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Comments on the Jirau Hydropower Project: Transboundary Impacts
Submitted to Lloyd's Register Quality Assurance Ltd.

May 22, 2012

I am writing to express my concerns over the application for validation of the Jirau Hydropower Project in Brazil. The Project Design Document (PDD) for this project is deeply flawed and inaccurate. This is particularly true in relation with transboundary environmental impacts, as is described below.

Summary of Key Concerns

a) *The project will have serious transboundary environmental and social impacts in Bolivia and Peru.* Both independent technical studies[1] and IBAMA (Instituto Brasileiro do Meio Ambiente) concluded that the Jirau hydropower project will cause transboundary impacts in Bolivia and Peru. By only referring to the EIA, the PDD violates Decision 4/CMP.1, which foresees the inclusion of transboundary issues in its discussion of environmental and social impacts.

b) *Transboundary impacts were deliberately ignored in the EIA and the licensing process show inconsistencies with Brazilian and international laws.* The project EIA avoided an analysis of transboundary impacts and therefore, the possibility of mitigating or compensating project impacts outside Brazil. Project licenses were given in spite of serious observations of the Brazilian body in charge of licensing (IBAMA).

a) Transboundary impacts

The Jirau HPP will cause transboundary impacts in upstream areas of neighboring Bolivia and Peru. The PDD ignores these impacts. However, feasibility and EIA studies (Furnas, Odebrecht, 2004)already identified cross-border impacts, often without mentioning them explicitly as such. One of the most important impacts is the effect on the water levels along the binational stretch of the Madera River, stretch that extends from the confluence with the Abuna River at its downstream end to the confluence of the Beni and Mamoré rivers upstream. Contrary to what the PDD mentions (page 8), the feasibility study (Chapter 7) shows that even operating the Jirau reservoir with varying levels (table 2 of the PDD), water levels in the Madera River near the city

1 <http://www.fobomade.org.bo/documentos/libro_represas%20.pdf>, <www.ore-hybam.org/index.../Pouilly&-08%20(Madera-WWF).pdf>

of Abuna will increase, at least for medium and low flows. The city of Abuna is located on the Brazilian side of the binational stretch. The western shore to the front is Bolivian.

Water levels in the binational stretch would be increased further as a result of the sedimentation induced by the reservoir (Chapter 7 of the EIA, Switkes, 2008). ANEEL and the authors of the EIA subsequently denied their own results, relying on simple "views" (i.e. opinions and not studies) of supposed experts.

The main consequences of the increase of the river water levels in the binational stretch would be the loss of potential energy in that stretch and the increase in the frequency and duration of floods in Bolivian territory. The loss of potential energy can be estimated readily in monetary terms. Even for the modest increase in water levels estimated in the feasibility study and the cost of energy to which was awarded , the value of the energy lost in the binational stretch would be 70 million dollars per year, and over 100 million dollars per year according to independent studies (Molina et al, 2008).

Potential transboundary impacts of the Jirau project are not limited to the main river course. Several of the socio-environmental impacts identified in the EIA (as listed in section D.2 of the PDD) would affect much of the Madera River basin, located mostly in Bolivia. The IBAMA technical report No. 014/2007 was clear: "The extension of direct and indirect environmental impacts to other countries is feasible in relation to the over-elevation of water levels. There is no doubt in relation to the productivity of fishing activity and viability of fish stocks (especially the migratory fish as the dourada) and to the proliferation of malaria. These impacts affect the other two countries in the basin: Bolivia and Peru. It is concluded that there is an imperative for the realization of a new, more comprehensive environmental impact study, both on national (Brazilian) and foreign territories, including the realization of new public hearings. Therefore, we recommend the non-issuance of the preliminary license". However, the license was issued a few months after a removal of IBAMA authorities.

Impacts on migratory fish, that spawn at the Andean foothills in Bolivia and Peru after a long journey from the Lower Amazon and Lower Madera rivers, have been studied in Bolivia by Van Damme et al (2008). Before that, the complementary studies of the EIA (2006), mentioned the following, to justify the construction of a system of fish passage (STP): "Fish passage systems do not guarantee the passage upstream of adult fish and have no effect on the passage downstream of eggs and larvae. The fact that there exist two consecutive reservoirs (Santo Antônio and Jirau) increases the uncertainties. Fish passage systems can act as introducers of *alocton* species in the subsystems upstream and downstream of the *cachuelas* (rapids and low waterfalls). Despite these doubts, there are technical and political reasons to build fish passage systems, because the impact on fish migration extrapolates the limits of Brazilian territory and interferes in transnational stocks and fisheries production, both in Brazil and Bolivia and Peru".

Van Damme et al (2008) showed that commercial fishing in Bolivia, which depends for the most part on migratory catfish, would be most likely affected by the dams´ barrier effect. The most affected population in Bolivia would be indigenous people and poor riparian populations that depend on fishing for most of the proteins they eat.

b) Inconsistencies of the licensing process regarding transboundary impacts

The process of licensing shows serious inconsistencies with Brazilian and international laws. The results of the studies of water levels referred to in point a) of these commentaries are an example. Incredibly, Resolution ANA 555/2006, referred to in the PDD, adopted as the stage-discharge curve in Abuna (curve ANA-ESBR of figure 1 of Annex) the curve (Jirau Furnas in figure 1 of the Annex) which according to the feasibility studies, is the one modified by the operation of the Jirau reservoir. The original natural curve was the ANA curve of figure 1. Furthermore, the ESBR consortium in charge of developing Jirau submitted the technical note ESBR UHE JIRAU/ANEEL 001-2008, which reduces, arbitrarily and without technical support, friction losses in the future reservoir, in order to further reduce modified water levels in the binational stretch. This was observed by the Bolivian delegation, at the binational technical meeting held on 30 and 31 October 2008, while the Brazilian delegation could not give a reply. Moreover, a study (Molina et al, 2008) showed that the use of the original friction coefficients of the feasibility study significantly increase water levels in Abuna in relation to natural levels (Figure 2).

Another example is the system of fish passage (STP) and the statement on the PDD that eggs and larvae would pass through the turbines without suffering damage. The EIA states that the eggs and larvae passing through the weirs would suffer little or no damage. The PDD and the EIA do not cite any prior reference nor provide any technical support to show that bulb turbines will not cause a great mortality of eggs and larvae. A recent study (Van Damme et al, 2011) showed that the majority of eggs and larvae will pass through the turbines and that all the concerns expressed in the complementary studies of the EIA are real. This demonstrates that the "technical and political reasons" were primarily political. Thus, despite the conclusions and recommendations of the IBAMA technical report No. 014/2007, the preliminary license was issued within a few months. During the process of licensing of Jirau and Santo Antonio projects the head of IBAMA, several technicians and even the Minister of Environment of the Brazil resigned or were removed.

In general, the process of approval of the environmental licenses for Jirau showed the political interest by the Brazilian Government to deliberately ignore the transboundary impacts of Jirau and Santo Antonio, and to take advantage of obvious asymmetries between Brazil, Bolivia and Peru to handle the licensing process.

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ANNEX

Figure 1: Water levels in Abuna (m)

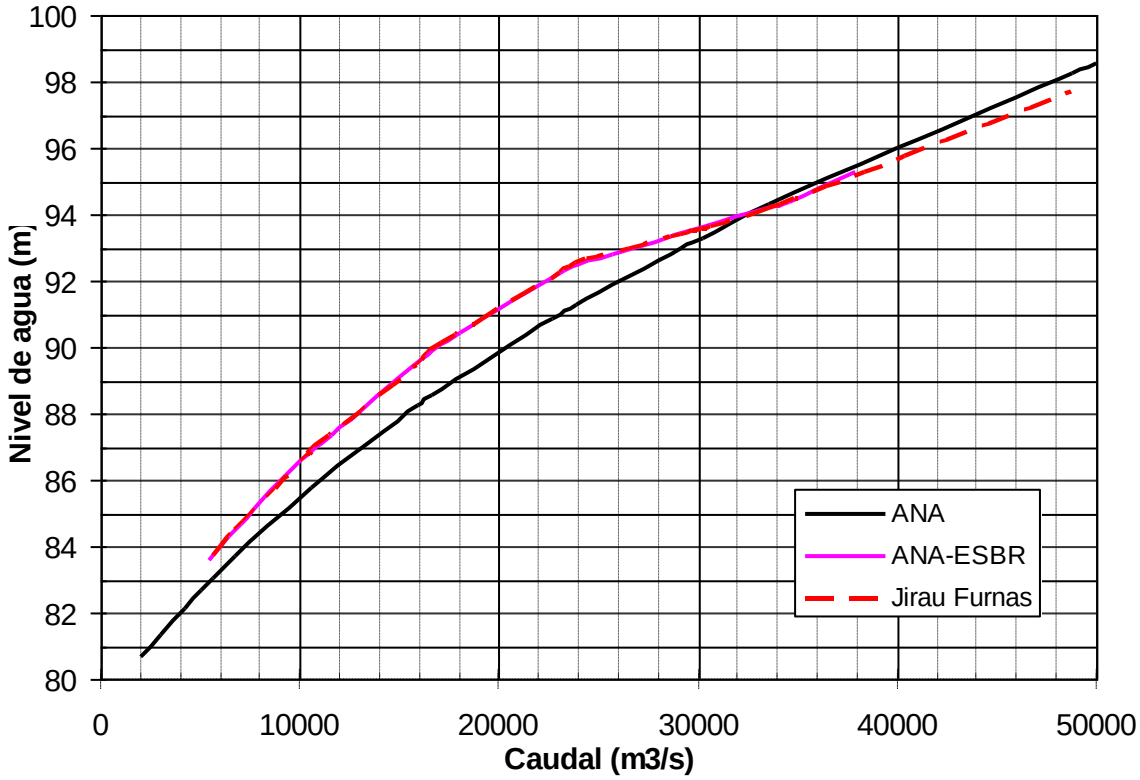

Figure 2: Natural and Jirau induced water levels in Abuna/Manoa