

# GUINEA'S KOUKOUTAMBA DAM: A WHITE ELEPHANT IN THE MAKING

## Summary

The Koukoutamba Dam is under preparation in Guinea, a country considered West Africa's "water tower," the source of a number of major rivers that sustain the region and its peoples. Since 2012, the Guinean government has sought to exploit its significant hydropower potential, citing persistently low energy access rates. Koukoutamba is just one of five major dams either under construction or in advanced preparation. Koukoutamba was heavily promoted by the World Bank, which ultimately decided not to finance the dam's construction once the extent of its impacts became clear. Since then, the world's largest dam construction company, Beijing-based Sinohydro, signed an agreement to build the dam. However, the project remains plagued by controversy, and must be reconsidered in light of a number of fundamental flaws.

**The Koukoutamba Dam is not necessary to meet Guinea's energy demand.**

Bafing River | Photo courtesy of Kalyanee Mam

**By any measure, the Koukoutamba Dam would be both extremely expensive and inefficient**

Koukoutamba is a demonstrably poor site to construct a hydropower dam, and its \$812 million price tag cannot justify the meager amount of power that it would be able to generate. A new study published in Nature Sustainability found that the Koukoutamba Dam would generate less than half the amount of electricity that the project developers promised<sup>1</sup>. Capable of operating at only 14 percent efficiency – less than a third of the global average – Koukoutamba would rank among the least efficient hydropower dams in the world.

Compared to other dams recently constructed in the region, Koukoutamba's power would be twice as expensive as the Souapiti Dam, soon to come online in Guinea, and four times as expensive as the recently completed Soubré Dam in Cote d'Ivoire. The Koukoutamba Dam would be among the most expensive dams in the world for the amount of electricity it is expected to generate.

1. Sterl et al. [Smart renewable electricity portfolios in West Africa](#). Nature Sustainability. 2020.



**Village near proposed dam site would be impacted**

### **Koukoutamba is not necessary to meet Guinea's energy needs**

The Koukoutamba Dam enjoys widespread popular support from the Guinean public under the premise that it will address the country's chronic energy shortages, in particular the regular power outages in Conakry and other urban centers. However, the government has indicated that three-quarters of Koukoutamba's power would be exported, with only the remaining quarter of the dam's 294 MW reserved for consumption within Guinea<sup>2</sup>.

More importantly, with the impending completion of the Souapiti Dam this year, Guinea will already be able to meet its domestic energy demand for years to come, and even export excess power to its neighbors through the West African Power Pool. Therefore, the Koukoutamba Dam is not necessary to meet Guinea's energy demand.

### **Solar power can replace Koukoutamba's share of domestic generation**

Solar energy is the ideal complement to Guinea's existing hydropower because it is most available during the months that dam reservoirs are at their lowest levels. A recent study showed that the Souapiti Dam alone is capable of accommodating up to 100 MW of variable solar power<sup>3</sup>. In fact, a single 35 MW solar facility is capable of generating as much power as Koukoutamba is expected to provide to the national grid, for less than one-tenth of the cost.

### **Nearly 8700 people would be displaced by Koukoutamba's reservoir**

Koukoutamba's reservoir would displace an estimated 8700 people, which would be the second largest displacement event in the country's history. A years-long process to resettle communities displaced by the Souapiti Dam has been fraught with problems, and without urgent resolution will consign impacted communities to long-term impoverishment. Guinea's resettlement requirements are well below international standards, and compensation packages for Souapiti communities were only half of those received by communities similarly impacted by a World Bank-financed dam on the Niger River.

### **Koukoutamba would kill up to 1500 critically endangered Western chimpanzees**

The Koukoutamba Dam would be built within the Moyen Bafing National Park, which was recently created to protect an important stronghold of the Western chimpanzee. This species is threatened by extinction after its population has declined by 80 percent in just the past 25 years. The world's largest continuous population of Western chimpanzees inhabits the park, noted by IUCN as "one of the most important areas for the survival of this species."<sup>4</sup> Conservationists estimate that as many as 1500 of the 4000 chimpanzees in the park could be killed by drowning when the reservoir fills, conflict between groups as ranges are restricted, and induced impacts from the construction of access roads to a previously inaccessible area.

2. World Bank [Project Paper](#) for Power Sector Recovery Project.

3. Sterl et al.

4. WCF [Biological Inventory for the Creation of the Moyen Bafing National Park](#), November 2016.

## Introduction

The Republic of Guinea receives the most precipitation in West Africa and is home to a significant number of rivers. Guinea is widely considered the region's "water tower," and it is the main source of several major rivers in the region, including the Niger, Senegal, and Gambia rivers. Together, these rivers sustain the lives and livelihoods of tens of millions of people. Over the past decade, the government of Guinea has undertaken an ambitious hydropower dam-building program to address the country's persistent energy shortages. The Kaléta Dam on the Konkouré River was commissioned in 2015 with the Souapiti Dam, built just upstream of Kaléta, expected to come online in the coming months. A number of other dams are either under construction or under preparation, including the Koukoutamba Dam.

The 294 MW Koukoutamba Dam is proposed on the Bafing River, a tributary of the Senegal River, on a remote stretch of Guinea's Fouta Djallon highlands. Koukoutamba has been promoted under the auspices of the Senegal River Basin Development Organization (OMVS) – a regional body that also includes Senegal, Mali, and Mauritania – that is designed to reduce the energy deficit of member countries. Koukoutamba was one of three dams considered on the Bafing River, with encouragement from the World Bank. A 280 km transmission line would be built to link Koukoutamba with the Manantali Dam, located downstream on the Bafing River in Mali. That transmission line would evacuate three-quarters of the power that Koukoutamba would produce to Guinea's neighbors and be sold through the West Africa Power Pool<sup>5</sup>. Another transmission line to be built would carry the remaining power to Conakry.

Even as early as 2006, the World Bank had initiated plans through the OMVS to exploit Guinea's significant hydropower potential, financing a series of studies that ultimately led to the selection of Koukoutamba as the priority project. In the years that followed, the World Bank allocated millions of dollars to bring Koukoutamba to fruition. However, in 2016 the World Bank belatedly realized that the dam would be built in and have severe impacts on the Moyon Bafing National Park, which was established with funds from the World Bank's own private sector arm, the International Finance Corporation (IFC). Soon after, the World Bank withdrew its support from the Koukoutamba Dam; yet the project had by then reached an advanced stage of preparation, and in 2019 the government appointed the Chinese dam construction firm Sinohydro to build Koukoutamba. Despite media reports from 2019 that the China Export-Import Bank agreed to finance the dam, that has since been refuted. Thus, by all indications the government has not yet secured the estimated \$812 million necessary to finance the dam's construction, which could prove a significant obstacle as lenders and governments are forced to cope with the economic fallout of the ongoing COVID-19 pandemic.

As the government of Guinea and prospective financiers assess Koukoutamba's prospects in light of these circumstances, International Rivers and Centre du Commerce International pour le Développement (CECIDE) have prepared this briefing note to highlight a number of issues of concern with decision makers, the public, and the communities who would be impacted by the dam. These issues together represent fundamental and critical flaws that should cause the project to be abandoned in favor of better and cheaper energy options that can deliver electricity to the Guineans who lack it.

5. World Bank [Project Paper](#) for Power Sector Recovery Project



**Bafing River**

## Koukoutamba's power would be extremely expensive

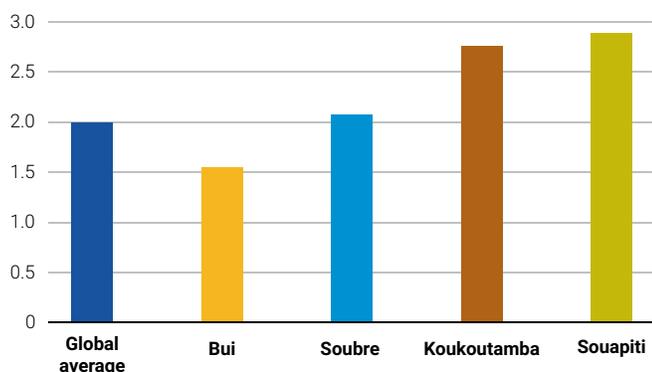
As technological innovations and economies of scale have made many energy technologies such as wind and solar power cheaper over time, hydropower dams have become even more expensive and less cost competitive. Meanwhile, a growing acknowledgment of recent studies that show hydropower dams to be particularly prone to cost overruns – costing on average double their original price tag – has further challenged their economic rationale. These factors help explain why new hydropower capacity has declined by 61 percent globally since 2013<sup>6</sup>.

By any measure, Koukoutamba is a demonstrably poor site to construct a hydropower dam, and its \$812 million price tag cannot justify the meager amount of power that it would be able to generate.

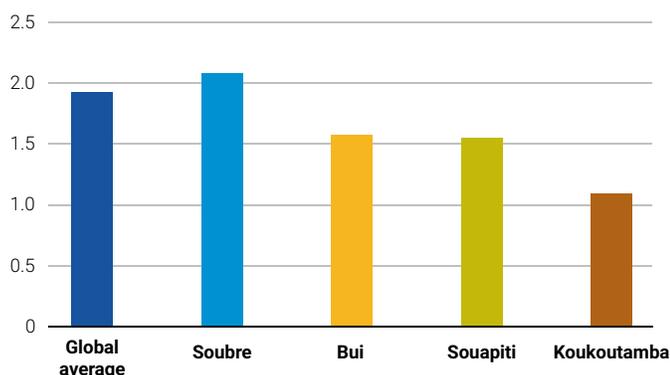
### Cost per MW of installed capacity

Koukoutamba would rank among the more expensive dams in the region based on construction costs per megawatt (MW) of installed capacity. As shown in Figure 1, Koukoutamba ranks only behind the Souapiti Dam among recently built dams in West Africa in cost per megawatt of installed capacity, at \$2.76 million, and is well above the global average of \$2 million.

**Figure 1:** USD million per MW installed capacity



**Figure 2:** Annual electricity generation (GWh) per USD million invested



6. IRENA Renewable Energy Capacity Statistics.

### Power generation per construction costs

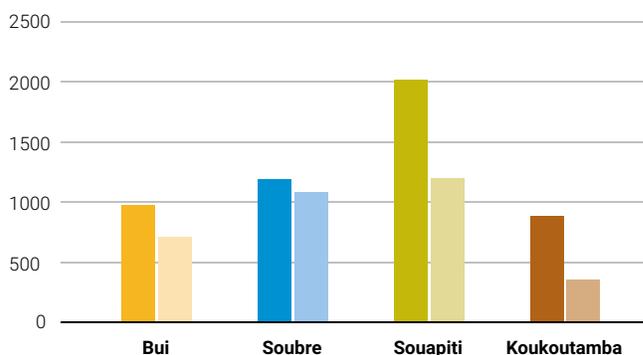
Yet far more important than a dam's installed capacity is the actual amount of energy it produces, typically measured in gigawatt hours (GWh) per year. The amount of electricity a dam generates depends on a number of factors, including the height of the dam and the speed and volume of a river's flows. Figure 2 ranks the same selection of dams by how much electricity each it is expected to generate per million dollars invested.

As shown in the graph, the Souapiti Dam would produce 42 percent more electricity per dollar of construction cost than Koukoutamba. The Soubré Dam, meanwhile, will generate 90 percent more power – nearly double – per dollar invested than Koukoutamba. Compared globally, Koukoutamba would produce just 56 percent of the global average per dollar invested.

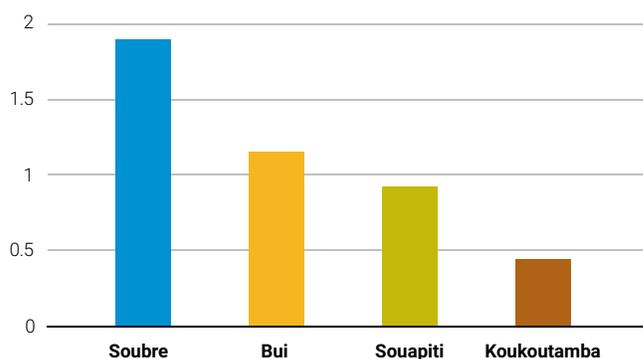
### Power generation based on modeled river flows

Yet according to a recent peer-reviewed study on the prospects for integrating hydropower and variable renewable energy in West Africa, those estimates significantly overstate the amount of power that Koukoutamba is likely to produce. Models of incoming river flows for the Bafing River, for example, indicate that the Koukoutamba Dam would generate only 361.7 GWh per year,<sup>7</sup> or just 41 percent of the 888 GWh promised.

**Figure 3:** Annual electricity generation (GWh): publicly stated (dark) versus modeled river flows in Sterl (light)



**Figure 4:** Annual electricity generation (GWh) per USD million invested using modeled river flows (Sterl)



7. Sterl et al. [Supplementary information](#).

Based on the modeled river flows scenario, electricity produced by the Koukoutamba Dam would be twice as expensive as the Souapiti Dam, and over four times as expensive as the Soubré Dam per dollar invested.

This would make Koukoutamba among the most expensive dams in the world for the amount of electricity it is expected to generate, and among the very least efficient hydropower projects in the world. These factors alone should disqualify the Koukoutamba Dam from consideration.

### Guinea will already be a net power exporter before Koukoutamba is built

By all accounts, the Koukoutamba Dam enjoys widespread popular support from the Guinean public under the premise that it will address the country's chronic energy shortages, in particular the regular power outages in Conakry and other urban centers. However, the government has indicated that three-quarters of Koukoutamba's power is earmarked for export, with only the remaining quarter of the dam's 294 MW reserved for consumption within Guinea.

#### *What impact would Koukoutamba have on Guinea's electricity production?*

The commissioning of Kaléta Dam in 2015 effectively doubled the amount of power available to the national grid. Souapiti, scheduled to come online in the near future, will nearly double the amount of power again. Koukoutamba, however, would increase the amount of available power within Guinea by just 5 percent - an extremely modest increase, particularly given its \$812 million price tag. In the modeled flows scenario discussed in the previous section, it would mean an increase of just 2.5 percent.

#### *Guinea can meet domestic energy demand without Koukoutamba*

Once the Souapiti Dam is commissioned, expected in 2020, Souapiti and Kaléta will become the second and fourth largest hydropower projects in West Africa respectively, capable of generating 3167 GWh of electricity per year. As noted in the feasibility study for the Souapiti Dam, once the dam is completed Guinea will not only be able to meet Guinea's domestic energy needs for years to come, it will be capable of exporting its excess energy supply or selling to the mining industry<sup>8</sup>. Therefore, the Koukoutamba Dam is not necessary to meet Guinea's energy needs.

### **Energy experts indicate Koukoutamba can only produce 41 percent of the power that has been promised.**

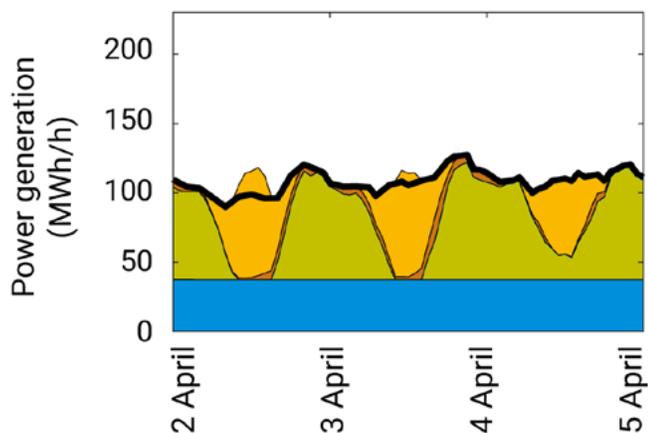


8. Souapiti Dam Feasibility Study, 2015.

## Availability of energy options

*Solar energy is the ideal complement to Guinea's existing hydropower*

While Guinea will be capable of exporting excess power to its neighbors already once Souapiti is commissioned, the country's heavy reliance on seasonal hydropower means any power shortages are likely to take place during the dry season when dam reservoirs are at their lowest levels. As noted in the recent study from Sterl et al on energy options in West Africa, solar energy is an effective complement to Guinea's hydropower because it is available during the months that hydropower is at its lowest levels. The study further shows that with the addition of Souapiti and its considerable reservoir storage capacity, it can be operated to accommodate high levels of solar power. As in the example below from the Sterl et al study, Guinea could rely on its solar power during the day, then increase operation of its hydropower turbines at night. This would effectively address the main drawback of solar power, namely that it only produces power during the day.



Sterl et al shows how Ghana's existing Bui Dam can time flexible releases (green) predominantly at night as a complement to daytime solar power (orange).

*A single 37.5 MW solar facility could replace Koukoutamba's share of power for Guinea*

Operated in this manner, the study found that Souapiti alone is capable of accommodating up to 238 GWh of Guinean solar power (equivalent to roughly 100 MW installed capacity), which would itself exceed the 222 GWh of power that Koukoutamba is promised to supply to the national grid. As stated previously, the Sterl et al study also contradicts the developer's claims of the amount of electricity that Koukoutamba is capable of producing, estimating instead 361.7 GWh. If only a quarter of that power remains in Guinea – 90 GWh – this amount of power could be replaced by a single 37.5 MW solar facility, for a fraction of the cost of Koukoutamba. For the sake of comparison, a 50 MW solar facility is currently under development in Togo at an estimated \$35 million, or just 4.3 percent of the cost of Koukoutamba.

## High risk of impoverishment for 8700 people to be displaced by Koukoutamba's reservoir

Reservoir dams such as Koukoutamba have displaced tens of millions of people around the world. Studies have shown conclusively that dam-induced displacement has impoverished millions by removing communities from productive lands and fisheries, breaking social networks, and negatively affecting livelihoods and cultures.

These issues were acknowledged in the years-long process to develop the ECOWAS Directive on Water Infrastructure, universally adopted by the ECOWAS Council of Ministers in 2017, which recognized that many dams "have not improved the lives of the affected communities and have often even resulted in the deterioration of their living conditions."

While the key lessons of how to avoid dam-induced impoverishment are known – land-for-land compensation, adequately resourced and participatory development of livelihood restoration programs, providing full replacement cost compensation for lost assets – governments and companies too often don't adequately implement these measures, deem them too expensive. Such measures are required as a condition for World Bank loans, for example, but provisions within Guinean law are well below this standard.

The consequences are manifesting in the Souapiti Dam in Guinea, which is displacing an estimated 16,000 people – the largest resettlement scheme ever undertaken in Guinea. Because the government has not provided communities with adequate compensation or replacement land, thousands of people already displaced are struggling to find adequate land, food and housing. If not adequately and urgently resolved, these impacts will result in long-term impoverishment, including of future generations.

*Inadequate funds allocated for compensation and livelihood restoration programs*

One key factor in the difficulties that communities are currently facing is that funds allocated for compensation programs are wholly inadequate to align with international standards. As an illustration, funds set aside to compensate a similar number of people affected by the World Bank-financed Kandadji Dam in Niger is 85 percent more than budgeted for Souapiti<sup>9</sup>.

The government has only done a preliminary assessment of the number of people to be physically displaced by Koukoutamba's reservoir. The EIA estimates the figure to be nearly 8700, primarily on the southern extent of the reservoir. If the government takes a similar approach as they have for Souapiti, communities displaced by Koukoutamba could be at significant risk of impoverishment.

9. [Resettlement Action Plan](#) for the the Kandadji Dam. World Bank, 2019



**Communities displaced by the Souapiti Dam have been left considerably worse off** | Photo courtesy of Ibrahima Kalil Bamba

### *Customary land rights*

Complicating the matter of resettling and compensating communities displaced by the Koukoutamba reservoir is that much of the land to be submerged, particularly the productive agricultural lands, are subject to customary ownership. In its comments on the Resettlement Policy Framework for Koukoutamba, the World Bank noted the lack of discussion of the “heavy dependence” that communities have on customarily held agricultural land, 103 km<sup>2</sup><sup>10</sup>. of which will be submerged by the reservoir. “This will be exacerbated by the need to relocate a significant number of households and the need to find new areas for resettled people.”<sup>11</sup>

Indeed these same issues have plagued the Souapiti resettlement process, where “the absence of clear protection for customary land rights under national law” has resulted in displaced communities being denied adequate compensation<sup>11</sup>. Not only have Souapiti communities lost access to customary lands for farming, they were also not compensated for lost land, only the trees and crops on it<sup>12</sup>. This represents a significant loss in their ability to achieve and maintain food security, and in income generation. The exclusion from compensation of displaced households with only customary land tenure bodes ill for the 8700 facing displacement from Koukoutamba’s reservoir, most of whom lack formally recorded or registered tenure rights.

The World Bank cautioned that attention must be paid to customary ownership of agricultural lands, particularly given the number of people to be resettled. “Communities’ guaranteed access to customary land will decrease significantly without adequate prior planning and understanding of the long-term implications.”<sup>13</sup>



**Moyen Bafing National Park**

10. World Bank Comments on the Project ESIA, 2018.

11. Human Rights Watch report “[We’re Leaving Everything Behind](#)”, 2020.

12. *ibid.*

13. World Bank Comments on the Project ESIA, 2018.

## Koukoutamba would kill up to 1500 critically endangered Western chimpanzees

The Koukoutamba Dam would be built within and have severe adverse impacts on the Moyen Bafing National Park, which was established in 2017 to protect an important stronghold for the critically endangered Western chimpanzee.

At least 130 km<sup>2</sup> of the park would be submerged by the dam's reservoir, much of which is chimpanzee habitat<sup>14</sup>. The impacts on the critically endangered Western chimpanzee would be especially pronounced, and are the subject of great concern to civil society and conservationists.

### *Creation of the Moyen Bafing National Park*

The government's decision to establish the Moyen Bafing National Park in 2017 was praised for its commitment to protect the estimated 4000 chimpanzees within the park's 6000 square kilometer span, which the announcement described as the subspecies' "largest continuous population." The park was created with support from the International Finance Corporation (IFC), the World Bank's private sector lending arm, as a biodiversity offset to compensate for the loss of chimpanzees impacted by IFC-financed bauxite mines elsewhere in the country.

At the time, Guinea's Minister of Environment said "This park represents a unique chance to contribute to the protection of the West African chimpanzee and, with specific actions, restore the vital function of water in the environment, contributing to an improvement in the living conditions of the communities directly affected by the decrease of rainfall and uncontrolled deforestation."<sup>15</sup>

The establishment of the national park was considered to be the Western chimpanzee's best hope of survival, after habitat loss, deforestation, and hunting resulted in an 80 percent decline in the species' population over the past 25 years, prompting IUCN to add the Western chimpanzee to its list of critically endangered species in 2017. Guinea, which is home to fully two-thirds of the species, has witnessed a significant decline in its chimpanzee population as mining, road construction, and hunting have caused the population to plummet.



**Moyen Bafing National Park**

14.Moyen Bafing National Park Feasibility Study. 2017.

15.Official announcement of the creation of the Moyen Bafing National Park.

To date, the chimpanzee population within the national park has been largely spared because of its inaccessibility, as well as religious and cultural taboos against hunting or consuming chimpanzees among local communities.

### *Diverse and irreversible impacts on chimpanzees*

Only months after establishing the national park, the government of Guinea announced its intentions to proceed with plans to construct the Koukoutamba Dam within the park. This was a major blow to efforts to prevent the extinction of the Western chimpanzee. The Wild Chimpanzee Foundation noted that the dam would be "located within an area of high chimpanzee density, and one of the most important areas for the survival of this species."<sup>16</sup> The World Bank, in its review of the EIA, noted that "even under the best-case scenario, the Koukoutamba Dam would lead to significant losses of Western Chimpanzees and possibly other globally threatened species."

### **Western Chimpanzee under critical threat of extinction**

Guinea hosts the largest population of the Western chimpanzee, one of four subspecies of chimpanzees, which is found only in West Africa. They make wooden spears for hunting, use caves as homes, and share food with each other. Humans share about 99 percent of our DNA with chimpanzees, making them our closest living relatives and closer relatives of humans than gorillas. Like humans, they demonstrate similar emotions. They are extremely intelligent, express empathy, reason, and mourn their dead.

The Moyen Bafing population is largely intact up to now because it is located in a remote area. Most critically, cultural and religious taboos among the local population against their hunting and consumption means the population has largely thrived. However, the species as a whole is in serious decline. Their status was heightened from endangered to critically endangered, one step from extinction, by the International Union for Conservation of Nature in 2017 following an 80 percent decline over the past 25 years.

It was at this stage that the World Bank, which had heavily promoted the development of Koukoutamba since at least 2006, withdrew its support from the project because of its impacts on the national park that had been established as a biodiversity offset by the IFC. It also expressed concerns over the quality of the environmental impact assessment and found the proposed mitigation measures to be insufficient to protect the chimpanzee population or to meet World Bank safeguard policy requirements<sup>17</sup>.

The Wild Chimpanzee Foundation, which has decades of experience working in the area, estimates that up to 1500 chimpanzee deaths would result from the construction of Koukoutamba.

16.WCF Biological Inventory for the Creation of the Moyen Bafing National Park, November 2016.

17.World Bank Comments on the Project ESIA.

This number would likely be even higher if the worker's camp is built within the national park, which is reportedly under consideration. The principal causes would include:

- Chimpanzee deaths result from the filling of the reservoir. Some would be drowned when the reservoir behind the dam is filled, while others unable to escape the rising waters would die from starvation after being stranded and surrounded by water.
- Reduced range resulting in conflict between groups. Chimpanzees are extremely territorial and violent conflicts occur between groups when groups come into close proximity with each other and compete for resources. The reservoir will submerge at least 130 km<sup>2</sup> of chimpanzee habitat, crowding existing groups into an area insufficient for their numbers. The IFC-funded study considers that intergroup encounters could cause a "complete loss" of chimpanzees located within the vicinity of the reservoir.
- Induced impacts of creating an access road. Beyond the direct impacts on their habitats, ape populations are

especially vulnerable to the indirect impacts that accompany the construction of roads into sensitive ecosystems. As noted in the publication *State of the Apes*, "For apes the indirect impacts of large infrastructure projects, particularly increased poaching and habitat loss due to induced access and in-migration, are usually the most serious." Indeed, in its comments on the EIA, the World Bank noted "An improved access road linking the Koukoutamba dam area with the rest of Guinea could, in the absence of adequate access control, lead to a large-scale loss of Western Chimpanzees and other threatened biodiversity—perhaps even more than from the dam and reservoir itself. These biodiversity losses could result from indirect, road-induced impacts such as bushmeat poaching, illegal wildlife trade, forest cutting, charcoal-making, new settlements, and agricultural expansion." These impacts would be exacerbated by apparent plans to construct the worker's camp within the national park itself.



Map indicating proposed Koukoutamba Dam and future reservoir within the Moyen Bafing National Park



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