

# LAD CASE STUDY

## Funding Coca Codo Sinclair: Correa's Bet on Sustainable Power in Ecuador

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# LAD

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The Leadership Academy for Development (LAD) trains government officials and business leaders from developing countries to help the private sector be a constructive force for economic growth and development. It teaches carefully selected participants how to be effective reform leaders, promoting sound public policies in complex and contentious settings. LAD is a project of the Center on Democracy, Development and the Rule of Law, part of Stanford University's Freeman Spogli Institute for International Studies, and is conducted in partnership with the Johns Hopkins School of Advanced International Studies.

## **Funding Coca Codo Sinclair: Correa's Bet on Sustainable Power in Ecuador**

The date is April 28, 2010. Ecuadorian Coordinating Minister Jorge Glas faces a dilemma – should he negotiate a \$1.7 billion loan from two Chinese companies to build what would be the nation's biggest hydropower plant, Coca Codo Sinclair, even though it poses significant environmental risks? Or should he abandon the deal, guaranteeing that Ecuadorians will continue to live without sustainable power?

Two years earlier, Glas thought that he had a good plan in place. On February 7, 2008, he helped forge a joint venture between Termopichincha, an Ecuadorian state-owned thermal power generation Company, and ENARSA S.A., an Argentinean energy company. He hoped that this special-purpose vehicle, formally known as Coca Codo Sinclair S.A., would enable construction of the Hydroelectric Project Coca Codo Sinclair. Under the contract, Termopichincha would own 70 percent of the company's equity and the Argentinean ENARSA S.A. 30 percent, while Argentina would finance 30 percent of the hydropower plant. The facility, to be located in Napo Valley, is expected to have a capacity of 1,500 megawatts, enough to supply 75 percent of the country's energy.

However, the dramatic drop of the price of oil in late 2008 prompted the Argentinian company to back out of the deal before the project even started. Without a contracting partner, Glas had to find another way to build the facility.

Ecuadorian President Rafael Correa promised to build the hydro plant when he ran for the presidency in 2007. He promoted it as the centerpiece of a new national energy plan, which aims to replace energy from fossil fuels with renewable hydroelectric power in order to increase energy self-sufficiency and reduce energy imports from Peru and Colombia.

The Ministry of Electricity, created in 2007, is now charged with implementing a clause in the country's new constitution (introduced by Correa) that commits the government to increasing Ecuador's use of renewable energy. Jorge Glas, the coordinating minister of strategic sectors, oversees the Electricity Ministry and is responsible for completing this project during Correa's term. (See Appendix I for the structure of the coordinating ministries.)

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*Yao Yang conducted interviews and prepared this case under the supervision of Francis Fukuyama of Stanford University. This case was developed solely as a basis for class discussion. It is not intended to serve as a historical record, a source of primary data, or an illustration of effective or ineffective management.*

## **Ecuador's Economy and Government**

Slightly smaller than the U.S. state of Nevada, Ecuador has a population of 13.8 million people. It is a developing economy with severe inequality and energy problems that have dictated the current policy agenda. (See Appendix II for a map of Ecuador.) Ecuador is both geographically and ethnically diverse, and has a relatively long, albeit unstable, experience with democratic government. Some 40 percent of Ecuadorians live in poverty and another 13 percent live in extreme poverty. The country ranks 83rd in the UNDP Human Development Index, close to Peru (80), Brazil (84), and Colombia (87). At barely \$4000, GNI per capita is among the lowest in South America. Economic growth closely tracks the price of oil and the rate of oil production. According to the IMF, economic growth averaged 3.5 percent for 1997-2006, and during the next few years plummeted from 7.2 percent in 2008 to 0.4 percent in 2011<sup>i</sup>. Although Ecuador's oil sector accounts for more than half of the country's export earnings and approximately two-fifths of public sector revenues, the nation is the smallest member of OPEC in the Andean region of South America.

Ecuador has experienced a high degree of political and economic instability, especially since 1972. The government replaced its currency with the U.S. dollar in 2000 in an effort to stabilize its money supply and restrain inflation.

On January 15, 2007, Rafael Correa (a left leaning, U.S.-trained economist) was inaugurated to a four-year term, becoming the country's eighth president in ten years. Prior to him, Ecuadorian politics had been controlled mostly by powerful military officers, bankers and a series of elected presidents who often failed to finish their terms.

Correa is considered a very hands-on president with authoritarian leanings. An official with the Inter-American Development Bank described him as energetic and detail-oriented, eager to attend a wide variety of agency meetings.<sup>ii</sup>

Correa has called for a renegotiation of Ecuador's \$10.2 billion external debt, approximately 25 percent of GDP. In his inaugural address, on January 15, 2007, he termed a portion of Ecuador's external debt as illegitimate because it emerged under military rule. He has threatened to default on Ecuador's foreign debt, and to suspend review of the country's economy by the World Bank and the International Monetary Fund. To underscore his threat, on April 26, 2007, he ordered the expulsion of the World Bank's country manager.<sup>iii</sup> In December 2008, President Correa announced that the country would default on over \$3 billion worth of bonds and vowed to fight creditors in international courts. He ultimately succeeded in cutting the price of outstanding bonds by more than 60 percent. (See Appendix III on fluctuations in Ecuador's external debt.)

## **Coca Codo's History and Scope**

The Coca Codo Sinclair hydro project involves construction and operation of a run-of-the-river plant<sup>iv</sup> on the Coca River between the Ecuadorian provinces of Napo and Sucumbio. "Codo" means elbow in Spanish, and the site is to be built on the Coca River, a tributary of the Napo River. Sinclair is the last name of Joseph Sinclair, an American geologist who first explored the area in the early 20<sup>th</sup> century.

The Coca Codo Sinclair hydroelectric project was proposed in the early 1980s, but the 1987 Reventador volcanic eruption and financial constraints prevented its construction. Correa resurrected the project in 2007 as a centerpiece of his administration's energy plan, and cites recurrent energy shortages in Quito, the capital, as evidence of its necessity. The Italian firm Electroconsult was then hired to conduct a new feasibility study, one that justified nearly doubling the facility's installed capacity to 1,500 MW. However, according to one environmental expert, that study utilized historic hydrologic data of very questionable validity and no effort was made to verify the persistence of flows in the project area.

Construction alone was estimated to cost around \$1.979 billion. With other expenses, the total cost could hit \$2.670 billion. (See Appendix IV for more details on the project's cost estimation.)

## **Financing Options**

What are Glas' financing options to restart Coca Codo?

His first option is to draw on the equity of SPV Coca Codo Sinclair S.A., established by Ecuador and Argentina with projected assets of around \$988 million. At this moment, however, Argentina has not completed the legal process of transferring equity to Ecuador, and Glas still needs to find an additional \$1.68 billion.

Considering the risk and time involved in equitizing the new venture, Glas could opt instead for debt financing. Instead, he chose to first pursue a contractor for the project instead of an alliance partner, fearing that if the finance partner backs out as the Argentines did, the project would become unacceptably delayed. Therefore, he needs a contractor that can both build the plant and bring its own financing.

On September 21, 2008, bidding for the project contractor opened. Shortly beforehand, Glas transformed SPV Coca Codo Sinclair S.A. into the Hydroelectric Strategic Public Company Coca Codo Sinclair EP,<sup>v</sup> which has the power to "exercise as a legal entity under public law, with its own equity endowed with budgetary, financial, economical, and administrative autonomy."<sup>vi</sup> Under Ecuadorian law, financing or procurement by state-owned companies does not need approval from Congress. In this way, Glas retains control of the project without congressional interference.

Development banks, such as the IMF and World Bank, are common funding sources for developing nations. However, Correa's 2007 decision to expel the World Bank will complicate efforts to attract financing. Although other western development organizations like the Inter-American Development Bank could step in, these institutions may be reluctant to lend absent thorough environmental, social, and economic assessments. Such evaluations often take years. Glas can't afford to wait that long because he knows that Correa wants the project completed during his current term.

Once the dam is in operation, the government can cover some of its debt by selling the CO<sub>2</sub> quota that the dam is projected to save for electricity generation. An official estimate projects that the project would abate 4,552,852 tons of CO<sub>2</sub> per year. This amount of greenhouse gas, if certified by the UN under the Kyoto Protocol, could sell anywhere from 273,171,120 to 546,342,240 Euro (\$292,252,122 to \$584,504,245) over ten years.

What Glas needs now is an upfront investment so the project can begin quickly. Rather than look for separate contractors and funders, Glas wants to find a contractor with strong funding abilities. Glas began by looking at individual countries with the requisite engineering and financial capacity. On January 13, 2009, Glas altered the bidding terms to include a plan for financing the project built around a consortium in which an Ecuadorian company would hold a 15 percent stake.

That requirement makes Chinese firms, which have significant foreign reserves and extensive hydro development experience, the only possible bidders, and indeed, two qualified bidders (both from China) emerged: Gezhouba with China Development Bank as a funder and Sinohydro with China Exim Bank's backing. Both firms are state-owned hydropower engineering and construction companies and both banks are policy banks, meaning that they act as arms of the Chinese government. Since the inauguration of its "going out" strategy in 2002, which encouraged its enterprises to invest overseas, and because of its rich foreign reserves, China has become a global leader in the financing and construction of new hydroelectric installations worldwide. China Development Bank and China Exim Bank together hold more assets than the combined assets of the Western-backed multilateral development banks. (See Appendix VI for a comparison of development banks).

Sinohydro Corporation is a state-owned company and the world's largest hydropower construction company, with a 50 percent share of the international hydropower market. Gezhouba is also a large infrastructure construction contractor with significant experience in building large dams internationally; the firm was lead contractor for the biggest dam in China, the Three Gorges Project.

The bidding also stipulated that there had to be a domestic partner in the project, one which would hold a 15 percent equity stake in the consortium. Gezhouba chose San Jose May and Sinohydro chose CoAndes, both Ecuadorian construction companies.

How should Glas choose between the two bidders?

The bids were reviewed by a committee of four ministers led by Glas, including the ministers of electricity, finance and environment. President Correa set June 2009 as the deadline for signing the deal, pressuring the ministers to finish the deal quickly and indicating that they should resign if they failed.

Although the committee had experience evaluating bids for large oil projects, working with these Chinese firms proved more difficult because of technical, cultural and language barriers. Chinese hydropower knowhow is much more advanced than Ecuador's. According to a main legal negotiator, Paulina Durango, although Ecuador had technical staff involved from the beginning, the Chinese technical team would go back each time to approve every single issue, which greatly delayed the negotiation process. Language also proved to be a significant barrier.

According to Durango, Glas eventually chose Sinohydro because the company had more experience, its offer was more detailed and viable, and the firm promised to involve more Ecuadorian sub-contractors. Durango also added that Sinohydro likely prevailed because the firm provided more translation assistance. However, negotiations over technical issues and translation problems still delayed the signing of the engineering contract. Negotiations with Argentina to sell their shares occurred around the same time as negotiations with the Chinese company. On September 17, 2009, through a "Purchase Agreement of Shares," ENARSA S.A. officially transferred all shares in credit form to the Electricity Corporation of Ecuador, a state-owned holding company engaged in the generation, transmission, distribution, marketing, importing and exporting of electric power (CELEC).<sup>vii</sup> At about the same time, the engineering contract with Sinohydro was extended to August 31 and the document was finally signed on October 5.

### **Significant Environmental and Engineering Concerns**

After Minister Glas signed the engineering contract, civil society groups raised strong objections to the project, mostly based on concerns over environmental damage and engineering feasibility. These objections added to the pressure on Glas to reach an agreement with China on the financial terms. The environmental and engineering concerns revolved around the following specific issues:

- Potential Destruction of the San Rafael Waterfall and Threat to the Last Intact Roadless Region in the Tropical Andes

The water diversion dam is to be located just 19 km upstream of San Rafael Falls on the Coca River and would effectively divert the water needed for energy production through a large cross-country tunnel spanning a prominent bend in the river. Environmental groups contend that the dam would thereby circumvent San Rafael Falls altogether, causing it to dry up.

At a towering 480 feet, San Rafael Falls is Ecuador's largest and most spectacular waterfall. It is located in the mega-diverse transition zone between the Andes Mountains and the Amazon and is a principal attraction of the UNESCO-designated Sumaco Biosphere Reserve. The falls have become one of Ecuador's more prominent ecotourism attractions, a country that made headlines in 2008 for being the first nation to grant constitutional rights to nature itself.

The great elbow (or "codo") in the Coca River is not only home to the San Rafael Falls, but also protects a vast rainforest wilderness area in the Tropical Andes with its steep canyon walls. UNESCO designated the area as a Biosphere Reserve due to its importance to the conservation of tropical biodiversity.<sup>viii</sup>

A new access road to the proposed powerhouse location has already been built in a previously untouched part of the UNESCO Sumaco Biosphere Reserve, and a second major road into the reserve to service the project is now in planning stages. The studies have not been completed, but it is expected that it will require another separate road corridor be built for the construction work on the tunnel.<sup>ix</sup>

- Questions Regarding Installed Capacity

Another controversy concerns the engineering evaluation. According to Matthew Terry of the Ecuadorian Rivers Institute (ERI), the project lacks a comprehensive environmental impact study, as well as key technical studies, final designs, and a definitive budget.<sup>x</sup>

The Coca Codo Sinclair company claims that the project will generate 1,500 MW of electricity using 222 cubic meters of water per second from the Coca River. But Terry maintains that the river typically generates only 80-100 cubic meters per second, and the project does not have a reservoir with any significant regulating capacity because of sedimentation and seismic risk.

As stated by Terry: "We (ERI) consider the Coca Codo Sinclair (CCS) hydroelectric project to be a high cost, high risk project that will fall short of delivering the promised benefits due to deficiencies in the amount of available flow and gross exaggerations in the project design during normal operating conditions and scenarios. We consider the CCS project to be a serious distraction from an abundant variety of more reasonable priorities and alternatives for developing



secure and responsible renewable energy generation to meet the growing demands of the Ecuadorian electric sector.”

Terry said that under normal flow conditions and stated operating parameters, the CCS HPP will de-water approximately 60 km of the Coca River, including the largest waterfall in the country. The diversion dam site was built at an existing access point for adventure tourism. Existing recreational river uses and river-based tourism were not considered in the development of the project and this remains an issue and major contention. The CCS project is located about as far away as you can get from major population centers.

According to Terry, the two new feasibility studies that recommend developing the 1,500 MW project were based on historic hydrologic data of questionable validity, neglected to include hydrologic data from the last 20 years, and failed to take into account the effects of multiple trans-continental water diversions from the Coca watershed. All of this justifies their concern that the project does not take into account the current available flow regime in the Coca River’s drainage and the Upper Napo basin.<sup>xi</sup>

Terry referred to a document where the CCS project appeared in the catalog of projects published by the Consejo Nacional de Electricidad (CONELEC) in the year 2005. He said that this presents an alternative to the project as currently conceived, which was identified and recommended based on feasibility studies from 1992 funded by the IDB. It is important to note that in 2005, the CCS project was not included in the government’s long-term plans for the development of the electric sector, but was instead listed as an inventoried project in the government’s catalog of projects. In 2006, during the first presidential election campaign of Rafael Correa, the CCS project was arbitrarily increased to 1500 MW and proposed as the solution for Ecuador’s growing electricity needs without any new studies or technical justification.

The original feasibility studies, financed by the IDB and finished in 1992, recommended the project be built in two phases - first, a 432 MW project using a flow of 63.5 cubic meters of water per second from the Coca River, and later (in order to take advantage of exceptionally high flows for power generation) a second stage could be installed with capacity of 427 MW, for a total production of 859 MW using a total flow of 127 cubic meters of water per second.

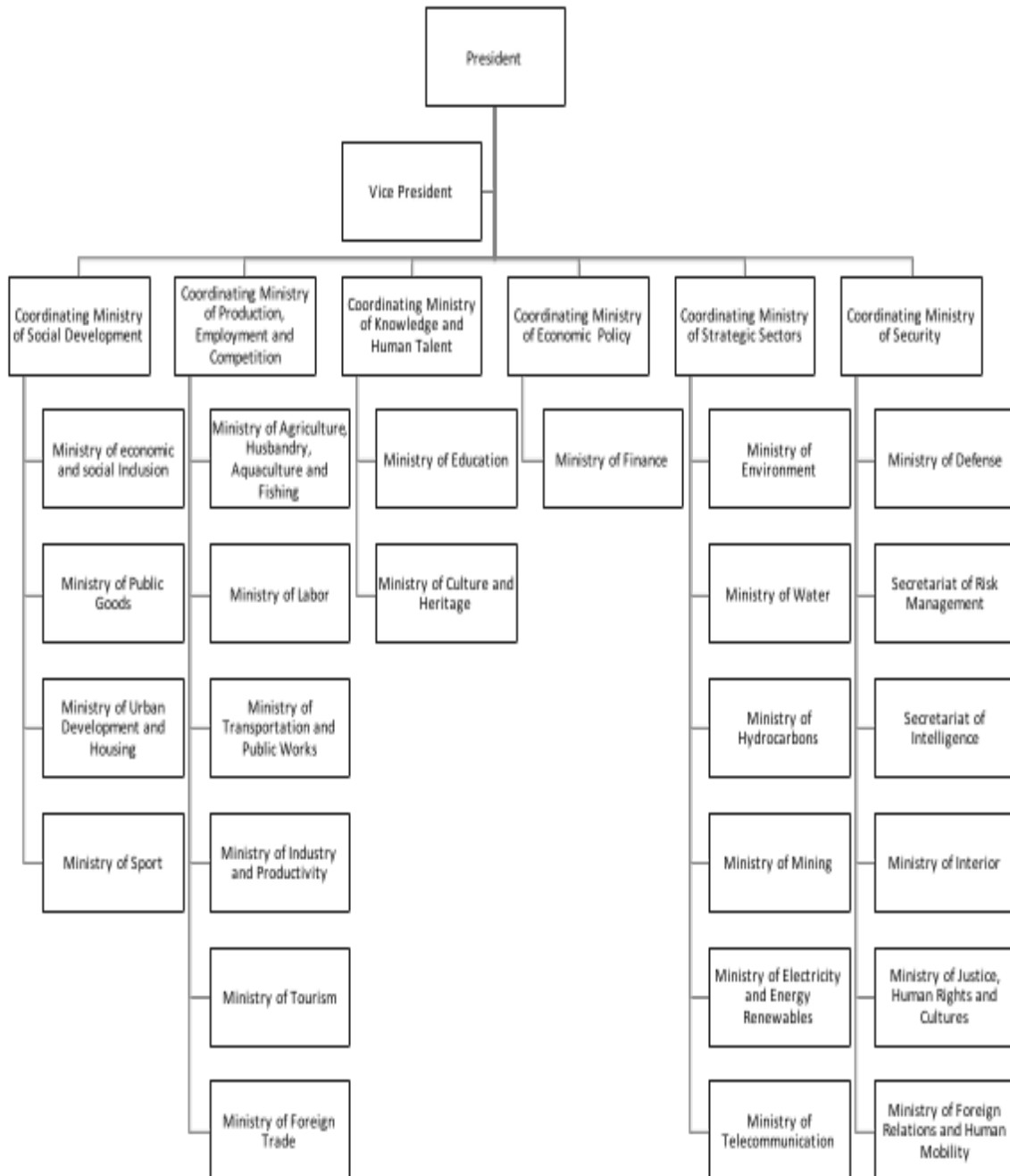
In January 2010, the Mexican state electricity company completed an analysis of the Electroconsult study and recommended an installed capacity of 1,200 MW for the project. However, this analysis only evaluated the methodology used in the Electroconsult study and did not verify or evaluate the hydrologic data for the project.

In the face of these concerns, the Chinese Exim Bank has offered to finance 85 percent of the project, valued at USD 1.979 billion. However, the offer included interest rates much higher than those normally offered by Western development organizations (the full details of the offer were not publicly disclosed). The two parties are still far apart on issues such as loan guarantees and dispute resolution.

Given the significant environmental risks inherent in the Coca Codo project, should Glas proceed with this deal or try to renegotiate better terms with Sinohydro?

## Appendices

### Appendix I: Structure of Ecuador's Government



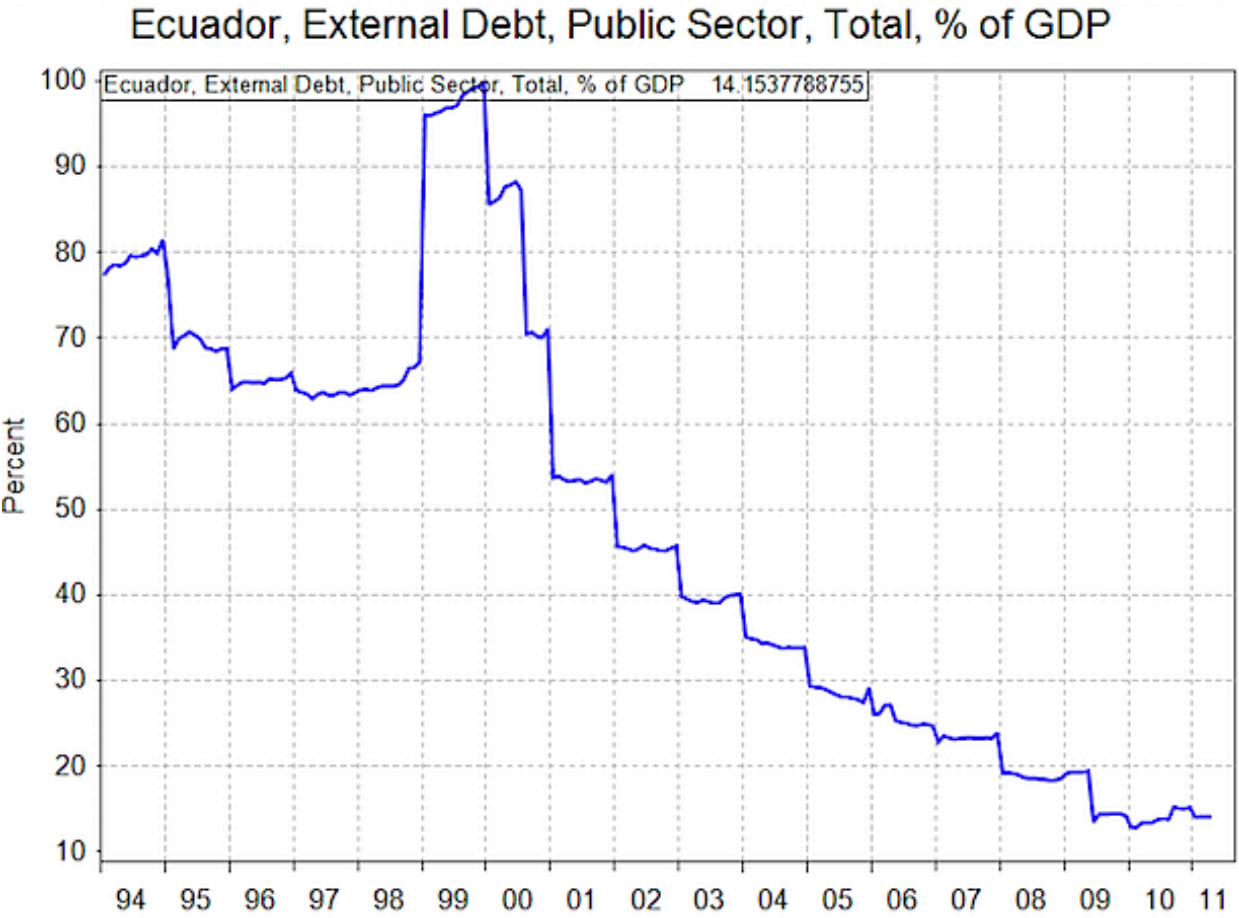
Source: <http://countrystudies.us/ecuador/58.htm>

## Appendix II: Map of Ecuador



Source: <https://geology.com/world/ecuador-satellite-image.shtml>

**Appendix III: Ecuador's External Debt, Public Sector, Total % of GDP**



Source: <http://blogs.reuters.com/felix-salmon/2011/07/05/how-ecuador-sold-itself-to-china/>

## Appendix IV: Project Information

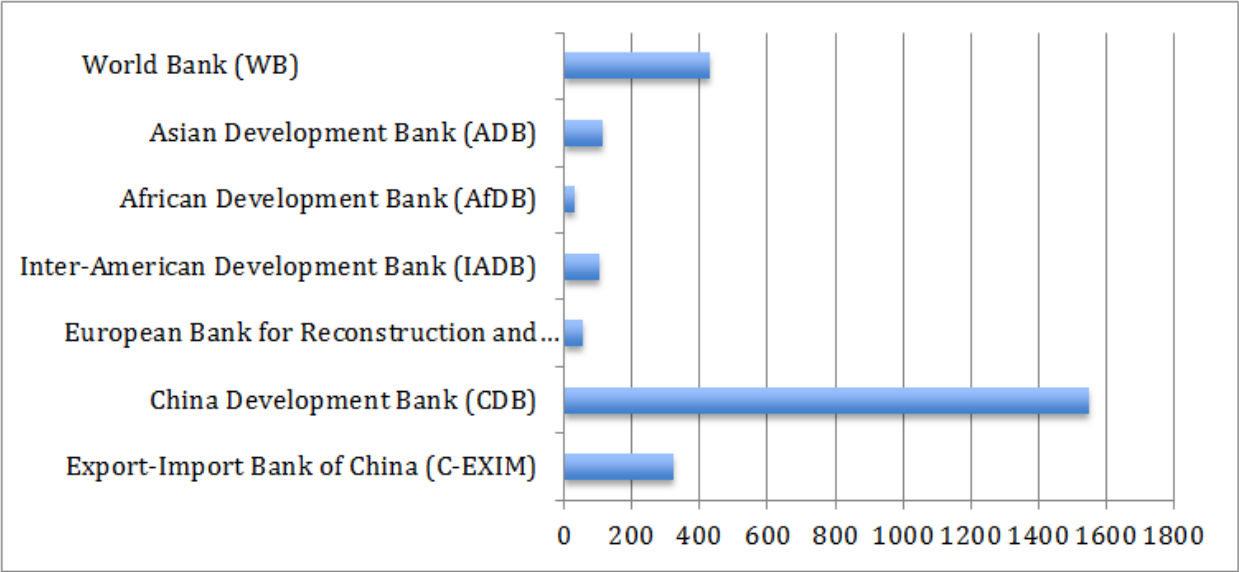
Owner/Client:	Hidroeléctrica Coca Codo Sinclair EP/ Sinohydro Corporation Ltd
Period of Activity:	2009-2016
Project Objective:	<p>To build a hydroelectric central/plant with nominal power of 1,500 MW in order to produce an annual energy average of 8.631 GWh.</p> <p>To deliver the generated energy to the interconnected national system.</p> <p>To replace thermoelectric energy, which derives from fossil fuels, with renewable hydroelectric energy.</p>
Project Description:	<p>The 1500 MW Coca Codo Sinclair Hydroelectric Project uses the water coming from the Quijos and Salado Rivers, tributaries of the Coca River, in an area where the Coca River forms an important curve that produces the 620m-high San Rafael Waterfall. The flow rate is 222m<sup>3</sup>/sec and the yearly energy production is 8743GWh.</p> <p>The rockfill gravity dam is approx. 40m-high and has a volume of 300,000m<sup>3</sup>. The compensating basin has a total regulating volume of 860,000m<sup>3</sup>. The 24.5km-long headrace tunnel (8.2m of internal diameter) will be excavated by TBM. There are two 1400m-long penstocks, with an internal diameter of 5.8m, and a 630m maximum water head.</p> <p>The access road to the compensation basin is 29.5km-long and 7.2m-wide. It is a dual carriageway and it crosses the Coca River by means of a 24m-long bridge. The 1.4km-long access road to adit n.2 overpasses the Coca River with a 131m-long bridge.</p>

## Appendix V: Project Finance

<b>Total Project Cost</b>			
Development Costs	US\$ 54,509,895		
Construction/Installation Costs	US\$ 1,979,700,000		
Other Costs	US\$ 636,498,805		
Total Project Costs	US\$ 2,670,708,700		
<b>Sources of Finance (to be sought or already committed)</b>			
Equity	US\$ 987,863,700	Coca Codo Sinclair EP	37%
Debt - Long Term	US\$ 1,682,745,000	Ex-Im Bank, China	63%
Debt - Short Term			
Non-Identified	A leverage of 25% through CERs is being considered		
<b>CDM Contribution (complimentary earnings on the sale of CERs)</b>			
Average Reduction per Year	4,552,852 ton CO2		
Indicative Price on One "CER"	€6/ton CO2	€9/ton CO2	€12/ton CO2
CDM Contribution if Certified 7 years	€ 382,439,589	€ 573,659,384	€ 764,879,178
CDM Contribution if Certified 10 years	€ 273,171,120	€ 409,756,680	€ 546,342,240
CERs Sold in Advance	15 to 20 percent		
<b>Basic Estimation of Profitability</b>			
Internal Return Rate (IRR)			
IRR without CERs	7,78%		
IRR with CERs, until 2012			
IRR with CERs, 7 years period	8,62%	9,04%	9,46%
IRR with CERs, 10 years period	8,50%	8,88%	9,25%

Source: Coca Codo Sinclair Project Idea Note <https://endlessriveradventures.com/wp-content/uploads/2012/01/CocaSinclair.pdf>

**Appendix VI: China-backed and Western-backed Development Banks (total assets in USD billions)**



Source: <http://www.brettonwoodsproject.org/2016/04/20508/>



## Endnotes

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<sup>i</sup> <https://www.imf.org/en/Countries/ECU>

<sup>ii</sup> Interview conducted by author with an IDB official

<sup>iii</sup> <http://news.bbc.co.uk/2/hi/americas/6598027.stm>.

<sup>iv</sup> Run-of-the-river hydroelectricity (ROR) is a type of hydroelectric generation plant with little or no water storage capacity. The small amount of water that accumulates behind larger run-of-the-river systems during off-peak periods is called pondage and is used during peak periods. Run-of-river plants are therefore subject to seasonal river flows, causing the plant to operate as an intermittent energy source unless the plant's pondage can regulate the water flow to continuously adjust to seasonal fluctuations.

<sup>v</sup> EP is the abbreviation for Empresa Pública or state-owned company.

<sup>vi</sup> Consejo Nacional de Electricidad, 2008.

<sup>vii</sup> <http://www.elcomercio.com/actualidad/enarsa-deja-coca-codo-sinclair.html>.

<sup>viii</sup> <http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?code=ECU+03&mode=all>

<sup>ix</sup> <https://www.internationalrivers.org/resources/ecuador-s-most-spectacular-waterfall-threatened-by-chinese-funded-hydroelectric-project>

<sup>x</sup> E-mail interview conducted by the author with Matthew Terry and International River's press release: <https://www.internationalrivers.org/resources/ecuador-s-most-spectacular-waterfall-threatened-by-chinese-funded-hydroelectric-project>

<sup>xi</sup> Ibid.