NON-PERMANENCE RISK REPORT

Yacumama Forest Carbon Project

Document Prepared By Conservation Management Institute at Virginia Tech-College of Natural Resources and Environment

Project Title	Yacumama Forest Carbon Project
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1 INTERNAL RISK

Project Management		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Species planted (where applicable) associated with more than 25% of the stocks on which GHG credits have previously been issued are not native or proven to be adapted to the same or similar agro-ecological zone(s) in which the project is located. **Not Applicable**. *The Yacumama REDD Project is based upon the conservation of existing forest.*	0
b)	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50% of stocks on which GHG credits have previously been issued. **Not Applicable.** *No GHG credits have been issued.*	0
c)	Management team does not include individuals with significant experience in all skills necessary to successfully undertake all project activities (ie, any area of required experience is not covered by at least one individual with at least 5 years experience in the area). *Management and technical team have > than 5 years' experience in all aspects of the Project. Professional CV's are available for all staff involved in the project and will be made available to the audit team.* ***See 1.c Skills required****.*	0
d)	Management team does not maintain a presence in the country or is located more than a day of travel from the project site, considering all parcels or polygons in the project area. *While the management team does maintain a periodic presence at the site they are not permanently located at Yacumama. (Note: Once final project is approved a management team member will be permanently assigned to the project site)*	2
e)	**Mitigation:** Management team includes individuals with significant experience Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs. *The Yacumama REDD Project was developed by a professional team with substantial experience in the development and implementation of REDD and CCB projects. The team has performed the technical and management work for two validated and Verified REDD projects in Belize. Both of which also achieved CCB Gold status.* ***See 1.e Experience***	-2
f)	**Mitigation:** Adaptive management plan in place **Not applicable**.	0
Total Project Management (PM) [as applicable, (a + b + c + d + e + f)] Total may be less than zero.		**0**

1.c Skills required

The skills required to successfully implement the project fall under three categories: 1. Financial, 2. In-country management of project site, and 3. Scientific/Technical.

Mr. Lawrence Bishop will be responsible hiring qualified contractors for future monitoring assessments, carbons sales, and finances in the United States. Mr. Bishop has served as the primary United States fiscal manager for Yacumama (lodge operations and other activities) since the properties were purchased in the early1990's. Mr. Bishop is also a licensed commodities broker and will be responsible for marketing, selling, and managing funds derived from all forest carbon offsets sales.

Mr. Norman Walters will be responsible for management of the infrastructure of the lodge facilities[1], forest protection at Yacumama, and business matters within the country of Peru. In addition Mr. Walters is the diplomatic liaison between Yacumama and the local communities because of his fluency in the local Spanish dialect. Mr. Walters has extensive experience working in the Peruvian Amazon and was the manager who hired hire 90 local village workers and taught them skills pertinent to construction in the Amazon Jungle. Mr. Walters was the manager for Yacumama Lodge, and managed all aspects of construction, employee relations, banking, liaison for all Peruvian Government actions and interactions, and defended Yacumama SRLtda., in the Peruvian Judicial System. Mr. Walters will be responsible for the day to day operations at Yacumama during the course of the project.

Dr. Verl Emrick will be responsible for managing and implementing all scientific/technical aspects of the project. Dr. Emrick is a Research Ecologist and Senior Project Manager with the Virginia Tech-Conservation Management Institute within the College of Natural Resources and Environment. Dr. Emrick has been the scientific lead on three pervious international forest carbon offset projects, two of which have been validated and verified under VCS REDD and CCB. He currently manages research

[1] The former Yacumama lodge is adjacent to the project area but is not part of the project. The remaining lodge buildings now house a permanent staff (who are the only permanent residents near the project area) that, support researchers, patrol project area and monitor boat traffic on the Yarapa river within the project area.

projects involving, ecosystem restoration, forest carbon sequestration, threatened and endangered species research and management, disturbance ecology and biogeochemistry. In recent years, Dr. Emrick has participated in a variety of ecology and natural resource related research and management projects for private, state, and federal land management agencies.

1.e Scientific Team Experience

Team member	Previous Roles	Previous Projects
Verl Emrick Professional Experience: 18 years	**Project manager** responsible for overseeing all aspects of the project including but not limited to scientific and technical coordination, task implementation, and financial management for each project.	-Boden Creek Ecological Preserve Forest Carbon Project -Bull Run Overseas Forest Carbon Project: Phase 1
Aaron Teets Professional Experience: 6 years	**Field team leader** responsible for leading field crew in the collection of forest carbon data. Responsible for data summaries and written field methods for each project.	Boden Creek Ecological Preserve Forest Carbon Project -Bull Run Overseas Forest Carbon Project: Phase 1
Mike St. Germain Professional Experience: 12 years	**Field team leader** responsible for developing and implementing biodiversity surveys in support of the overall project. Field crew member forest carbon survey. Provided written and editorial input for each project	Boden Creek Ecological Preserve Forest Carbon Project -Bull Run Overseas Forest Carbon Project: Phase 1
Kevin McGuckin Professional Experience: 13 years	**GIS and remote sensing team leader** responsible for the creation of all map figures and geo-database creation. Responsible for remote sensing, spatial data analyses, and reporting. Provided written and editorial input for each project.	Boden Creek Ecological Preserve Forest Carbon Project -Bull Run Overseas Forest Carbon Project: Phase 1

Eric Wolf Professional Experience: 15 years	**Field team member** for biodiversity survey and forest carbon survey. Provided written and editorial input for each project.	Boden Creek Ecological Preserve Forest Carbon Project -Bull Run Overseas Forest Carbon Project: Phase 1

CVs for each team will be available to the audit team.

Financial Viability		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Project cash flow breakeven point is greater than 10 years from the current risk assessment	3
b)	Project cash flow breakeven point is between 7 and up to less than 10 years from the current risk assessment	0
c)	Project cash flow breakeven point between 4 and up to less than 7 years from the current risk assessment	0
d)	Project cash flow breakeven point is less than 4 years from the current risk assessment	0
e)	Project has secured less than 15% of funding needed to cover the total cash out before the project reaches breakeven	3
f)	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches breakeven	0
g)	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven	0
h)	Project proponent has secured 100% of the funding to implement project.	0
i)	**Mitigation:** Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven	0
Total Financial Viability (FV) [as applicable, ((a, b, c or d) + (e, f, g or h) + i)] Total may not be less than zero.		**6**

The project costs and financial viability were calculated based upon the following assumptions[2]:

A. Yearly Expenses:

1. Employment: Under the project scenario there will be 4 full time (12 months) and 4 part time employees (8 months). The Peruvian minimum wage is 750 Nuevo Soles (PEN) with an exchange rate of 1USD/0.36 PEN (June 2014). Therefore the minimum wage for Peru is $270 USD. The stated intention by Yacumama is to pay 25% above minimum wage for permanent

[2] See MS-Excel "*Project Expense Accounting_Yacumama Version 1.2 Conservative"* workbook (Yearly Expense Summary and financial viability worksheets) for calculations.

employees and 15% above for part time employees. As a result full time wage is $337.50 USD/month for permanent and $310.50 USD/month for part time employees or a total of $16,200 USD/year and $9,936 USD/year respectively. Thus total employee wage costs are estimated to be $26,136 USD/year and for the purposes of planning Yacumama is budgeting $30,000 USD/year.

2. Yearly Operational Expenses (in country): Yacumama estimates the following yearly operating expenses to implement the project requirements of maintaining basic infrastructure and a continuous physical presence onsite:

a. Local transportation,

b. Local Communication,

c. Property taxes and Business License,

d. Food for Yacumama employees,

e. Energy and Related Products, and

f. Infrastructure Repair and Maintenance.

Based upon previous expenses during CY2013 the total estimate for yearly operations is $17,000 USD/year. For purposes of budgeting Yacumama has allocated $20,000 USD/year for operational expenses.

3. Yearly International Expenses: These are expenses related to maintaining the lodge and physical presence at Yacumama to support implementation of the project. The two costs are travel and communications which are liberally estimated to be $9,000/year. For the purposes of budgeting Yacumama has allocated $10,000 USD/year for international expenses.

4. Yearly Support to Puerto Miguel Health Clinic: Yacumama has committed to $6,000 USD/year minimum support to the Puerto Miguel health clinic.

Total yearly expenses budgeted by Yacumama to implement the project: ***$66,000 USD/year***

B. Non-Yearly Expenses

1. Puerto Miguel Health Clinic Building Support: The current building that housed the Puerto Miguel health clinic that was paid for by Yacumama prior to the initiation of the project has degraded substantially. Yacumama will work with the community leaders to locate and build a new clinic and has budgeted $30,000 USD in 2016 for this purpose. In addition to the yearly support Yacumama has also budget $15,000 USD in 2026 and 2036 for substantial infrastructure improvements. Total building support for the life of the project will equal $60,000 USD/year.

2. Recurring 5 year expenses: There are recurring expenses that will occur approximately every 5 years throughout the project. These expenses are:

a. New Boat and Motor ($3,500 USD),

b. Monitoring data collection and verification ($60,000 USD),

c. Monitoring and verification audit (40,000 USD).

Thus the total budget for 5 year recurring expenses is $103,500 USD every 5th year of the project.

C. Estimated Income from VCU's

From the pre-risk buffer VCU's we estimated potential income from VCU's to establish project financial viability. Because the project is relatively small, the project proponents' explicitly stated and planned sales strategy is to target the secondary REDD market in order to exceed stated forest carbon, biodiversity conservation, and community support goals. Current options for small and medium size projects - who most need to maximize their percentage share of the offset value of their VCU's- are limited in a current market dominated by large block sales, at reduced values, to private equity funds as a speculative investment for re-tender into the secondary market. Thompson Reuters in their fourth quarter *2014 Point Carbon Market Overview* quoted the prices in the secondary market ranging from…."$6-$12/t depending upon volume….the higher price was typical for small transactions" which the project

proponents are targeting. In addition, USAID (2013) estimated the mid-range market price for VCU's as $10/t as various compliance markets begin accepting forest carbon offsets. Furthermore depending upon how compliance markets incorporate offsets demand and prices could increase substantially (USAID 2013). Given these uncertainties the project proponents originally selected a reasonable and conservative mid-range price of $8.50/VCU to evaluate their business model and the overall project efficacy. However, explicit VCS rules require that projects using VCU sales to demonstrate financial viability have signed contractual agreements in place prior to verification in order to count income from sales.

Financial Viability Assessment

For the purposes of financial viability, the project selected the most conservative choices possible in calculating financial viability.

Opportunity Cost		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	NPV from the most profitable alternative land use activity is expected to be at least 100% more than that associated with project activities; or where baseline activities are subsistence-driven, net positive community impacts are not demonstrated	8
b)	NPV from the most profitable alternative land use activity is expected to be between 50% and up to100% more than from project activities	0
c)	NPV from the most profitable alternative land use activity is expected to be between 20% and up to 50% more than from project activities	0
d)	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	0
e)	NPV from project activities is expected to be between 20% and up to 50% more profitable than the most profitable alternative land use activity	0
f)	NPV from project activities is expected to be at least 50% more profitable than the most profitable alternative land use activity	0
g)	**Mitigation:** Project proponent is a non-profit organization	0
h)	**Mitigation:** Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period (see project longevity)	0
i)	**Mitigation:** Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over at least 100 years (see project longevity)	0
Total Opportunity Cost (OC) [as applicable, (a, b, c, d, e or f) + (g + h or i)] Total may not be less than 0.		**8**

The project selected “a”, the most conservative choice.

Project Longevity		
a)	Without legal agreement or requirement to continue the management practice	18
b)	With legal agreement or requirement to continue the management practice	0
Total Project Longevity (PL) May not be less than zero		**18**

Internal Risk	
Total Internal Risk (PM + FV + OC + PL) Total may not be less than zero.	**32**

2 EXTERNAL RISKS

Land Tenure and Resource Access/Impacts		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Ownership and resource access/use rights are held by same entity(s)	0
b)	**Not Applicable.** Ownership and resource access/use rights are held by different entity(s) (eg, land is government owned and the project proponent holds a lease or concession)	0
c)	**Not Applicable.** In more than 5% of the project area, there exist disputes over land tenure or ownership	0
d)	**Not Applicable.** There exist disputes over access/use rights (or overlapping rights)	0
e)	**Not Applicable.** WRC projects unable to demonstrate that potential upstream and sea impacts that could undermine issued credits in the next 10 years are irrelevant or expected to be insignificant, or that there is a plan in place for effectively mitigating such impacts	0
f)	**Not Applicable.** **Mitigation:** Project area is protected by legally binding commitment (eg, a conservation easement or protected area) to continue management practices that protect carbon stocks over the length of the project crediting period	0
g)	**Not Applicable.** **Mitigation:** Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	0
Total Land Tenure (LT) [as applicable, ((a or b) + c + d + e + f + g)] Total may not be less than zero.		**0**

The project proponent has clear ownership title to the project area with accompanying resources access and use rights. The title and boundaries are registered officially in Peru with COFOPRI (http://www.cofopri.gob.pe/) which is the formal land titling organization in Peru. The title and original survey maps have been provided to the audit team.

An unofficial survey map produced by an individual during a site visit indicated that communal land if titled, would border Yacumama lodge property. The unofficial survey map produced by the individual from Puerto Miguel appeared to show a potential border discrepancy with the Yacumama lodge property, which incidentally is not part of the project area. However, the village officials declined to provide a copy

of the map or other supporting data to Yacumama or VTCMI. Furthermore, as of December 2013 the representatives of Puerto Miguel have ceased pursuing titling their community lands. Thus, in the absence of any tangible data or maps to the contrary, the project determined at this point there is no boundary dispute to resolve.

Community Engagement		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	**Not Applicable.** Less than 50 percent of households living within the project area who are reliant on the project area, have been consulted	0
b)	**Not Applicable.** Less than 20 percent of households living within 20 km of the project boundary outside the project area, and who are reliant on the project area, have been consulted.	0
c)	**Mitigation:** The project generates net positive impacts on the social and economic well- being of the local communities who derive livelihoods from the project area	-5
Total Community Engagement (CE) [where applicable, (a + b + c)] Total may be less than zero.		**-5**

There are no communities within the project area thus a score of "0". The primary households dependent upon the project area are those whose permanent staff members employed by Yacumama lodge, of which 100% were consulted. Community members of Puerto Miguel were consulted in a series of formal and informal community meetings and notified of the project through fliers. In addition the "village council" (i.e. elected representatives of Puerto Miguel) attended the meetings and the minutes were entered into the official log book. Very few of the households in Puerto Miguel (if any) who do not have members employed by Yacumama, are directly reliant upon the project area. Nevertheless, over 100 adults attended meetings or were otherwise directly consulted, conservatively representing over 10% of the total population and well exceeding 20% of the households. Thus a score of "0" was entered.

The project generates net positive impacts on the social and economic well- being of the local communities who derive livelihoods from the project area. For the larger community (i.e. residents of Puerto Miguel, staff and owners of other lodges etc.) there are direct and indirect benefits under the with-Project scenario. Residents of the village of Puerto Miguel will directly benefit from the renewed support

by Yacumama management to the local health clinic. Furthermore, Yacumama serves as the logistical base for Amazon Promise[3], a non-profit organization providing needed medical and dental care to remote populations living in the Upper Amazon Basin of northeastern-Peru. The environmental effects of maintaining forest cover on the Rio Yarapa will benefit both the lodges and community of Puerto Miguel through maintenance of water quality and habitat for the important Rio Yarapa fishery.

Political Risk		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Governance score of less than -0.79	0
b)	Governance score of -0.79 to less than -0.32	0
c)	Governance score of -0.32 to less than 0.19	2
d)	Governance score of 0.19 to less than 0.82	0
e)	Governance score of 0.82 or higher	0
f)	**Mitigation:** Country implementing REDD+ Readiness or other activities such as: a) The country is receiving REDD+ Readiness funding from the FCPF, UN-REDD or other bilateral or multilateral donors b) The country is participating in the CCBA/CARE REDD+ Social and Environmental Standards Initiative c) The jurisdiction in which the project is located is participating in the Governors' Climate and Forest Taskforce d) The country has an established national FSC or PEFC standards body e) The country has an established DNA under the CDM and has at least one registered CDM A/R project	-2
Total Political (PC) [as applicable ((a, b, c, d or e) + f)] Total may not be less than zero.		**0**

To assess political risk, the calculated governance score is -0.221 . This figure was calculated from Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home) most recent available data (2011-2015).

Country	*Indicator*	*2011*	*2012*	*2013*	*2014*	2015	Average
Peru	**Voice and accountability**	0.09	0.07	0.04	0.14	0.16	0.1

[3] http://www.amazonpromise.org/

	Political Stability and Absence of Violence/Terrorism	-0.74	-0.87	-0.77	-0.55	-0.51	-0.688
	Government Effectiveness	-0.15	-0.14	-0.11	-0.28	-0.28	-0.192
	Regulatory Quality	0.48	0.50	0.47	0.52	0.49	0.492
	Rule of law	-0.62	-0.61	-0.60	-0.55	-0.53	-0.582
	Control of corruption	-0.25	-0.39	-0.44	-0.59	-0.60	-0.454
						Average Governance score	-0.221

Peru has a designated national authority (see below).

	Organization's address / Contact person
Peru Designated National Authority	Ministerio del Ambiente Av. Javier Prado 1440, San Isidro Lima 27 Perú Mr. Eduardo Durand López - Hurtado (edurand@minam.gob.pe, kmondonedo@minam.gob.pe) Director General de Cambio Climático, Desertificación y Recursos Hídricos Phone: (+511) 611-6000 ext. 1350 Fax: (+511) 611 6000 ext.1634

Peru CDM Project:

The project *"Ignacio Tavara Dry Forest Reforestation, Sustainable Production and Carbon Sequestration",* was established on 8989 ha of the communal land of the Ignacio Tavara Pasapera Community. It is located in Chulucanas District, department of Piura. The project was registered in 2009 with the Clean Development Mechanism (CDM) of the UNFCCC and it employs native species from the

dry tropical forest, such as algarrobo (*Prosopis pallida*), zapote (*Capparis scabrida*) and overo (*Cordia lutea*).

External Risk	
Total External Risk (LT + CE + PC) Total may not be less than zero.	**0**

3 NATURAL RISKS

Fire

The risk of forest fire at any one location in the Amazon basin varies widely and is highly dependent upon a number of factors, not least of which is the local land-use, vegetation matrix and geographic location within the basin (Cochrane and Laurance 2002, Silvestrini et al. 2011). Other risk factors include logging history, spatial juxtaposition to road networks and forest fragmentation due to agricultural activities (Alencar et al 2004, Cardoso et al. 2003, Nepstad et al. 1999). In addition Silvestrini et al. (2011) found a negative relationship between fire occurrence and floodplain forests. Furthermore Uhl (1990) stated that "Wildfires in most undisturbed, tall, closed-canopy, tropical rain forests are virtually impossible because a moist microclimate and high rainfall create nearly non- flammable conditions."

The Yacumama project area is located on an annually flooded floodplain, has no history of extensive commercial logging, is not near a road network, and is not within a fragmented forest-agricultural landscape. Furthermore, rainfall occurs throughout the year (2715mm), and yearly flooding impacts the majority of the property from 1-6 months a year, which maintains surface fuel moisture thus reducing fire risk and the severity (Kvist and Nebel 2001). In addition, the project is located in the eastern Amazon basin and receives significantly higher precipitation compared to the western amazon because of the strong east-west precipitation gradient (Olivares et al 2015). Furthermore, Silvestrini et al (2011) showed that under IPCC's A2 climate scenario and business as-usual (BAU) deforestation, that even by 2050 the region surrounding Yacumama has a very low probability of fire and the fires that may occur will be limited

in severity. Thus the 'likelihood' rating for fire in the Project area was conservatively rated as "*Every 50 to less than 100 years*". Because fire is rare to essentially absent in the undisturbed wet tropical, flooded forest of Peru no studies examining the effect of fire on carbon stocks in these ecosystems are available. However, because in the future there is a slight risk of fire under IPCC's A2 climate scenario the 'significance' rating in the Project area was rated as "*Minor (5% to less than 25% loss of carbon stocks)."*

Natural Risk- Fire	
Significance	Minor (5% to less than 25% loss of carbon stocks)
Likelihood	Every 50 to less than 100 years
Score (LS)	1
Mitigation	0

Pest and Disease Outbreaks

Because of high tree diversity in the Peruvian floodplain forests (over 320 species) (Nebel et al 2001b), and in the Amazon rainforest as a whole (513 genera) (Steege et al 2006), the risk of pest and disease outbreaks affecting the tree, biomass composition, and density are very low. "In tropical forests, the high diversity of tree species serves to substantially reduce the spread of disease through simple physical interference, because intervening non-susceptible plants could impede the spread of air- or soil-borne pathogens" (Gilbert and Hubbell 1996). The broad range of species diversity does not eliminate the possibility of pathogens affecting individual trees, but it does ensure that regardless of an outbreak, large areas will not be affected, or susceptible to the pathogen. Thus the rating for the 'likelihood' of pest and disease outbreaks was assessed as "e*very 50 to less than 100 years"* and 'significance' rated as "*insignificant (less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event)".*

Natural Risk-Pest and Disease outbreaks	
Significance	Insignificant (less than 5% loss of carbon stocks) or transient (full recovery of lost carbon stocks expected within 10 years of any event)
Likelihood	*Every 50 to less than 100 years*
Score (LS)	0
Mitigation	0

Extreme Weather

Aside from annual flooding, and occasional dry periods associated with the southern oscillation, which are both considered to be a part of the system, there are no major extreme weather events that may impact carbon stocks within the project area. There is no evidence that the climate of the region has undergone a significant droughts in the last 10 million years (Junk et al 2010), and geographically the property is under no threat of hurricanes or tropical storms. The recurrence intervals for large disturbances in the western Amazon are estimated to be every 27,000 years (Espirito-Santo et al 2010). Therefore the 'likelihood' was assessed as "*not applicable*" and the significance as '*no loss'*.

Natural Risk -Extreme Weather	
Significance	No Loss
Likelihood	Once every 100 years or more, or risk is not applicable to project area
Score (LS)	0
Mitigation	0

Geological Risk

For the time period of the project (i.e. 30 years) there is no geological risk for the project area. Geologically, the Amazon basin is bounded by two, ancient, large stable masses of Pre-Cambrian rock, the Guiana Shield or Highlands to the north, the Central Brazilian Shield or Plateau to the south. The Andes Mountains to the west are of relatively recent origin but effect the Amazon only through the deposition of eroded sediments. The Amazon basin developed during the Cretaceous and has been a

permanent feature of (the South American) continent for at least the last 55 million years (Maslin et al 2005).

Natural Risk-Geological Risk	
Significance	No Loss
Likelihood	Once every 100 years or more, or risk is not applicable to project area
Score (LS)	0
Mitigation	0

Score for each natural risk applicable to the project (Determined by (LS × M)	
Fire (F)	1
Pest and Disease Outbreaks (PD)	0
Extreme Weather (W)	0
Geological Risk (G)	0
Other natural risk (ON)	0
Total Natural Risk (as applicable, F + PD + W + G + ON)	**1**

4 OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

4.1 Overall Risk Rating

Risk Category	Rating
a) Internal Risk	32
b) External Risk	0
c) Natural Risk	1
Overall Risk Rating (a + b + c)	**33**

4.2 Calculation of Total VCUs

Please refer to Yacumama Project Description section 3.4 “Net GHG Emission Reductions and Removals” estimated VCU’s.

Literature Cited

Alencar, A. A. C., L. A. Solorzano, and D. C. Nepstad. 2004. Modeling forest understory fires in an eastern Amazonian landscape. Ecological Applications 14(Supplement):S139–S149.

Anderson, L.E. 1997. A cost-benefit analysis of deforestation in the Brazilian Amazon. Institute for Applied economic research. Rio de Janeiro.

Cardoso, M. F., C. G. Hurtt, B. Moore, C. A. Nobre, and E. M. Prins. 2003. Projecting future fire activity in Amazonia. Global Change Biology 9:656–669.

Covell, Phil. 2011 Business Guidance: Forest Carbon Marketing and Finance. In Building Forest Carbon Projects, Johannes Ebeling and Jacob Olander (eds.). Washington, DC: Forest Trends.

Espirito-Santo, F., M. Keller, B. Braswell, B. Nelson, S. Frolking, and G. Vicente. 2010. Storm intensity and old-growth forest disturbances in the Amazon region. Geophysical Research Letters 37: L11403.

Gilbert, G., and S. Hubbell. 1996. Plant diseases and the conservation of Tropical forests. Bioscience 46(2): 98-106.

Junk, W., M. Piedade, F. Wittmann, J. Schongart, and Pia Parolin (Eds.) 2010. Amazonian Floodplain Forests: Ecophysiology, Biodiversity and Sustainable Management. Springer Verlag. Berlin.

Maslin, M., Y. Malhi, O. Phillips, and S. Cowling. 2005. New views on an old forest: assessing the longevity, resilience and future of the Amazon rainforest. Transactions of the Institute of British Geographers 30(4): 477-499.

McClain, M. E. and R. E. Cossio. 2003. The use and conservation of riparian zones in the rural Peruvian Amazon. Environmental Conservation 30:242–248.

Nebel, G., L. P. Kvist, J. K. Vanclay, H. Christensen, L. Freitas, and J. Ruiz. 2001b. Structure and floristic composition of flood plain forests in the Peruvian Amazon I. Overstorey. Forest Ecology and Management 150: 27-57.

Nepstad, D. C., A. Verissimo, and A. Alencar. 1999. Largescale impoverishment of Amazonian forests by logging and fire. Nature 398:505–508.

Olivares, I., J. Svenning, P. M. van Bodegom, and H. Balslev. 2015. Effects of Warming and Drought on the Vegetation and Plant Diversity in the Amazon Basin. Botanical Review. 81:42–69

Ortiz, R., Nowak, A., Lavado, A. and Parker, L. 2013. Food security in Amazonia. Report for Global Canopy Programme and International Center forTropical Agriculture as part of the Amazonia Security Agenda project.

ter Steege, H., N. Pitman, O. Philips, J. Chave, D. Sabatier, A. Dunque, J.F. Molino, M.F. Prevost, R. Spichiger, H. Castellanos, P. von Hildebrand, and R. Vasquez. Continental-scale patterns of canopy tree composition and function across Amazonia. Nature 443(28): 444-447.

Uhl, C., J. Boone Kauffman. 1990. Deforestation, fire susceptibility, and potential tree responses to fire in the eastern Amazon. Ecology 7(2): 437-449.

USAID.2013. Emerging compliance markets for REDD+: An assessment of supply and demand.

USDA Foreign Agricultural Service. 2013. Global Agricultural Information Network. Report number 2/20/2013.