal and Translation Costs		TBD
Staff Costs		TBD
Total Cost		**$375,600 to $550,600**

Project Piaba would need to obtain either an APX or an IHS Markit Environmental Registry account in order to receive issued VCUs (Verified Carbon Units, essentially a VER under the VCS Standard) and to then later transact these VCUs. In addition to the fixed costs of opening up ($600 one-time fee) and maintaining a registry ($600 per year) mentioned above, there are also variable fees associated with the registries.

For clarification purposes, the term issued refers to VCUs being generated and activated within one's registry account. The term transferred means trading a VCU between account holders and is often the responsibility of the buyer to pay. The term retired means to permanently withdraw a VCU from eligible trading and this is often done by end-users.

- US$0.10: VCS Levy Per VCU Issued;
- US$0.05: CCBS Tag Added to VCU Issued;
- US$0.04: Markit's Fee for Issuance;
- US$0.02: Per VCU Transferred;

- US$0.02: Per VCU Retired; and
- US$200: Per Retirement Certificate.

Potential Revenue

The following is a high-level estimate of the potential revenue that Project Piaba might be able to earn over the first ten years of the Project. The carbon stock figures used are according to the Governors' Climate and Forest Task Force (i.e., which estimates 118.0 tonnes of carbon per hectare in the municipality of Barcelos, which is equivalent to 432.7 $mtCO_2e$),[64] and according to a federal decree issued by the Brazilian Government (i.e., which stipulates an average 132.3 tonnes of carbon per hectare across the Amazon Biome, which is equivalent to 485.1 $mtCO_2e$ per hectare).[65] The deforestation rates are based off the figures compiled by GCF Impact.[66] The risk buffer, leakage, and price per offset are based off CarbonCo's experience and market research.

Potential Revenue and Quantity of Offsets from Project Piaba				
	Low Estimate	**Average Estimate**	**High Estimate**	**CarbonCo Best Estimate**
Total Size of Project Area (Hectares)	TBD	TBD	TBD	TBD
Annual Deforestation Area of Project Area (Hectares)	126.9	141	155.1	141
Metric Tonnes (Carbon Offsets) Per Hectare	432.7	458.9	485.1	485.1
Gross Metric Tonnes (Carbon Offsets) Over 10 Years	549,096	647,049	752,390	683,991
Gross Metric Tonnes (Carbon Offsets) Per Year	54,910	64,705	75,239	68,399
Risk Buffer and Leakage to be Withheld (%)	53% (43% from risk)	30% (20% from risk)	20% (10% from risk)	20% (15% from risk)
Risk Buffer and Leakage to be Withheld (Metric Tonnes)	291,021	194,115	150,478	136,798
Total Net Metric Tonnes (Carbon Offsets) After Buffer	258,075	452,934	601,912	547,193
Price Per Carbon Offset	$3.00	$4.25	$5.50	$3.50

[64] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction

[65] IDESAM, Forest Trends, and Carbon Decisions International, "Proposal of a State-wide REDD+ System in Amazonas," Available: http://www.idesam.org.br/publicacao/Oportunidades-REDD-2-Sistema-REDD-Amazonas-ENG.pdf, 14.

[66] GCF Impact, "Barcelos, Amazonas (Brazil)," Available: http://gcfimpact.org/states?region=3213,states#jurisdiction

Total Value of Carbon Offsets Over 10 Years (After Buffer)	$774,225	$1,924,971	$3,310,516	$1,915,175
Total Value of Carbon Offsets Per Year (After Buffer)	$77,423	$192,497	$331,052	$191,518

Detailed Timeline

January 2018 to March 2018

- Rapid Assessment of Project Piaba

April to May 2018

- Project Piaba Reviews Results of Rapid Assessment; Decides Whether to Move Forward with Full Project Implementation
- Come Up with Fund Raising Plan

June to July 2018

- Execute Project Agreements;
- Receive Updated Landownership/Concession/State Decree Documents and All Maps in ShapeFile and/or AutoCAD; and
- Draft Templates of Climate, Community and Biodiversity Standard's (CCBS, Third Edition) Project Design Document (PDD) and the Verified Carbon Standard's (VCS) Project Description (PD).

August to September 2018

- Initiate Biweekly Partnership Calls, Begin Asking Questions to Complete CCBS PDD (Plan to Finish CCBS PDD in 6 Months)
    - Specify Project Activities (What Will Stop Deforestation) and Project Start Date;
    - Gather Letters of Support (From Communities, Government Officials, etc.);
    - Choose Biodiversity and Community Impact Monitoring Plans; and
    - Choose CCBS Gold Level Option(s) to Pursue.
- Identify Local Forest Carbon Inventory Firms;
- Identify Local Experts for Regional Deforestation and Land-Use Modeling;
- Identify Technical Firms to Assist with Project Development; and
- Identify Local Biodiversity Experts and Local Community Specialists.

October to December 2018

- Contract Local Forest Carbon Inventory Firm;
- Contract Local Expert for Regional Deforestation and Land-Use Modeling;
- Contract Technical Firm to Assist with Project Development; and
- Identify Project Stakeholders and Map Out January Trip.

January 2019

- Potential Site Visit with Technical Firm:
    - Train Local Forest Carbon Inventory Firm;
    - Meet with Local Expert for Regional Deforestation and Land-Use Modeling;
    - Meet Stakeholders, Particularly Government Officials; and

    - Initiate Community Impact Monitoring Plan.
- Local Forest Carbon Inventory Firm Begins Work (Completes in 6 Months);
- Local Expert Begins Land-Use Modeling and Acquiring Remote Sensing Data (Completes in 6 Months); and
- Local Biodiversity Experts and Community Specialists Begin (Completes in 2 Months).

February 2019

- Identify Project Validation Audit Firm, Qualify Their Availability.

March 2019

- Contract Project Validation Audit Firm, Map Out Validation Site Visit;
- Collect Information from Biodiversity Experts and Community Specialists (2 Months from January 2019); and
- Targeted Finish for CCBS PDD.

April 2019

- Extra Time for CCBS PDD in Case Delayed.

May to July 2019

- Forest Carbon Inventory Completed (6 Months Since January 2019);
- Land-Use Modeling and Acquisition of Remote Sensing Data Completed (6 Months Since January 2019); and
- Continue Working on VCS PD (Completed in 2 Months After Forest Inventory and Modeling Finished).

August 2019

- Extra Time If Needed for Forest Carbon Inventory and Land-Use Modeling.

September 2019

- Targeted Finish for VCS PD.

October 2019

- Extra Time for VCS PD in Case Delayed; and
- Book Project Validation Site Visit Travel.

November 2019

- Upload VCS PD to VCS Project Database;
- Initiate CCBS 30-Day Project Public Comment Period of PDD; and
- Communities Must Be Informed About Public Comment Period.

December 2019

- Potential Project Validation Site Visit (Site Visit Approximately 10-14 Days).

January to February 2020

- Auditor Compiles Corrective Action Requests, Drafts Validation Report; and
- Receive CCBS and VCS Corrective Action Requests from Validation Firm.

March to April 2020

- Address Corrective Action Requests.

May 2020

- Targeted Date for Project's VCS and CCBS Validation; and
- Register Project with VCS-Approved Registry.

June 2020 to – June 2021

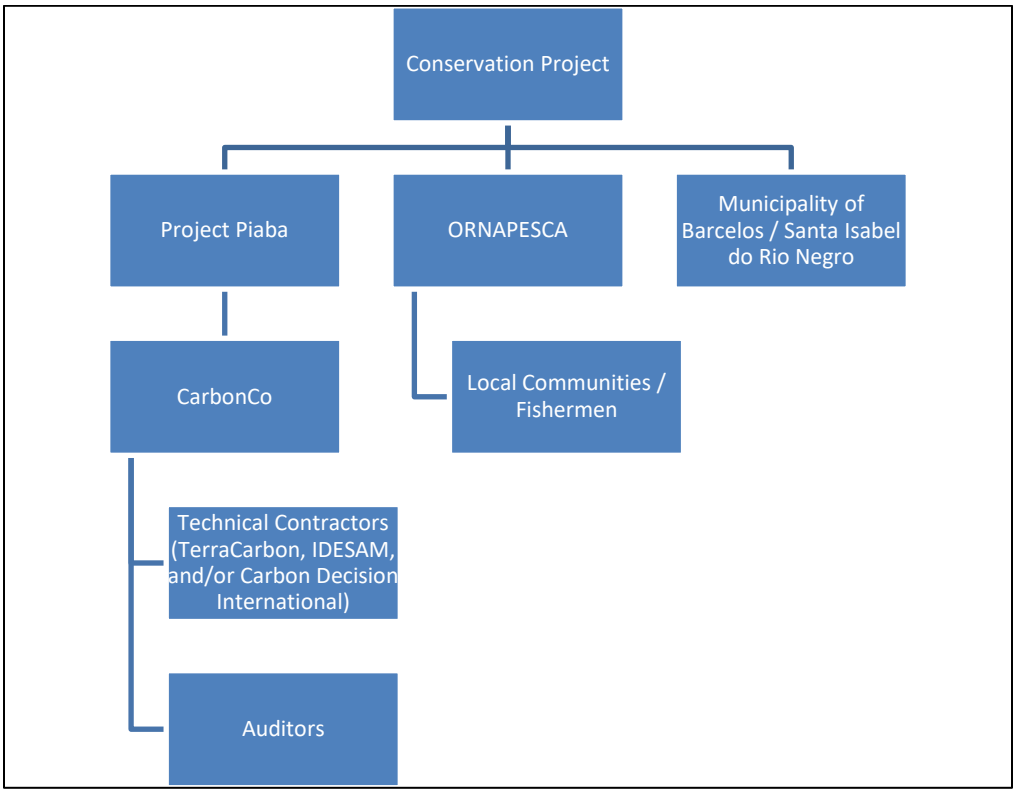
- Undertake Project Verification;
- Write CCBS Project Implementation Report and VCS Monitoring Report; and
- Qualify and Contract Auditing Firm to Verify Project to CCBS and VCS.

Proposed Management Structure

The key technical skills required to successfully implement the Project, include:

- Stakeholder identification and community engagement;
- Biodiversity assessment and monitoring;
- Carbon stock measurement and monitoring;
- Regional deforestation and land-use modelling;
- Project management;
- Carbon finance;
- Local knowledge and fluency in Portuguese; and
- Expertise in Rio Negro Fishery, best handling techniques, and supply chain management.

With this in mind, CarbonCo preliminarily suggests the following management structure:

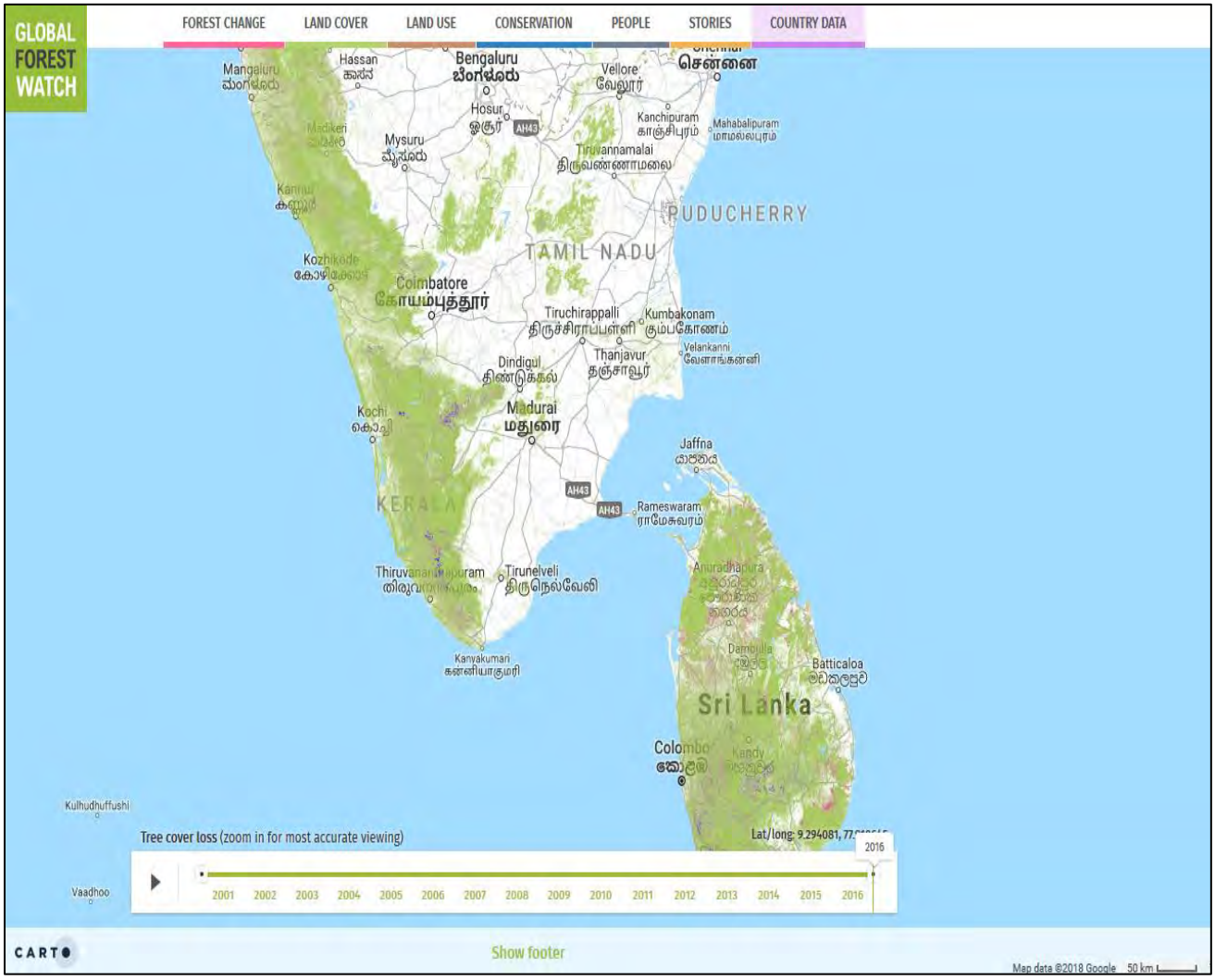


Simplified Organization Chart

Potential Expansion Opportunities

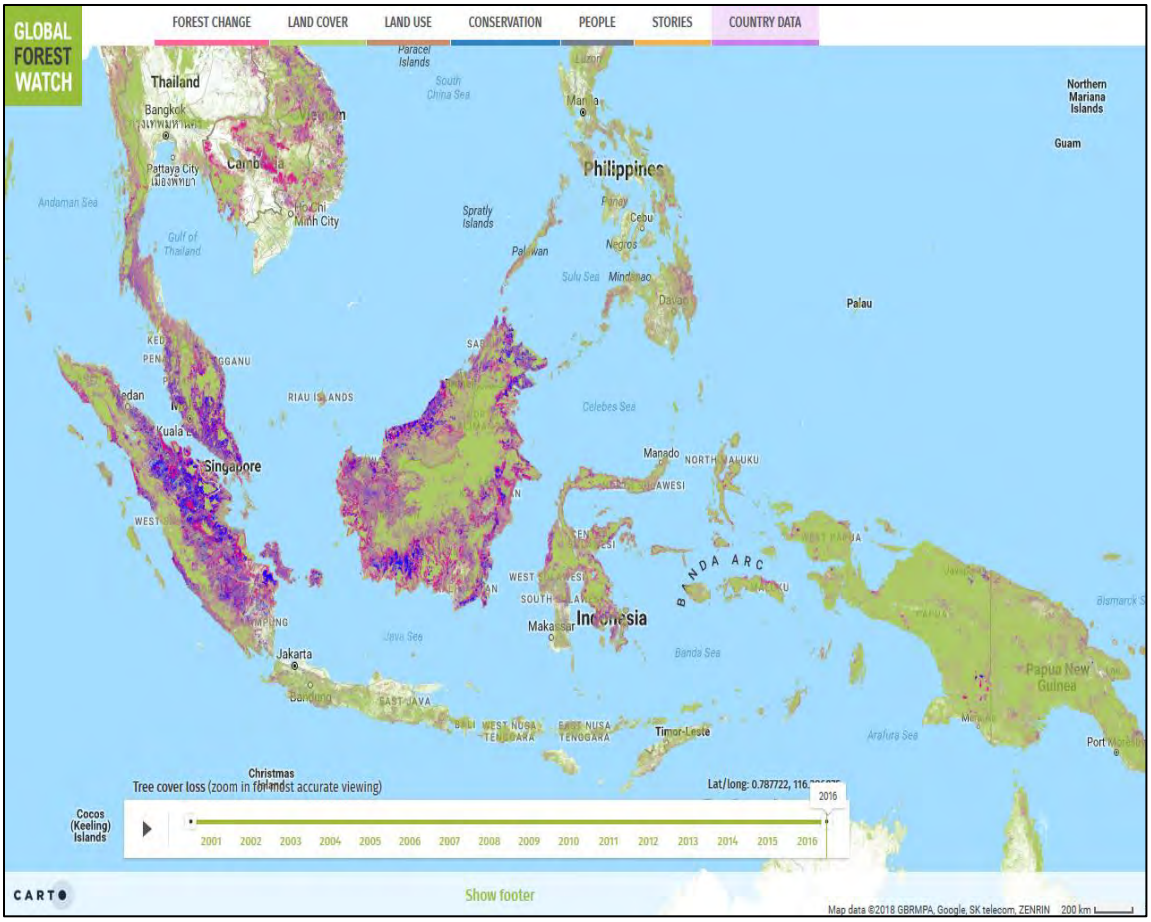
Project Piaba, led by Mr. Scott Dowd, is uniquely qualified to identify global hotspots of biodiversity where community-led fisheries for the aquarium trade can have a positive impact on the surrounding forests. For instance, two possible locations highlighted are India's Western Ghats in Kerla and the range of the tiger barb (*Puntius tetrazona*) throughout Indonesia and Malaysia.

According to Global Forest Watch, the Western Ghats region appears to have modest deforestation.



Tree Cover Loss in Kerla, India (2001-2016) (Credit: Global Forest Watch)

With respect to the tiger barb as a potential expansion opportunity, it is important to note that Indonesia has some of the highest rates of deforestation in the world.



Tree Cover Loss (2001-2016) (Credit: Global Forest Watch)

Overall Suggestions on Standalone REDD+ Project

Developing a standalone REDD+ forest carbon project, with the option of aligning the standalone REDD+ project with the State's work at a later date, is the most difficult, costly, and time-consuming phase. In sum, there are several reasons why this is the most challenging phase including the low regional deforestation rate in the area, the unclear commitment from the municipality to enroll their lands into a minimum 30-year project lifetime, and the relatively high development costs (i.e., particularly the costs of a forest carbon inventory and the costs of modeling a project-specific deforestation baseline). There is no assurance until the work is complete whether or not the costs to complete this work will outweigh the potential revenue, so more assessment is needed before this stage begins. Developing standalone REDD+ projects while aligning with a jurisdiction's work is the main expertise of CarbonCo and thus, CarbonCo remains willingly and able to advise Project Piaba if this phase is chosen.

PRICING, SUPPLY, and DEMAND ANALYSIS

The following shall provide a projected range of pricing for the sale of carbon offset credits from the Project over time, as well as an outlook on the supply/demand dynamic affecting the Project.

Overview of Pricing and Demand in Voluntary REDD+ Markets
In today's voluntary carbon market, with most trades occurring through Over-the-Counter (OTC) transactions and only small volumes traded on voluntary exchanges, there is a clear lack of transparency in pricing and contract structures in the marketplace. Offers on forward credits (i.e., meaning the project has not yet issued) and contracts where the buyer is willing to provide upfront payment are rare.

According to Thomson Reuters' first half 2017 REDD Price Report, the bid-ask spread for REDD offsets was USD$5.00 to USD5.50.[67] Similarly, Forest Trends' State of Forest Carbon Finance 2017 reported that approximately 14.3 million voluntary forest carbon offsets were transacted for a total market value of USD$74.2 million with an average price of USD$5.20 per voluntary forest carbon offset.[68]

Though there is somewhat low REDD+ market activity, developers generally expect that mid-to-long term pricing will increase as demand from compliance trading schemes and parallel regulation are clarified.

Overview of International Compliance Markets in 2017 and 2018
A carbon compliance market may take the form of a carbon tax, a cap-and-trade system (i.e., otherwise known as an emissions trading scheme or ETS), or be a hybrid of these two. Within a cap-and-trade scheme, regulated entities often have a variety of options to meet their mandated reductions in greenhouse gas (GHG) emissions. These options include purchasing allowances (i.e., auctioned government permits), purchasing compliance-grade offsets, and/or making internal reductions.

An ETS or "cap-and-trade" is a system involving the trading of emission allowances, where the total allowance is strictly limited or "capped." A regulatory authority establishes the cap which is usually considerably lower (50% to 85%) than the historic level of emissions. Allowances are created to account for the total allowed emissions. Trading occurs when an entity has excess allowances, either through actions taken or improvements made, and sells them to an entity requiring allowances because of growth in their emissions or an inability to make cost-effective reductions. Cap-and-trade programs are closed systems, but can be modified to allow the creation of new permits by non-capped sources in the manner of credit-based systems, also known as carbon offsets.

As of March 2018, there are no compliance markets that specifically accept international REDD+ offsets. This absence of clarity for REDD+ in potential compliance schemes, means REDD+ development will continue to depend on demand from voluntary buyers in the short term.

In the short (next 2-3 years) to mid-term (next 5-10 years), CarbonCo expects voluntary pricing for REDD+ credits to remain stable with modest growth for projects with VCS verification and

[67] Thomson Reuters, "H1 2017 REDD Price Report," June 2017.
[68] Forest Trends, "Fertile Ground: State of the Forest Carbon Finance," Available: http://www.forest-trends.org/documents/files/doc_5715.pdf, 27.

strong climate, community and/or biodiversity benefits as demonstrated by verification to the CCB with Gold Level Distinction.

Because of the low pricing structures for pre-compliance speculation, we again recommend voluntary market sales until the market is more defined in hopefully the next 2-3 years. Though the current compliance market conditions create a challenging landscape with unclear regulation and timeframes for inclusion of REDD+, CarbonCo expects over the next 3-5 years, there to be significant potential for REDD+ to be accepted into these compliance markets.

The three most promising developments with respect to a potential compliance market accepting REDD+ are: the California ETS, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and the International Maritime Organization's (IMO) ETS.

California ETS

California adopted the California Global Warming Solutions Act of 2006 (known as AB32) to reduce GHG emissions to 1990 levels by 2020. The Legislation calls for the adoption of, "a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit greenhouse gas emissions,"[69] applicable from January 1, 2012 to December 31, 2020. Six years after passing AB32, California auctioned the first permits in its emissions trading system in November 2012. The newly created cap-and-trade is the largest in the United States.

AB32 presents a tremendous opportunity for REDD+ projects. The California ETS currently accepts domestic avoided conversion projects and the legislation provides for international sector based offsets. These international sector based offsets could include REDD+ offsets from a subnational scheme such as the State of Acre in the beginning, and then later REDD+ offsets from another jurisdiction such as the State of Amazonas.

Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

CORSIA is the first global scheme covering an entire industrial sector, and reflects the spirit of the United Nations Framework Convention on Climate Change's (UNFCCC) Paris Agreement – equity and common but differentiated responsibilities and respective capabilities due to different national circumstances.[70] Aircraft operators will be required to purchase carbon offsets or emission units for the growth in CO_2 emissions covered by the scheme. The initiative aims to address any annual increase in total CO_2 emissions from international civil aviation above 2020 levels. The average levels of CO_2 emissions from international aviation covered by the scheme between 2019-2020 represents the basis for carbon neutral growth from 2020.

- 2021-2023: Voluntary pilot phase;
- 2024-2026: Full voluntary phase; and
- 2027-2035: Mandatory phase for most developed countries.

[69] California Air Resources Board, "Assembly Bill 32 Overview," Available: https://www.arb.ca.gov/cc/ab32/ab32.htm

[70] UNFCCC, "Paris Agreement," Available: https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

It is important to note that 66 countries volunteered to implement the scheme from its outset – covering approximately 86.5% of CO_2 growth in 2021-2035. The CORSIA initiative could open up several billion US dollars for REDD+ initiatives. Project Piaba could also develop a unique partnership with airlines in Manaus, whereby compliance grade REDD+ offsets are offered in exchange for discounted freight costs for aquarium fish.

International Maritime Organization (IMO) ETS

Maritime shipping is the world's most carbon-efficient form of transporting goods - far more efficient than road or air transport. Yet, the industry seeks to further improve the fuel efficiency and the carbon footprint of its vessels. Today's container ships and vehicle carriers enable the movement of tremendous volumes of goods across the world, which has fueled global economic growth in a manner considered implausible only 50 or 60 years ago.

The IMO agreed in October 2016 to develop a comprehensive strategy for addressing GHG emissions from international shipping. The strategy will consider different actions that can be pursued to reduce GHG emissions from shipping over the short, medium, and long term. An initial GHG reduction strategy is expected to be agreed to in 2018 with subsequent review and revision through 2023 using ship specific data generated by IMO's recently adopted data collection system. The IMO data system will collect in-use fuel consumption data from ships with annual reporting that will allow governments and other stakeholders to accurately assess fuel consumption and emissions generated by international shipping.

The World Shipping Council and its member companies are actively engaged in considering appropriate strategies to further reduce fuel consumption and to reduce emissions through the IMO GHG strategy including carbon offsetting. While the IMO ETS is promising, it is still a long-term development.

EVALUATING and STRATEGIZING NEXT STEPS

The following is an evaluation of next steps for Project Piaba.

Going Forward Management Plan

Overall, CarbonCo suggests that Project Piaba does not immediately pursue doing a standalone REDD+ project and instead, focus on working with the municipality of Barcelos (and later the municipality of Santa Isabel do Rio Negro) to align with the State of Amazonas while simultaneously focusing on Project Piaba's core activities (e.g., training best handling practices) and start marketing the climate change benefits of its work.

The preliminary letter to be signed by the mayor of Barcelos municipality should include some language to the effect of:

> "On behalf of municipality, we would like to partner with the Institute of Project Piaba and their collaborators on activities designed to benefit the local aquarium fishermen and sport fishermen and to reduce deforestation on municipal-owned land, while aligning our project with the State of Amazonas' climate change work."

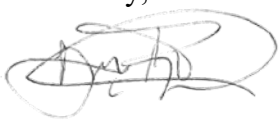
Some ongoing questions that Project Piaba should seek to resolve or at least contemplate are:

- What will be the future allocation of the emission reductions associated with reducing deforestation? For example, will the stock-flow-risk calculation be used? If yes, how will the calculation be weighted between the Federal Government of Brazil and the State Government of Amazonas, and how will the calculation then be weighted between the State Government of Amazonas and other actors in Amazonas (i.e., the municipalities of Barcelos and Santa Isabel do Rio Negro)?
- What share of the benefits (i.e., share of revenue or share of carbon offsets) does Project Piaba need? How will benefits be shared with the local communities?
- Does the mayor have legal authority to enter into a 30-year partnership agreement?
- If a VCS standalone project baseline predicts little-to-no deforestation, but a State of Amazonas baseline (due to being rewarded for the carbon stocks of the standing forest) indicates a viable carbon project, what happens? Can Project Piaba pursue both a VCS project and a project aligned with the State of Amazonas?
- If Brazilian law says the Project needs to use a specific carbon stock figure (e.g., 132 t/C/ha), what happens if the project-level forest carbon inventory reveals a higher or lower carbon stock figure?
- If the fishery collapses further, does deforestation really ensue? Likewise, does the forest remain because of the fishery? Or does the forest remain because of the remote location and the nature of the seasonal floods that would otherwise wash away cattle and crops?
- What is the general price trend of cardinal tetras? What is the price of cardinal tetras vis-à-vis other substitutes? What are the export trends of competing countries such as Southeast Asia?

While working on these questions and developing a letter for the mayor of Barcelos, Project Piaba should continue with its training in the Rio Negro and move forward with promoting the benefits of the aquarium trade.

CarbonCo would like to once again thank the New England Aquarium and Project Piaba for the opportunity to evaluate the Project and to participate in the 2018 expedition. We remain at your disposal and please do not hesitate to let us know if you have any questions.

Sincerely,



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APPENDIX A: VCS AFOLU Projects in Brazil (as of December 13, 2017)

There are a total of 16 VCS AFOLU (Agriculture, Forestry and Other Land Use) projects in Brazil and 13 of these are REDD+ projects. Please note, there are another 6 projects that are either in development or were validated (and/or verified) to the CCB with VCS. This list does not include projects – such as the Juma Sustainable Development Reserve Project in Amazonas – that were either withdrawn or there are now expired. In total, there appear to be 2 REDD+ projects under development in Amazonas (excluding the aforementioned Juma Project).

Projects Currently Validated and/or Verified

	Project Name	State of Brazil	VCS REDD+ Methodology Used	Status of Project
1	Resex Rio Preto-Jacundá REDD+ Project	Rondônia	VM0015	Validated to VCS and CCB; Verified to VCS (pending CCB verification)
2	The Envira Amazonia Project - A Tropical Forest Conservation Project in Acre, Brazil	Acre	VM0007	Validated and Verified to both VCS and CCB
3	Maísa REDD+ Project	Pará	VM0015	Validated and Verified to VCS (pending CCB verification)
4	Reforestation Grouped Project at Pratigi Environmental Protection Area	Bahia	N/A	Validated to CCB (pending CCB verification); No VCS validation
5	Suruí Forest Carbon Project	Rondônia and Mato Grosso	VM0015	Validated and verified to VCS and CCB; Project is likely suspended
6	6. JARI/AMAPÁ REDD+ PROJECT	Amapá	VM0015	Validated to VCS and CCB; Verified to VCS (no CCB verification)
7	The Valparaiso Project	Acre	VM0007	Validated and verified to VCS and CCB
8	The Russas Project	Acre	VM0007	Validated and verified to VCS and CCB
9	Ecomapua Amazon REDD Project	Amapá	VM0015	Validated and verified to VCS (no CCB)
10	ADPML PORTEL-PARA REDD PROJECT	Pará	VM0015	Validated to VCS and CCB; Verified to VCS (no CCB)
11	RMDLT PORTEL-PARA REDD PROJECT	Pará	VM0015	Validated to VCS and CCB; Verified to VCS (no CCB)
12	The Purus Project	Acre	VM0007	Validated and verified to VCS and CCB
13	FLORESTAL SANTA MARIA PROJECT	Mata Grosso	VM0007	Validated and verified to VCS (no CCB)
14	Cikel Brazilian Amazon REDD APD Project Avoiding Planned Deforestation	Pará	VM0007	Validated and verified to VCS (no CCB)

15	Carbon Project in the Emas-Taquari Biodiversity Corridor, Goiás and Mato Grosso do Sul, Brazil	Goiás and Mato Grosso do Sul	N/A	Validated to VCS and CCB; CCB verified (no VCS verification)
16	Multi-Species Reforestation in Mato Grosso, Brazil	Mato Grosso	N/A	Validated and verified to VCS (no CCB)

Projects Currently Undergoing Validation

	Project Name	**State of Brazil**	**VCS REDD+ Methodology Used**	**Status of Project**
1	Fazenda São Paulo Agroforestry	Mato Grosso do Sul	N/A	Under VCS and CCB validation.
2	Fortaleza Ituxi REDD Project	Amazonas	VM0015	Under VCS and CCB validation.
3	Manoa REDD+ Project	Rondônia	VM0015	Under VCS and CCB validation.
4	Amazon Rio REDD+ APD Project	Amazonas	VM0011	Undergoing validation to VCS and CCB; also undergoing verification to CCB.
5	Guapiaçu Grande Vida	Rio de Janeiro	N/A	Validated to CCB (no VCS).
6	Carbono Nascentes do Xingu	Mato Grosso	N/A	Validated to CCB (no VCS).

APPENDIX B: Applicability Conditions of VCS Methodologies

The two most frequently used VCS methodologies in Brazil are VM0007, REDD+ Methodology Framework (REDD-MF), v1.5,[71] and VM0015, Methodology for Avoided Unplanned Deforestation, v1.1.[72]

Applicability Conditions for VM0015

"The methodology has no geographic restrictions and is applicable globally under the following conditions:

a) Baseline activities may include planned or unplanned logging for timber, fuel-wood collection, charcoal production, agricultural and grazing activities as long as the category is unplanned deforestation according to the most recent VCS AFOLU requirements.

b) Project activities may include one or a combination of the eligible categories defined in the description of the scope of the methodology (table 1 and figure 2).

c) The project area can include different types of forest, such as, but not limited to, old-growth forest, degraded forest, secondary forests, planted forests and agro-forestry systems meeting the definition of "forest".

d) At project commencement, the project area shall include only land qualifying as "forest" for a minimum of 10 years prior to the project start date.

e) The project area can include forested wetlands (such as bottomland forests, floodplain forests, mangrove forests) as long as they do not grow on peat. Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm. If the project area includes a forested wetlands growing on peat (e.g. peat swamp forests), this methodology is not applicable.

Demonstrate that the methodology is applicable to the proposed AUD project activity."[73]

Applicability Conditions for VM0007

"This REDD+ Methodology Framework is a compilation of modules and tools that together define the project activity and necessary methodological steps. By choosing the appropriate modules, a project-specific methodology can be constructed. The justification of the choice of modules and why they are applicable to the proposed project activity must be given in the PD.

Specific applicability conditions exist for each module and must be met for the module to be used. This methodology includes forest degradation caused only by extraction of wood for fuel.

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[71] VCS, "VM0007: REDD+ Methodology Framework (REDD-MF), v1.5," Available: http://database.v-c-s.org/methodologies/redd-methodology-framework-redd-mf-v15

[72] VCS, "VM0015, Methodology for Avoided Unplanned Deforestation, v1.1," Available: http://database.v-c-s.org/methodologies/methodology-avoided-unplanned-deforestation-v11

[73] Ibid.

No modules are included for activities to reduce emissions from forest degradation caused by illegal harvesting of trees for timber.[74]

Use of this methodology is subject to the following applicability conditions, noting the project must also comply with the applicability conditions of the applied modules and tools:

4.1: General

All land areas registered under the CDM or under any other GHG program (both voluntary and compliance-oriented) must be transparently reported and excluded from the project area. The exclusion of land in the project area from any other GHG program must be monitored over time and reported in the monitoring reports.

4.2: REDD

4.2.1: All REDD Activity Types

REDD activity types applicable under the following conditions:

- Land in the project area has qualified as forest (following the definition used by VCS) at least 10 years before the project start date.
- If land within the project area is peatland and emissions from the soil carbon pool are deemed significant, the relevant WRC modules (see Table 1) must be applied alongside other relevant modules.
- Baseline deforestation and forest degradation in the project area fall within one or more of the following categories:

Unplanned deforestation (VCS category AUDD);

- Planned deforestation/degradation (VCS category APD);
- Degradation through extraction of wood for fuel (fuelwood and charcoal production) (VCS category AUDD).

Leakage avoidance activities must not include:

- Agricultural lands that are flooded to increase production (eg, paddy rice);
- Intensifying livestock production through use of feed-lots[75] and/or manure lagoons.[76]

4.2.2: Unplanned Deforestation

Unplanned deforestation activities are applicable under the following conditions:

- Baseline agents of deforestation must: (i) clear the land for settlements, crop production (agriculturalist) or ranching, where such clearing for crop production or ranching does

[74] Further clarification from VCS: "Illegal timber harvest may be occurring in the project area in the baseline but conservatively no benefit can be calculated for preventing timber harvests, and any emissions arising from timber harvests in the project case must be monitored and deducted from calculated project net emission reductions."
[75] Further clarification form VCS: "Feedlots are defined as areas in which naturally grazing animals are confined to an area which produces no feed and are fed on stored feeds."
[76] Further clarification from VCS: "Anaerobic lagoons that function as receptacles for animal waste flushed from animal pens. Anaerobic organisms present in the manure and the environment decompose the waste in the lagoon."

not amount to large scale industrial agriculture activities[77]; (ii) have no documented and uncontested legal right to deforest the land for these purposes; and (iii) be either residents in the Reference Region for Deforestation (cf. section 1 below) or immigrants. Under any other condition this methodology must not be used.
- If, in the baseline scenario of avoiding unplanned deforestation project activities, post-deforestation land use constitutes reforestation, this methodology may not be used.

4.2.3: Planned Deforestation/Degradation

Unplanned deforestation/degradation activities are applicable under the following condition:
- Conversion of forest lands to a deforested condition must be legally permitted.

4.2.4: Degradation (Fuelwood/Charcoal)

Degradation activities are applicable under the following conditions:
- Fuelwood collection and charcoal production must be non-renewable[78] in the baseline period.
- If degradation is caused by either illegal or legal tree extraction for timber, this methodology cannot be used.

4.3: ARR

ARR activities are applicable under the following conditions:
- The project area is non-forest land or land with degraded forest.
- The project scenario does not involve the harvesting of trees. Therefore, procedures for the estimation of long-term average carbon stocks are not provided.
- The project scenario does not involve the application of nitrogen fertilizers.

Note, where project activities on wetlands are excluded by the applicability conditions of applied modules or tools, these can be disregarded for the purpose of their use within this methodology, as quantification procedures for the peat soil are provided in modules BL-PEAT and M-PEAT.

4.4: WRC

WRC activities are applicable under the following conditions:
- This methodology is applicable to rewetting drained peatland (RDP) and conservation of undrained and partially drained peatland (CUPP) activities on project areas that meet the VCS definition for peatland.[79] The scope of this methodology is limited to domed peatlands in the tropical climate zone.
- Fire reduction projects on peatland that exclude rewetting as part of the project activity are not eligible.

[77] Further clarification from VCS: "Small-scale / large-scale agriculture to be defined and justified by the project."
[78] Further clarification from VCS: "As defined in Module BL-DFW."
[79] Further clarification from VCS: "RDP (Rewetting of Drained Peatland) and CUPP (Conservation of Undrained or Partially Drained Peatland) project activities are both sub-categories of Restoration of Wetland Ecosystems (RWE) and Conservation of Intact Wetlands (CIW) of the Wetlands Restoration and Conservation (WRC) project category."

- Rewetting of drained peatland and conservation of undrained or partially drained peatland may be implemented in combination with REDD project activities. REDD project activities on peatland must not increase drainage.
- Rewetting of drained peatland may be implemented as a separate activity or in combination with ARR project activities. ARR activities must not enhance peat oxidation and therefore this activity requires at least some degree of rewetting."[80]

[80] http://database.v-c-s.org/methodologies/redd-methodology-framework-redd-mf-v15

APPENDIX C: Additional Stakeholders

Project Piaba has already established relationships with numerous stakeholders ranging from local communities and government officials to export companies and aquariums.[81] A few additional stakeholders include:

Technical Experts

- TerraCarbon
  - David Shoch, Director of Forestry & Technical Services
    - Phone: +1 (434) 326-1144
    - Email: David.Shoch@TerraCarbon.com
    - Website: www.TerraCarbon.com
    - TerraCarbon is a leading expert on technical aspects of REDD+ projects.

- IDESAM
  - Pedro Soares, Program Manager for Climate Change and REDD+
    - Phone: +55 (19) 3429-0877 or (92) 991-612-160
    - Email: Pedro.Soares@idesam.org.br
    - Website: www.ideasam.org.obr
    - IDESAM is working with the State of Amazonas on their REDD+ program.

- Carbon Decisions International
  - Lucio Pedroni, Founder and CEO
    - Phone: N/A
    - Email: info@carbondecisions.com
    - Website: http://www.carbondecisions.com/
    - Carbon Decisions International is working with the State of Amazonas on their REDD+ program. The firm also worked on the Juma REDD+ Project in Amazonas.

Zoos, Aquariums and Museums

- The Field Museum of Chicago
  - Christina Magerkurth
    - Phone: +1 (630) 947-9563
    - Email: CMagerkurth@FieldMuseum.org
    - Website: http://fm2.fieldmuseum.org/scienceinaction/cordilleraazul/index.html
    - The Field Museum was/is involved on technical aspects of the Cordillera Azul National Park, a REDD+ Project in Peru. See here: http://www.vcsprojectdatabase.org/#/project_details/985. It appears as though Ms. Magerkurth has since moved on to start her own company. See here: http://www.magerkurthassoc.com/about-our-company.html

[81] Project Piaba, "Partners and Supporters," Available: http://projectpiaba.org/who-we-are/advisors/

Other Carbon Market Participants

- Ludovino Lopes Lawyers
  - Ludovino Lopes, Founder
    - Address: Avenida Engenheiro Luís Carlos Berrini, 1748, 1º andar – conjunto 102, CEP: 04571 – 000, Brooklin Novo, São Paulo – Brasil
    - Phone: +55 (11) 5501-0415
    - Email: ludovinolopes@ludovinolopes.com.br
    - Website: http://www.ludovinolopes.com.br/
    - Ludovino Lopes is leading expert on the legal aspects of REDD+ and subnational jurisdictions.

- Fundação Amazonas Sustentável (FAS, Amazonas Sustainable Foundation)
  - Gabriel Ribenboim
    - Address: Rua Álvaro Braga, 351, Parque Dez de Novembro, Manaus – AM | 69055-660
    - Phone: +55 (92) 4009-8900
    - Email: Gabriel.Ribenboim@fas-amazonas.org
    - Website: http://fas-amazonas.org/
    - FAS worked on the first REDD+ project in the State of Amazonas known as the Juma Sustainable Development Reserve Project.

- Fundação Vitória Amazônica (FVA, Vitória Amazônica Foundation)
  - Address: Rua Estrela D'Alva, 146, Conjunto Morada do Sol, Aleixo, Manaus
  - Phone: +55 (92) 3642-4559 / (92) 3302-7262 / (92) 3236-3257 / (92) 3302-7261
  - Email: fva@fva.org.br or ascom@fva.org.br
  - Website: http://www.fva.org.br/index.php/home/
  - FVA appears to be working with the State of Amazonas on their system of safeguards.

Government Related Entities

- The State Forum for Climate Change, Biodiversity, Environmental Services and Energy
  - Address: Av. Mario Ypiranga Monteiro, nº3280, Parque Dez., Manaus, Amazonas
  - Phone: +55 92 3642 4724 Website: http://www.sds.am.gov.br/
  - The Forum brings together 49 organizations representing diverse interests (including 17 state, 9 federal, 3 county, 3 labor unions, 7 environmental NGOs, 3 social organizations, and 3 multi-stakeholder fora). Twenty-one of these organizations (including FUNAI and COIAB, Coordination of Indigenous Organizations in Brazil) participate in the Forum's Land Use, Forests, and Ecosystem Services Working Group which is assigned to the task of developing the REDD program. Forum is Coordinated by Secretariat of the Environment and Sustainable Development for the State of Amazonas

- ITEAM (Institute of Land in Amazonas)
  - Address: Rodovia Deputado Vital de Mendonça, km 09 - Bairro de Flores - (próximo a feira agropecuária)- CEP: 69048-660
  - Phone: +55 (92) 3214-7921, (92) 3214-7942, (92) 3214-7901, or (92) 3214-7902

  - Website: http://www.iteam.am.gov.br/ (DOES NOT WORK)
  - ITEAM is responsible for regularizing land titles and working on the politics of land rights through agrarian reform. ITEAM instituted Forum da Terra (Land Forum) initiate community-level discussions in contentious counties.

- GCF Representative for Amazonas State: Antônio Luiz Menezes de Andrade
  - Address: Secretário Executivo Adjunto da Secretaria de Estado do Meio Ambiente – SEMA
  - Phone: +55 (92) 3659-1820/1822/1828
  - Email: ecoluiz@sema.am.gov.br
  - Website: http://www.gcftaskforce-database.org/StateOverview/brazil.amazonas and http://gcfimpact.org/states?region=3213,states and http://meioambiente.am.gov.br/ and http://www.gcftaskforce-database.org/Frameworks/brazil.amazonas
  - The Governors' Climate and Forest Task Force is the leading association of subnational jurisdictions working on REDD+ initiatives.

- Comissão Nacional para REDD+ (National REDD+ Commission): Jair Schmitt
  - Address: SEPN 505 Bloco "B" Edifício Marie Prendi Cruz 2º andar Sala 214, 70730-542, Brasília – DF
  - Phone: +55 (61) 2028-2028 / 2293
  - Email: jair.schmitt@mma.gov.br
  - Website: http://redd.mma.gov.br/pt/comissao-nacional-para-redd
  - The National REDD+ Commission is the focal point for REDD+ within the Brazilian Federal Government.

APPENDIX D: Potential Buyers of Project Piaba's Carbon Offsets and Other Possible Financiers

Brazil Funds

- Amazon Fund (Project Piaba currently submitting proposal)
- National Climate Change Fund of Brazil (created by Law No. 12.114/2009)
- National Environment Fund of Brazil (created by Law No. 7.797/1989)
- National Fund for Forestry Development (created by Law No. 11.284/2006)
- Protected Areas Fund of the ARPA Programme
- Green Climate Fund

Brian McFarland previously shared an Excel sheet with some promising foundations.

Partial List of Groups Supporting ICMBio's Work in Amazonas

- Durrell Wildlife Conservation Trust (https://www.durrell.org/wildlife/)
- WCS Brazil
- Greenheart Conservation Company (http://www.greenheart.ca/)

Here is a list of potential buyers of Project Piaba's carbon offsets, if the Project is able to successfully complete the aforementioned steps. The first group of companies to approach should probably be companies with an already established relationship with the New England Aquarium. The following companies are sponsors of the New England Aquarium and have a history of purchasing offsets or being involved with carbon offset projects:

- Bank of America (i.e., Merrill Lynch was involved early on in an Indonesia-based REDD+ project);
- Credit Suisse;
- Dell; and
- Santander.[82]

Here are a few larger companies in Boston that have publicly announced they are buying offsets:

- Biogen;[83]
- Boston Trust & Investment Management Co.;[84]
- Breckinridge Capital Advisors;[85] and
- GoodDeedSeats.com.[86]

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[82] New England Aquarium, "Corporate Partnership," Available: http://www.neaq.org/support/corporate-partnership/
[83] Boston Globe, "Biogen, biggest company in Mass., has gone carbon neutral" Available: https://www.bostonglobe.com/business/2015/06/23/the-biggest-company-massachusetts-has-gone-carbon-neutral/a1ZeeWg4vXRxH1D312OOnI/story.html
[84] Carbonfund.org, "Search: Boston," Available: https://carbonfund.org/?post_type=partners&post_title=&s=&city=boston&state=
[85] Breckinridge Capital Advisors, "Breckinridge Takes Steps to Reduce Carbon Footprint," Available: https://www.breckinridge.com/company/company-news/breckinridge-takes-steps-to-reduce-carbon-footprint/
[86] Carbonfund.org, "Search: Boston," Available: https://carbonfund.org/?post_type=partners&post_title=&s=&city=boston&state=

Otherwise, contacting carbon offset retailers that have programs in place is a good avenue for sale. For example at Carbonfund.org Foundation, of which CarbonCo, LLC is a wholly-owned subsidiary, corporates have developed voluntary carbon programs to market the respective company's sustainability efforts. These programs include:

Amtrak Program: Customers have option to offset their travel supporting carbon offset projects during ticket purchase process.

JetBlue Program: Customers have option to offset their travel through supporting carbon offset projects during ticket purchase process.

Carbonfund.org, along with other carbon offset retailers, often look to purchase offsets at a wholesale price to sell to their corporate supporter base. Other carbon providers include:

- Bonneville Foundation, (541) 760-6658 (main number)
- Climate Trust, (503) 238-1915 (main number)
- *Native*Energy, (800) 924-6826 (main number)
- Offsetters Climate Solutions, (604) 699-2658 (main number)
- Sterling Planet, (877) 457-2306 (main number)
- TerraPass, (877) 210-9581 (main number)

Another option for sales would be emission brokerage firms which charge a commission on the sell side between 3-5% and have access to voluntary buyers and sometimes Request for Proposals (RFPs) from major corporates. Examples of these brokerage firms include:

- BGC Environmental, (646) 346-6899 (main number)
- Evolution Markets, (914) 323-0200 (main number)
- Karbone, (646) 291-2900 (main number)
- TFS Green, (212) 943-2883 (main number)

In reference to Request for Proposals (RFPs), they tend to come out by corporates and often sent directly to market players in their scope, versus in past years when they were mass mailed out to the public. Hence, CarbonCo recommends utilizing an established broker (or retailer) to keep your project in mind when they are approached for an RFP opportunity that may fit the requirements of your project.

Additional opportunities would include contacting the following potential voluntary buyers that have completed previous transactions in the voluntary carbon markets. It is important to remember a voluntary buyer is looking for the "new and fresh" in their portfolio, so voluntary players are all candidates for REDD+.

- **Financials:** Nedbank Capital, Entega, Bank of America/ Merrill Lynch, Goldman Sachs, and JPMorgan (previously owner of ClimateCare).

- **Insurance Industry:** Insurance Giant Allianz with a stake in Wildlife Works, a major REDD+ project developer. Transamerica is another insurance company involved with REDD+.

- **Transportation Sector:** Amtrak, JetBlue, Virgin Atlantic, Avis Car Rentals, have all been buyers of credits.

- **Energy companies:** BP, HEAG Sudhessische Energie AG (HSE), Eneco, Chevron, Exxon Mobil, and Texaco have been credit buyers under their voluntary CSR programs.

- **Manufacturing:** Chevrolet has been largely involved in voluntary carbon markets through Bonneville Foundation (listed in retailer list).

- **Example of Funds:** (Note, a fund that may not be interested in REDD+ now could be in the near future.)
  - Althelia Fund;
  - BioCarbon Fund; and
  - Terra Bella Fund.

Environmental Finance, a leading environmental markets publication, also sells a list of Carbon Funds updated every few years for a subscription service.

- **Associations** (Good for both voluntary and compliance players):
  - Climate Markets & Investment Association (CMIA);
  - Code REDD;
  - Environmental Markets Association (EMA); and
  - International Emissions Trading Association (IETA).

- **Exchanges** (some with voluntary carbon market components):
  - Carbon Trade Exchange;
  - CBL Markets; and
  - Climex.