

**Assessment of illegal damages caused
by Belize Hydroelectric Development
and Management Company Limited
within the Bladen Nature Reserve &
Columbia River Forest Reserve**



**Produced by the Ya'axché Conservation Trust and
Wildtracks**

October 2009

EXECUTIVE SUMMARY

In August 2008, a patrol was conducted to assess illegal damages inflicted by Belize Hydroelectric Development and Management Company Ltd (BHD) on the Bladen Nature Reserve and Columbia River Forest Reserve. Numerous impacts to the natural and archaeological resources of the area were noted to be from forest clearance even on slopes of up to 45° as well as blocked creeks, illegal resource use and road development. These activities are of particular concern due to the international biological importance of the area which has been listed as a national focal site for biodiversity conservation. It is recommended that BHD cover the estimated \$125,000 for the remediation of damage, plus \$22,040 for payment to the Government of Belize for expenses incurred to conduct this assessment, plus a fee for the diminished environmental services during the >40 year regeneration period and punitive damages at a figure set by the Ministry of Natural Resources.

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ACRONYMS

BDF	Belize Defence Force
BHD	Belize Hydroelectric Development and Management Company Limited
BNR	Bladen Nature Reserve
CRFR	Columbia River Forest Reserve
DoE	Department of the Environment
EIA	Environmental Impact Assessment
FD	Forest Department
PA	Protected Area

BACKGROUND

In early July 2009, the Belize Forest Department (FD) and the Ya'axché Conservation Trust became aware that Belize Hydroelectric Development and Management Company Limited (BHD) were entering into and operating within the Columbia River Forest Reserve (CRFR) and Bladen Nature Reserve (BNR) without valid permits. A meeting held between the three parties at the Belize Defence Force's (BDF) Fairweather Camp in Toledo on the 7th July 2009 confirmed this. BHD clarified that they had ten people working inside the reserve, preparing a road and camp for future studies. The company also provided coordinates for their camp which was identified to be within the BNR, a protected area comanaged by the Forest Department and Ya'axché Conservation Trust, in which only research and environmental education activities are permitted by law. BHD claimed that they did not know that they needed permits to operate within the protected area(s) as they had a concession from the Ministry of Finance to investigate and exploit the hydroelectric resources of the Central River. Subsequently, the Forest Department informed them that they did and issued an order to cease all activities within CRFR and BNR. The following day, a joint BDF, FD and Ya'axché patrol launched to investigate the activities within the area confirmed that the company was operating within BNR and that all employees of BHD had left the area. It was then decided that a second patrol would be needed in the area to quantitatively assess the damage done to the area and calculate the costs incurred for restoring the area. This report details the outcomes of that assessment.

METHODOLOGY

The assessment team (listed below), plus four BDF soldiers to provide security, travelled to the sites cleared by BHD in CRFR and BNR between Wednesday 12th and Saturday 15th August 2009.

Assessment Team

Saul Cruz	Forest Department
Marco Leal	Department of the Environment
Henry Sanchez	Department of the Environment
Nick Wicks	Ya'axché Conservation Trust
Bartolo Teul	Ya'axché Conservation Trust
Paul Walker	Columbia River Forest Reserve Management Plan Consultant
Jorge Coc	Alcalde, San Pedro Columbia

DAMAGE ASSESSMENT

The following observations of impacts to the natural resources of the CRFR/BNR were made:

Road/Track development

As shown in figure 1, approximately 13.25 miles of existing logging roads from 291814 1800749 to 289307 1812711 were reopened within the Columbia River Forest Reserve. These roads already impacted from previous logging operations are covered in grass and herbaceous plants. Of greater consequence was the opening of approximately 1.5 miles of new access road from 289307 1812711 to 287989 1812711 and an approx. 2.5 mile long trail from 287989 1812711 to 283907 1816343. Trees and vegetation were cut down and pushed to the side, clearing an area that was on average about 12 feet wide, but in at least 7 instances widened to over 40 feet or more. Numerous large trees were observed to have been cleared from this area, from a

number of different species. Several miles of access trails were also cleared within BNR and CRFR, most of which were only 2-3 feet wide and caused minimal impact except for increasing access.

Slope Clearance

On at least 6 slopes of approximately 40°, vegetation was cleared for road access and several more of between 20° to 40° which is prohibited under Forest Department policy. It was noted that along these steep slopes, surface run-off was extremely swift and was responsible for very high levels of sediment run-off into nearby creeks, which will eventually flow into the Rio Grande. Moreover, this run-off was also eroding the sediment along the road, removing soil and forming deep drains which shall inhibit natural regeneration if left unaddressed.

Waterway blockage

During the (re)opening of roads at least 4 waterways were blocked forcing water to flow over the top of the blockage and creating ponds. Forest regulations normally stipulate that culverts must be constructed to facilitate water flow in a relatively normal manner. These blockages contribute to the erosion of creek banks and siltation of the creeks themselves.

Increased accessibility

In clearing the road, accessibility to the Bladen Nature Reserve and northern CRFR was greatly increased. This was observed to have facilitated the entrance of hunters from the village of San Pedro Columbia who were found to be camping only a few kilometres away from the BHD campsite (Figure 7). Experiences from other areas within CRFR indicate that once a trail is opened it is very difficult, if not impossible, to close the trail as hunters and other users will keep the trail open. The assessment team noted numerous shells along the road, demonstrating that opening up of the area will be responsible for the depletion of local wildlife populations. Moreover, these trails link up with xatéro trails running from the Guatemalan border, facilitating access by both Guatemalans further south into the CRFR as well as by Belizeans throughout BNR and CRFR.

Camp site clearance and construction

A camp site within BNR at coordinates 283907 1816343 covering a total of 5830 square feet was cleared of all vegetation. Beside the camp a 45° slope, approximately 100 feet wide was cleared of vegetation for approximately 80 feet down towards the Central River. The rationale for this is believed to have been to provide a view of the river and possibly also as a helicopter flight approach. This is likely to result in increased erosion directly into the Central River & Rio Grande, particularly when bank failure occurs under the heavy rains that the area encounters. Moreover, this clearly violates Forest Department policy of leaving a 66 foot riparian buffer beside all water bodies.

Illegal logging and resource use

At least 20 medium to large trees were cut down at the camp, these were noted to be of the following species:

- 5 Sapodilla (*Manilkara zapota*)
- 4 large Banak logs (*Virola koschnyi*)
- 3 Santa Maria trees (*Calophyllum brasiliense*)
- 3 Sillion trees (*Pouteria campechiana*)
- 5 cohune trees (*Attalea cohune*)

A number of small trails were also found leading to nearby cohune palm trees from where the leaves for the thatches were harvested. This then places the footprint to about a 900 foot radius

from the perimeter of what was actually cleared for the camp. In total, an estimated total of 350 cohune leaves were gathered from the area surrounding the camp, for the construction of the two thatched palapas (Figure 5).

Archaeological Impact

The area around the campsite appears to have numerous ruins, including a fairly large site located on the access trail. The increased accessibility provided by the trail will facilitate looting of these ruins and any caves in the area. Moreover, had road development been allowed to continue, there would have been considerable damage done to the ruins.

Overall Impact to biodiversity

The increased accessibility into the area shall result in greater pressure being inserted on animal species, particularly as many medium to large mammals and birds such as jaguars and ocellated turkeys utilize trails and roads frequently, bringing these vulnerable species into contact with hunters. Not only will this pressure on the area's fauna have many repercussions to the functioning of the CRFR and BNR's forest ecosystems, but this shall threaten one of the last remaining refuges for wildlife in the country.

Importantly, the area in which these activities occurred is recognised as having the highest priority status within Belize's Key Biodiversity Areas assessment and is a key location within the Core Protection Area of the Maya Mountains Massif. This is partially because the north-western corner of CRFR has unique vegetation assemblages not found elsewhere in Belize. It is also home to two Critically Endangered, several Endangered, and one endemic amphibian species. It is the only locality in Belize where some of these species occur. It is likely to be home to several species of amphibian not previously known in Belize and some potentially new to science. It is likely that their discovery will qualify this unique area of Belize as an Alliance for Zero Extinction (AZE) site. The very brief habitat assessment conducted between the recently cleared camp area in BNR and the steep gorge where the dam is proposed, indicates that the area is highly likely to harbour regionally significant populations of the Critically Endangered Morelet's Treefrog (*Agalychnis moreletii*), the endemic Maya Mountains Frog (*Lithobates juliani*), and very likely some of the new species recently discovered on the other side of Little Quartz Ridge – including the (provisionally identified) Critically Endangered *Craugastor coffeus* rainfrog.

The occurrence of highly endangered amphibians in this vicinity, that are found nowhere else in Belize, was a significant factor in establishing the area's highest priority status within Belize's Key Biodiversity Areas assessment, and within the Core Protection Area of the Maya Mountains Massif. Significant negative impacts on the habitat of this most highly threatened terrestrial faunal group, as posed by the proposed hydro-electric facility, are therefore of significant national, regional and even global concern.

Violation of law and policies

Neither the National Parks System Act nor the Forest Act allow for any of the activities to take place without a permit inside the Bladen Nature Reserve or the Columbia River Forest Reserve. Moreover, the actions of the Company were in violation of Forest Department and Department of the Environment policies, especially the National Protected Area Policy.

REMEDIATION NEEDS

Although the activities that BHD have conducted within the area have created a significant impact in general, the system will return to its former condition through natural growth and succession. However, there are three areas that require immediate attention as these will not recover without intervention, namely: 1) steep slopes that have been cleared for roads, 2) creeks that have been blocked and 3) the increased accessibility into the reserve.

Installation of Water bars

On steep slopes that have been cleared, high levels of erosion will occur under the area's heavy rainfall leading to the loss of top soil and general lack of slope stability thereby inhibiting natural forest regeneration. To address this, the installation of water bars is recommended. These are ditches and/or humps placed across a road as a relatively cheap and cost-effective mechanism for reducing the overall speed of surface water run-off thereby reducing soil loss and stabilizing bare slopes. It is very important that these are installed correctly otherwise they will be ineffective or possibly even detrimental.

Ideally someone experienced in the construction of water bars should supervise the installation of these, but failing that, numerous free online resources are available which document effective techniques for constructing these. Due to the steepness of the slopes, the loose top-soil and substrate and high rainfall, it is recommended that water bars are spaced at the following intervals. It is estimated that at least 60 water bars would be needed to control erosion on the slopes.

Steepness of slope	Spacing of water bars (feet)
3-5	250-125
6-10	125-80
11-15	80-60
16-20	60-40
21-30	40-30
30-35	30-20
35-40	20-10
>40	>10

Removal of creek blockages

It is also advised that all blockages, placed within creeks during the construction or re-opening of roads, be removed to reduce the amount of sediment entering waterways and restore normal hydrologic regime.

Reducing access in the reserve

Due to the increased ease with which local community members can access the reserve, several measures need to be taken to address this. The first is the installation of a gate at the entrance to CRFR to stop unauthorized vehicles from entering the reserve, alongside the establishment of signs at this entrance and along the route indicating that entry without permits is illegal and trespassers may be prosecuted. This will need to be supported by patrols by a dedicated team of 3 rangers within the area to monitor and control illegal activities.

ESTIMATION OF COSTS

Based on the above, the estimated remediation costs for the area are \$125,000, as presented in Table 2.

No Units	Unit type	Unit cost	No. Units	Total
Tractor hire	Day	\$1000	3	\$3000
Labour for construction of water bars & removal of creek blockages	Person days	\$40	25	\$1000
Equipment: 1 Chainsaw, 5 spades, 3 hammers		\$3000	1	\$3000
Administration fee for FD supervision	Month	\$2500	2	\$5000
Establishment of signs	Signs	\$200	5	\$1000
Establishment of gates	Gate	\$400	1	\$400
Increased enforcement (3 rangers)	Month	\$3000	24	\$72,000
Enforcement logistical support	Month	\$1,500	24	\$36,000
Enforcement team equipment	Ranger	\$1,200	3	\$3,600
TOTAL				\$125,000

It is recommended that BHD pay the Government of Belize for the costs of the damage assessment conducted in August (Table 3) which was necessitated by the company's activities. This totals an additional \$22,040, bringing the grand total to \$147,040. In addition to these, the company should be made to pay for diminished environmental services during the >40 year regeneration period and punitive damages at a figure set by the Ministry of Natural Resources.

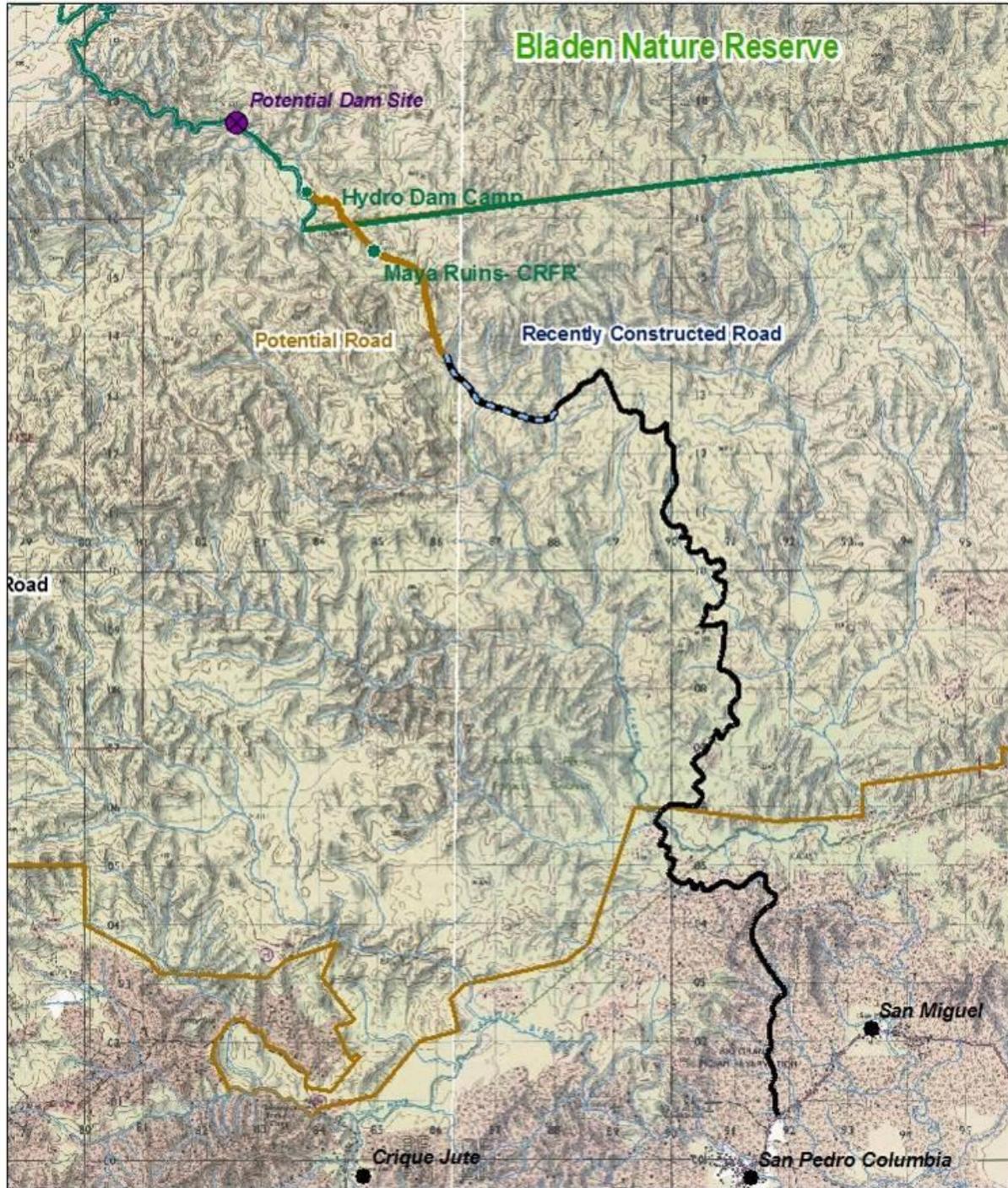
No Units	Unit type	Unit cost	No. Units	Total
Tractor usage	Day	\$1000	2	\$2000
Lost earnings for tractor	Day	\$1000	15	\$15,000
Forest Department/ DoE staff time	Person Day	\$140	12	\$1680
Ya'axché Manager staff time	Person Day	\$140	8	\$1120
Consultant day	Person Day	\$500	4	\$2000
Expedition Supplies	Person Day	\$10	24	\$240
TOTAL				\$22,040

APPENDICES

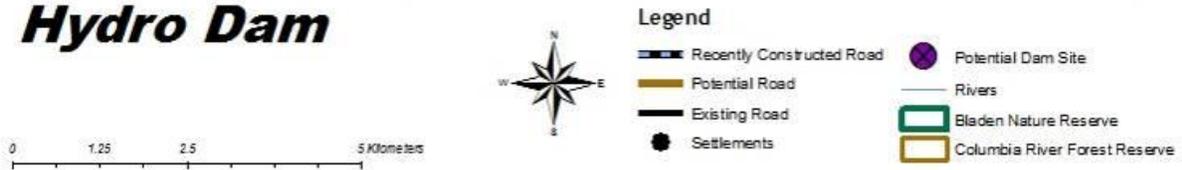
Appendix 1. Map of Columbia River Forest Reserve and Bladen Nature Reserve demonstrating sites impacted by BHD.

Appendix 2. Figures

Appendix 1. Map of Columbia River Forest Reserve and Bladen Nature Reserve demonstrating sites impacted by BHD.



Hydro Dam



Appendix 2. Figures

Figure 1. Road clearance on steep slope 1



Figure 2. Road clearance on steep slope 2

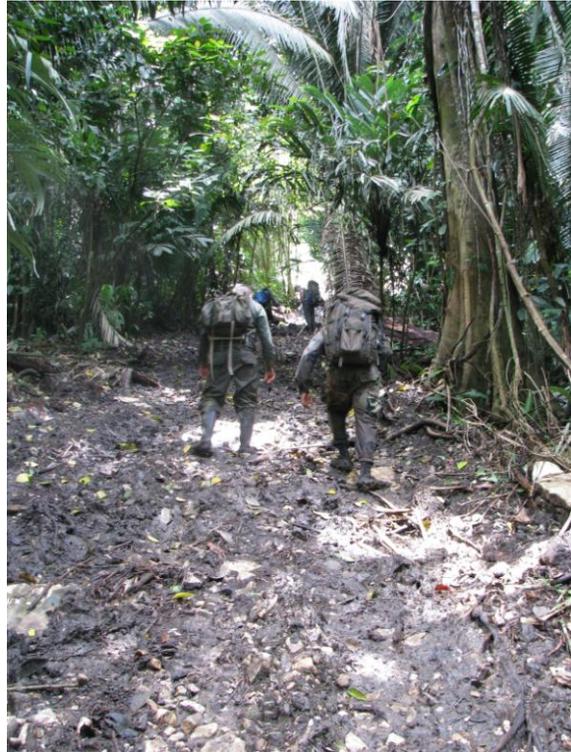


Figure 3. Slope cleared above Central River



Figure 4. Road clearance on steep slope 3

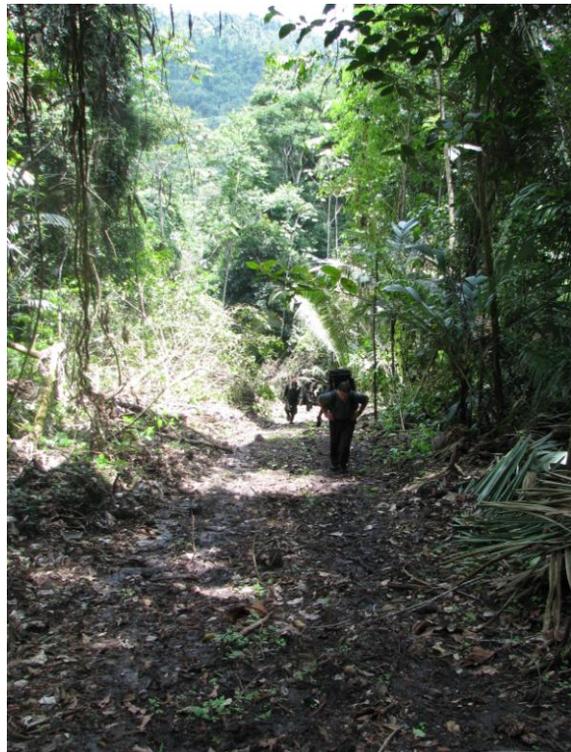


Figure 5. Thatched palapas constructed within BNR



Figure 6. Blocked creek along entry road



Figure 7. Belizean hunters camping within CRFR enabled by increased accessibility

