

Advancing Ecological Civilization?

Chinese hydropower giants
and their biodiversity footprints



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Content

1. Executive Summary	4
2. Introduction	8
3. Biodiversity Commitments and Standards	12
4. Case Studies: PowerChina	16
Koukoutamba, Guinea, Sinohydro	18
Batang Toru, North Sumatra, Indonesia, Sinohydro	24
Julius Nyerere Dam, Tanzania, Sinohydro	30
Nam Ou Cascade, Lao PDR, PowerChina	36
Don Sahong, Lao PDR, Sinohydro	42
Jiasa River, Yunnan, China, HydroChina	48
Case Studies: China Three Gorges	
São Manoel, Brazil, China Three Gorges	54
Mongton, Myanmar, China Three Gorges	60
Isimba, Uganda, China International Water & Electric	66
Lom Pangar, Cameroon, China International Water & Electric	70
Inga 3, Democratic Republic of Congo, China Three Gorges	76
Three Gorges Dam, China, China Three Gorges	82
5. Key Findings and Recommendations	86

1. Executive Summary

Biodiversity plays a fundamental role in sustaining the world's ecosystems and its economies. The Sustainable Development Goals acknowledge that arresting biodiversity loss is necessary to reduce global poverty. Yet the world is experiencing a prolonged decline in biodiversity due to unchecked development into wild spaces and destruction of habitats, that threatens not only the loss of many of the world's species, but also human health - as the ongoing global pandemic attests¹ - and the global economy.

In 2021, China is scheduled to host the biennial summit of the Convention on Biological Diversity in Yunnan province, which accounts for just 4% of China's land area but harbors an estimated 50% of its biodiversity.² This summit is considered by many to be among the most important in its history given the urgency of arresting global biodiversity loss and the conference's aim to produce biodiversity targets for the next ten years. As host, China has been vocal in its promotion of the concept of "ecological civilization" and has pledged to prioritize ecological restoration following decades of unprecedented economic growth.

Absent from the agenda, but an important subtext to the meetings, is the influential and growing role that Chinese state-owned enterprises play in infrastructure development outside of China and the scale of ecological impacts they have wrought. This has only accelerated since President Xi announced the Belt and Road Initiative, which will entail trillions of dollars of investment into many ecologically sensitive sectors. This is particularly true of the hydropower sector, where Chinese companies are estimated to account for 70% of the global market. Two companies - Powerchina Resources and China Three

Gorges Corp. - account for over half of all dams under construction today.³

Hydropower dams have had a particularly significant impact on global biodiversity and the ecosystem services that it provides. They have been found to be a key culprit in the 84% loss of freshwater species experienced since 1970. Dams and associated infrastructure such as roads and transmission lines have taken a significant ecological toll on terrestrial biodiversity as well, both directly by submerging or fragmenting habitats, as well as indirectly by bringing people and human settlements into previously inaccessible areas. Dams' impacts on wildlife and freshwater resources have also had a significant human cost. Declines in fish stocks, particularly downstream of dams, have impacted millions of river-dependent populations around the world and jeopardized a key source of protein for local diets.

The focus on China as host of the Convention on Biological Diversity summit, and its ambitious commitments to advance its vision of an "ecological civilization", represents a critical moment to reckon with a concerning trend: the increasing scale and severity of biodiversity impacts of these prominent Chinese state-owned enterprises in their hydropower investments.

This report is intended as a contribution toward important discussions about the role of Chinese state-owned enterprises, particularly PowerChina Resources and China Three Gorges and their subsidiaries, in helping fulfill China's commitment to the concept of ecological civilization and President Xi's pledge that the Belt and Road Initiative will be "eco-friendly" and that "biodiversity protection will be enhanced" as a result.⁴

1. Jeff Tollefson, ['Why Deforestation and Extinctions Make Pandemics More Likely'](#). Nature. August 2020.

2. Biodiversity and Biodiversity Conservation in Yunnan, China. Biodiversity and Conservation. 13(4):813-826. April 2004.

3. [Reflections on Chinese Companies' Global Investments in the Hydropower Sector Between 2006-2017](#).

4. Ministry of Ecology and Environment. [The Belt and Road Ecological and Environmental Cooperation Plan](#). May 2017.

The report examines and draws lessons from twelve project cases - six from each parent company - toward informing a series of recommendations of how China Three Gorges, PowerChina Resources, and, by extension, all dam-building companies, can ensure that they do not exacerbate biodiversity loss and instead are aligned with China's commitments to protecting biodiversity.

Key Findings and Recommendations

Protected areas are not spared from dam construction, including in UNESCO World Heritage sites. A recent study found that over 500 dams under construction or planned worldwide would be built in protected areas. Half of the 12 projects examined in this report would directly impact protected areas that harbor considerable biodiversity, including national parks, Ramsar sites and even UNESCO World Heritage sites. The issue of dams impacting World Heritage sites has been increasing,⁵ prompting the World Heritage Committee in 2016 to call for a prohibition on dams built within World Heritage sites.⁶ In one case, PowerChina's subsidiary Sinohydro is the primary subcontractor on the Julius Nyerere dam in Tanzania, which is under construction in the middle of the Selous Game Reserve, a UNESCO World Heritage Site. In addition to directly submerging habitats of some of Africa's most iconic and endangered species such as the black rhinoceros, the construction of 120 km of roads into the heart of the reserve will exacerbate the already persistent problem of poaching, which had nearly wiped out the reserve's elephant and rhinoceros populations.

Recommendation: Companies should adopt an explicit policy prohibiting dams that are constructed in or have significant impacts on protected areas, including UNESCO World Heritage sites.

A growing number of dams are impacting critically endangered great ape populations. Five of seven great ape species are critically endangered, a trend exacerbated by dam construction. According to one estimate, "by 2030, fewer than 10% of ape ranges in Africa and only about 1% of those in Asia will remain untouched by infrastructure development and the associated habitat disturbance."⁷ Developments that bring humans into direct contact with ape populations have become increasingly concerning in light of apes' particular vulnerability to transmission and death from COVID-19.⁸

Three of the projects examined would have significant, if not catastrophic, impacts on our closest living relatives. The most prominent and worrying example is that of the Batang Toru dam, a highly controversial project in North Sumatra, Indonesia. PowerChina subsidiary Sinohydro long resisted urgent global calls to halt the project's construction after orangutans local to the project site were discovered to be a previously unknown and distinct species, called the Tapanuli orangutan. Conservationists warned that construction of the Batang Toru dam alone could precipitate their extinction within decades.

Sinohydro has also received intense criticism for its



Orangutans | Photo courtesy of Stuart Jansen

5. Rivers without Boundaries. [Heritage Dammed](#), 2019.
6. UNESCO. State of Conservation of World Heritage Properties, 2016.
7. Arcus Foundation. State of the Apes: Infrastructure Development and Ape Conservation. 2018.
8. IUCN SGA. [Great apes, COVID-19 and the SARS CoV-2](#). March 2020.

agreement to construct the Koukoutamba dam in Guinea, which would result in the deaths of up to 1500 critically endangered Western chimpanzees, and would be built in a national park established explicitly to protect what is one of the subspecies' last remaining habitats.

Recommendation: Companies should adopt a policy prohibiting projects that will entail irreversible impacts on endangered species, particularly apes. Sinohydro should withdraw its involvement from Batang Toru and Koukoutamba dams immediately.

Dams planned on free-flowing rivers are of particular concern, including to biodiversity. Free-flowing rivers form the bedrock for local cultures and communities and have huge ecological significance, serving as one of the world's last bastions of dwindling freshwater biodiversity. The first dam constructed on a previously free-flowing river has a disproportionately large impact on freshwater ecosystems, and in some cases as much as 40% of a river's aquatic species can be lost as a result.⁹ Of the world's 177 largest rivers, only one-third are free flowing, and just 21 rivers longer than 1000 kilometers retain an unobstructed connection to the sea.

At least three of the projects examined are proposed on unobstructed, free-flowing rivers. Of greatest concern are plans - currently on hold - for China Three Gorges to construct the Mong Ton dam on the Salween River in Myanmar. The Salween, also called the Nu River upstream in China, is the longest undammed river in mainland Southeast Asia and supports the livelihoods of over ten million people, sustaining the rich fisheries and fertile farmland central to the lives of indigenous and ethnic minority communities living along its banks. Myanmar and China Three Gorges have been unable to proceed with dam construction on the Salween largely due to broad-based community resistance. Efforts to keep the Salween free flowing all the way to its source were bolstered in 2016 when China's Yunnan government decided to stop all dam construction in the Nu Valley.

Recommendation: Companies should forego projects proposed on a free-flowing river or the mainstem of a major river.

Significant human cost of biodiversity loss, particularly for indigenous peoples. Indigenous peoples, while constituting just 5% of the world's population, serve as stewards of 80% of global biodiversity.¹⁰ In addition to being subjected to forced displacement from their territories, they have also borne the brunt of dams' impacts on species that are often closely bound to indigenous cultures and identities.

At least three of the projects reviewed entail impacts on indigenous peoples. The São Manoel dam is located on Brazil's Teles Pires River in the Tapajós Basin, one of eight areas of Amazonian biological endemism, where many species are found nowhere else on earth. Indigenous groups, including the Mundurucu, Kayabi and Apiaká, have long staunchly opposed hydropower development on their lands and on the stretch of river that sustains freshwater species and other species that are integral to their lives, livelihoods and culture. China Three Gorges is one of three companies in the consortium that built and now operates the dam, which has caused a significant decline in freshwater species including the fish and turtles that are central to local indigenous diets. The economic impacts have also been particularly severe to fishermen who have reported fish catches plummeting to as low as 15% of their catch in years before the dam.

Recommendation: Adopt a requirement to secure the Free, Prior and Informed Consent (FPIC) of communities before becoming involved in projects that may impact indigenous peoples and their territories.

Pronounced impacts from the cumulative impacts of multiple dams on a river. Multiple dams on a river basin can cause significant cumulative impacts beyond the direct ones incurred by individual dams, as rivers are altered from their natural flow regimes. These impacts are particularly pronounced on freshwater species that face multiple barriers and find their habitats confined to a short stretch of river, or experience significant fluctuations in

9. Luther Aadland. Barrier Effects on Native Fishes of Minnesota, April 2015.

10. National Geographic, [Can indigenous land stewardship protect biodiversity](#), November 2018.

river flows that disrupt fish breeding grounds and aquatic biota that are critical to the food chain.

Several projects examined in this study did not account for nor attempt to mitigate cumulative impacts. In Lao PDR, PowerChina owns the rights to develop and operate a cascade of seven dams on the Nam Ou River, a major tributary of the Mekong. Studies predict that the projects will have a severe impact on the biodiversity in the Nam Ou Basin, in particular for fish species, due to the loss of connectivity and conversion of the river ecosystem from a free-flowing river to a series of reservoirs. A summary of the project's cumulative impacts predicts a loss of 66% of fish biodiversity in the Nam Ou, with additional cumulative impacts on the wider Mekong Basin. Despite this, there is no indication that the company is taking steps to reduce the cascade's cumulative impacts.

Recommendation: Require that cumulative impact assessments are conducted for dams on rivers with multiple dams to fully assess impacts, and that robust mitigation measures are in place to address them.

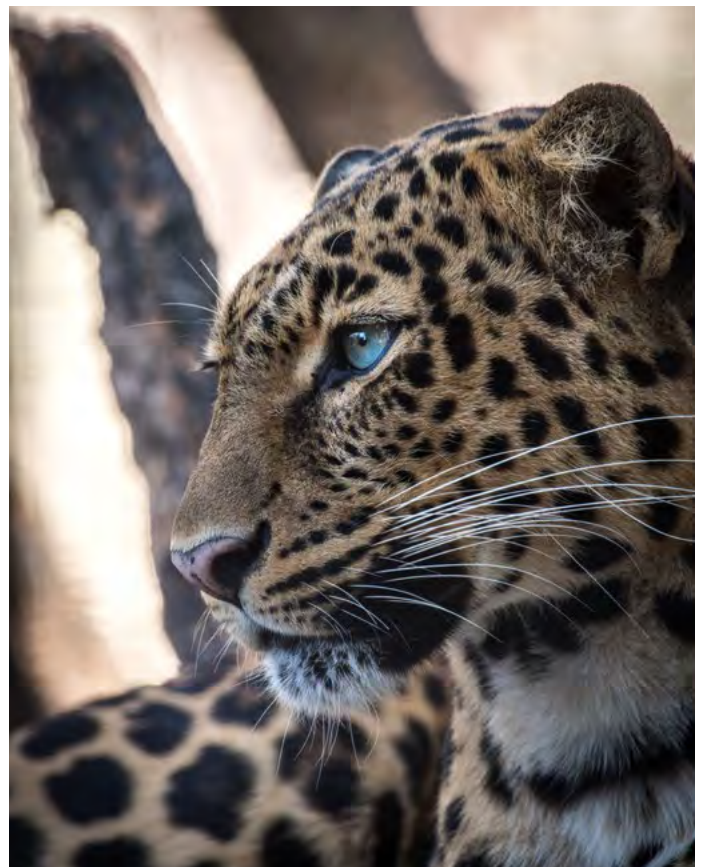
Company policies regarding biodiversity and due diligence fall well below international standards. A recurring issue encountered in the examination of the cases included in this report, as well as in previous assessments, is the lack of sufficient due diligence procedures to screen for destructive projects. This is in part an extension of companies largely lacking clear requirements regarding biodiversity and clearly defined “no go” policies to exclude problematic projects. It is also indicative of a tolerance for impacts and risks, including reputational risks, that many observers deem too high to prevent the most severe impacts, including the extinction of species.

This was particularly true of cases involving PowerChina, and even more specifically its subsidiary Sinohydro. The presence of orangutans known at the time to be “genetically distinct” in the Batang Toru case should have been sufficient to trigger broader assessment and mitigation of impacts before beginning construction. The discovery that the orangutans local to the project area are in fact a new species should have prompted an immediate suspension of works.

Combined with its continued involvement in the Koukoutamba Dam in Guinea and the Julius Nyerere dam in Tanzania over the objections of IUCN and the UNESCO World Heritage Committee, this is indicative of a troubling pattern of complete disregard for biodiversity concerns.

China Three Gorges, for its part, has made commitments to avoid projects impacting protected areas, including World Heritage sites. However, that has been insufficient to screen out destructive projects such as the São Manoel project in Brazil which violated the rights of indigenous peoples, or the Mong Ton dam in Myanmar that would severely impact one of Southeast Asia's last free-flowing rivers.

Recommendation: Adopt and implement due diligence procedures with clear bottom lines aligned to international standards, for example requiring no net biodiversity loss and requiring net biodiversity gain in projects impacting critical natural habitats.



Leopard | Photo courtesy of Uriel Soberanes on Unsplash

2. Introduction

Biodiversity plays a vital role in sustaining the world's ecosystems and its economies. Maintaining rich biological diversity is acknowledged as central to reducing poverty and meeting the Sustainable Development Goals. Yet the world is experiencing a prolonged decline in biodiversity from unchecked developments into wild spaces and destruction of habitats that threatens not only the loss of many of the world's species, but also human health - as the ongoing pandemic attests - and the global economy. A recent study by the world's second largest reinsurer, Swiss Re, found that over half of global GDP relies on high-functioning biodiversity and the ecosystem services that it provides.¹¹ The report warns, however, that "one-fifth of the world's countries are at risk of their ecosystems collapsing because of the destruction of wildlife and their habitats."



Malayan tapir | Photo courtesy of Renato Canepa from Pixabay

The 2020 Global Assessment on Biodiversity and Ecosystem Services by Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) indicates that at the current rate, over a million animal and plant species - a quarter of all known such species - are at risk of extinction in the coming decades.¹² In its latest Living Planet report, the World Wildlife Fund estimates 84% of all freshwater species, including 86% of migratory fish, have been lost since 1970 due in part to the construction of dams on rivers and key waterways.¹³

Dams and associated infrastructure such as roads and transmission lines have taken a significant ecological toll on terrestrial biodiversity as well, both directly through submerging or fragmenting habitats, as well as indirectly through bringing people and human settlement into previously inaccessible areas. This has had and continues to have an inordinate impact on endangered species. The State of the Apes, for example, estimates that "by 2030, fewer than 10% of ape ranges in Africa and only about 1% of those in Asia will remain untouched by infrastructure development" such as dams, and that "negative impacts of dam construction on apes and their habitats across Africa and Asia are likely to increase over the coming years."¹⁴

Dam impacts on wildlife and freshwater resources have also had a significant human cost. Declines in fish stocks, particularly downstream of dams, have impacted millions of river-dependent populations around the world and jeopardized a key source of protein for local diets. Indigenous peoples, while constituting just 5% of the world's population, serve as stewards of 80% of global biodiversity.¹⁵ As such, indigenous peoples have, in

11. Swiss Re. [A fifth of countries worldwide at risk from ecosystem collapse as biodiversity declines](#). September 2020.
12. IPBES. [Global Assessment Report on Biodiversity and Ecosystem Services](#). 2019.
13. World Wildlife Fund. [Living Planet Report 2020](#). 2020.
14. Arcus Foundation. State of the Apes: Infrastructure Development and Ape Conservation. 2018.
15. National Geographic, [Can indigenous land stewardship protect biodiversity](#), November 2018.

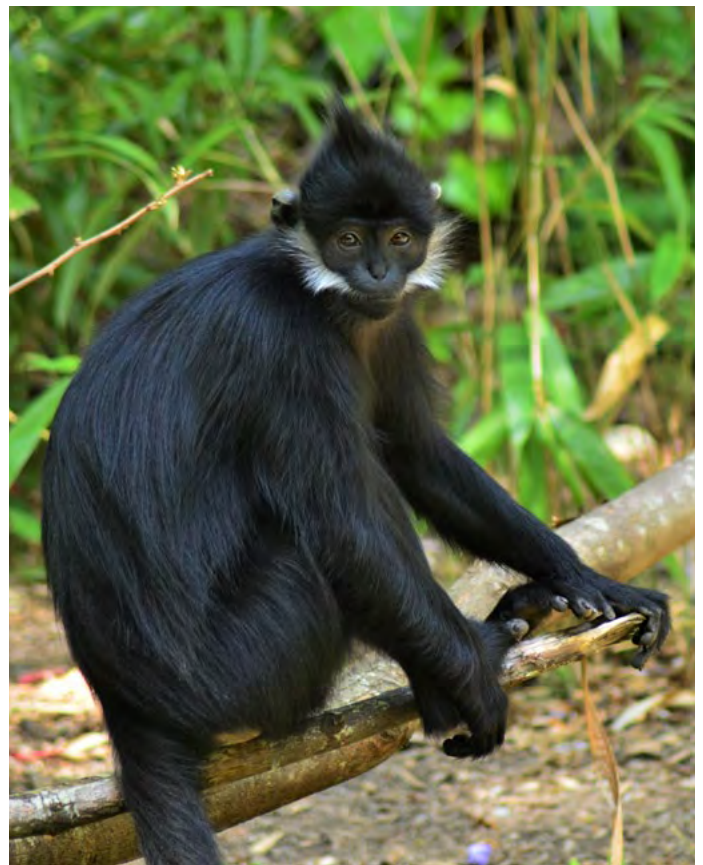
addition to being subjected to forced displacement from territories, borne the brunt of dams' impacts on species that are often bound to indigenous cultures and identities.

Yet biodiversity is increasingly under threat from dams despite growing recognition of their human and ecological toll. A recent study found that over 500 dams are currently under construction or planned within protected areas¹⁶ such as national parks, UNESCO World Heritage sites and wildlife reserves that cover nearly half of the world's Key Biodiversity Areas.¹⁷

This is in addition to the 1,249 existing dams that have already been built in protected areas.

Stemming the biodiversity crisis requires addressing the drivers of biodiversity loss and the destruction of habitats, including dams. This subject has taken on renewed importance and prominence in light of the Covid-19 pandemic, which has drawn global attention to the perils of unchecked development into the world's last wild spaces. It has also illustrated the need for the economic recovery to be invested in sustainable infrastructure and away from business as usual projects that have exacerbated the biodiversity crisis. Given the increasing threats and urgency of addressing biodiversity loss, the coming Conference of the Parties (COP) of the Convention on Biological Diversity (CBD) will be critical in setting the direction and priorities in arresting the biodiversity crisis.

The Convention on Biological Diversity, a global treaty launched at the Earth Summit in Rio de Janeiro in 1992, has long served as a focal point to coordinate global efforts to prevent the decline in biodiversity. Its biennial Conference of the Parties is set to take place in Kunming in China's biodiversity-rich Yunnan Province in 2021. China's hosting is widely seen as an opportunity for the government to showcase recent advances and future plans toward achieving its vision of an "ecological civilization." A prominent subtext, however, is the pronounced role of Chinese state-owned banks and companies' overseas interests and their impacts on biodiversity. This is particularly true of the hydropower sector.



Black-and-white colobus | Photo courtesy of Bryan Hanson on Unsplash

16. Thieme et al. Dams and protected areas: Quantifying the spatial and temporal extent of global dam construction within protected areas. May 2020.

17. IPBES. [Global Assessment Report on Biodiversity and Ecosystem Services](#). 2019.

Chinese state-owned enterprises have an outsized influence in the global hydropower sector. Some of China's largest construction companies, which have already built thousands of dams domestically within China, have in recent years shifted focus overseas, to the point that the China Energy Engineering Group estimated that Chinese enterprises represent 70% of the global hydropower market.¹⁸ In fact, the two largest dam builders alone - PowerChina Resources and China Three Gorges Corp, and their subsidiaries - are estimated to have well over half of the international hydropower construction market. Looking forward, Chinese hydropower corporations are positioned to become even more influential, as China continues to roll out the Belt and Road Initiative (BRI), a trans-continental infrastructure plan worth trillions of dollars that is slated for completion by 2049.

The focus on China as host of the Convention on Biological Diversity COP and its ambitious commitments to advance its vision of an "ecological civilization" represents a critical moment to reckon with a concerning trend: the increasing scale and severity of biodiversity impacts of these prominent Chinese state-owned enterprises in their hydropower investments.

The need to reassess destructive projects has been brought into sharp relief by a number of recent projects that have galvanized opposition from communities and conservationists alike. For example, PowerChina's subsidiary Sinohydro won the contract to construct the Batang Toru dam, a project in North Sumatra that scientists warn would precipitate the extinction of an entire great ape species, the recently discovered Tapanuli orangutan. The Batang Toru project is far from alone. Sinohydro is contracted to build another dam in West Africa that is expected to lead to the deaths of 1500 critically endangered Western chimpanzees in the middle of a national park that was established for their protection. A third Sinohydro project in Tanzania is under construction in the middle of a UNESCO World Heritage site, putting the black rhinoceros at risk of poachers after their population had finally been brought from the brink of extinction. China Three Gorges, meanwhile, built and is operating a dam in the Brazilian Amazon that has decimated habitats

and numbers of fish and turtles that are central to the diets and cultures of indigenous tribes. This includes the Mundurucu people who twice occupied the dam site after the company broke promises and destroyed sacred sites.

This report is intended as a contribution toward important discussions about the role of Chinese state-owned enterprises in helping fulfill China's commitment to the concept of ecological civilization and President Xi's pledge that the Belt and Road Initiative will be "eco-friendly" and that "biodiversity protection will be enhanced" as a result.¹⁹

The report examines twelve project cases, six from each parent company. It describes the biodiversity impacts of each, the role of the company, and what lessons can be drawn to inform a series of recommendations of how China Three Gorges, PowerChina Resources, and, by extension, all dam-building companies, can ensure that they do not exacerbate biodiversity loss and instead are aligned with China's commitments to protecting biodiversity. This is not intended as an exhaustive treatment of the subject, but it rather aims to provide examples of projects - past, current, and future - that illustrate the need for stronger biodiversity protections.



Asian Small Clawed Otter | Photo courtesy of Daniel Olaleye on Unsplash

18. People's Daily. Chinese enterprises represent 70 percent of global hydropower market. 2019.

19. Ministry of Ecology and Environment. [The Belt and Road Ecological and Environmental Cooperation Plan](#). May 2017.



Giraffe in the Selous Game Reserve | Photo courtesy of Leila Boujnane on Unsplash

3. Biodiversity Commitments and Standards

The 15th Conference of the Parties on the Convention on Biological Diversity is upcoming in Kunming, China in 2021 and 2022, amidst increasing scrutiny over the overseas ecological footprint of some of China's most prominent state-owned enterprises, including PowerChina and China Three Gorges. As such, it is an important moment to take stock of these companies' existing commitments with respect to biodiversity, the standards they are expected to uphold under Chinese regulations, and how these standards compare to internationally accepted standards.

Successive studies of China's state-owned enterprises by International Rivers²⁰ have found that company policies and practice routinely fall below accepted international standards. An examination of company policies and promotional materials reveals that while these occasionally make reference to the need to protect biodiversity, their actual policies and commitments tend to be more aspirational. In practice, companies almost uniformly defer to host country laws or financier policies as their benchmark, and a company's insistence on applying a higher standard is virtually unheard of. In fact, another persistent finding from previous research on Chinese state-owned dam building companies like PowerChina and China Three Gorges is the lack of clear bottom lines in due diligence procedures to rule out a company's involvement in destructive projects.

Key international principles and standards for the protection of biodiversity

CONVENTION ON BIOLOGICAL DIVERSITY

The **Convention on Biological Diversity (CBD)** is the main legally binding multilateral instrument regarding conservation and sustainable use of biodiversity. The CBD was agreed in 1992 at the Earth Summit in Rio de Janeiro and it entered into force in 1993. This represented the first time that conservation of biodiversity was reflected in international law as "a common concern of humankind" and as essential to the concept of sustainable development. The CBD recognizes the interdependence of indigenous peoples and biodiversity, and since its introduction it has underpinned global efforts and policies to protect biodiversity. The CBD secretariat has underscored the important role that private sector actors can play in ensuring that their activities and supply chains do not adversely impact biodiversity, and to proactively integrate biodiversity into their business practices.²¹

Discussions are currently underway for the adoption of a new set of biodiversity targets under the CBD through 2030 and for a global biodiversity vision through to 2050. These will be the subject of negotiation and agreement ahead of and at the upcoming biennial Conference of the Parties in Kunming, China in 2021. China's commitments under the existing set of targets focused on aquatic ecology and species, protection of endangered species, and a significant expansion of protected areas nationally.²²

20. See [Watered Down](#) (2019) and [Benchmarking Overseas Projects of Chinese Companies](#) (2015).

21. [Convention on Biological Diversity Business Engagement Programme](#).

22. [Convention on Biological Diversity - National Targets: China](#).

IFC PERFORMANCE STANDARDS

The CBD provides the framework for most international standards regarding biodiversity applicable today, including those of the World Bank and its private sector lending arm, the International Finance Corporation (IFC). In the introduction to its **Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources**, the IFC notes, “The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity.” While there are significant limitations to the Performance Standards, both in its requirements and its application, IFC’s environmental and social Performance Standards have become the de facto international standard for companies and financiers across the globe. For example, the Performance Standards form the basis for the Equator Principles, a set of criteria adopted by 111 private banks and representing three-quarters of project finance invested annually in emerging markets.

IFC Performance Standard 6 requires projects to ensure no net loss in biodiversity, and in projects impacting endangered species that they achieve a net biodiversity gain. It also requires consultations with affected communities regarding their value of biodiversity. Critically, Performance Standard 6 refers not only to the protection of biodiversity, but also to the need to address the impacts caused to ecosystem services, meaning the benefits that people derive from their ecosystems. IFC Performance Standard 6 also includes Guidance Note 73 that requires clients to consult the IUCN Species Survival Commission and Primate Specialist Group as early as possible if great apes may be located on the project site, and that any areas where great apes occur are to be treated as critical habitat. The World Bank and IFC biodiversity standards both permit the use of biodiversity offsets, which is highly controversial in part because of the lack of guarantees that those offsets will be maintained in the long term – an issue that is illustrated by several case studies in this report.

IFC Performance Standard 7 on Indigenous Peoples recognizes the internationally accepted right of indigenous peoples to grant or withhold their Free, Prior and Informed Consent (FPIC) on projects that will impact them. This is of critical importance because indigenous peoples have historically and currently been disproportionately impacted by hydropower projects, which have resulted

in their forced relocation away from the rivers, lands and natural resources that are often central to their culture and sense of self identity. IFC Performance Standard 7 on Indigenous Peoples requires that clients secure Free, Prior and Informed Consent in cases where indigenous lands and natural resources would be impacted. While criticized for its limited scope of application and imperfections in how it is typically implemented, Performance Standard 7 represents an important benchmark for global standards.

CHINESE OVERSEAS INVESTMENT AND BIODIVERSITY PROTECTIONS

In addition to abiding by host country laws, China’s state-owned enterprises operating abroad have a number of environmental and social guidelines that are supposed to guide their operations. However, there is little evidence of enforcement or even of their application, for example by citing specific provisions in project preparation. Below is a sampling of some oversight mechanisms and biodiversity-related provisions of these guidelines.

Chinese overseas investments are recorded by the Ministry of Commerce (MOFCOM) and companies must submit annual reports to the State-Owned Asset Supervision and Administration Commission (SASAC). The 2018 **Administrative Measures for Outbound Investment of Enterprises** requires that in projects by state-owned enterprises, investments over \$300 million or that involve “sensitive” sectors in sensitive countries are reviewed by the National Development and Reform Commission (NDRC). Article 13 defines “sensitive” sectors to include projects involving “exploitation or utilization of cross-border water resources.”

The 2013 MOFCOM and Ministry of Environment **Guidelines for Environmental Protection in Foreign Investment and Cooperation** apply to all Chinese companies operating overseas. The guidelines cover environmental impact assessments, pollution monitoring and public consultation. Article 15 states that companies should act together with the host country and communities “to reduce adverse impacts on local biodiversity.” However, these guidelines are not binding.

The 2012 **Green Credit Guidelines (GCG)** and related policies govern Chinese financiers and not companies, but are relevant given the prominent role of Chinese banks in financing hydropower globally. Indeed, most China Three Gorges and PowerChina projects under construction in Africa are financed by the policy banks China Ex-Im Bank and China Development Bank, while the larger Chinese commercial banks are also playing an increasingly important role in overseas hydropower projects. The GCG contain requirements to evaluate prospective lending and oversee client performance, and similarly obligates clients to comply with host country laws and international norms. In 2014, the banking regulator issued a set of key performance indicators for measuring GCG implementation.

The 2017 **Guidelines of Sustainable Infrastructure** for Chinese International Contractors stipulates that “Species protection should be a major factor in the siting decision.. the places where rare and endangered wildlife species grow, inhabit, forage, spawn, breed or migrate should be avoided as the project site.”²³ These guidelines were developed by the Chinese Association of International Contractors, of which several prominent state-owned enterprises including PowerChina and China Three Gorges are members. The guidelines are purely voluntary and there is no reporting or enforcement mechanism.

The 2017 **Regulations on the Administration of Foreign Contracted Projects** (Order No. 527 of the State Council of the People’s Republic of China) states: “In carrying out foreign contracted projects, enterprises shall abide by the laws of the countries or regions where the project is located, abide by contract terms, respect local customs and habits, pay attention to ecological environment protection, and promote local economic and social development.”²⁴

The **2017 Guidance on Promoting Green Belt and Road** is non-binding, aspirational, and aims to share the Chinese government’s concept of “ecological civilization” among countries participating in the Belt and Road Initiative. The document emphasizes the need for Chinese companies to help host countries achieve their Sustainable Development Goals, and that they should abide by host country laws, global treaties and international high standards. The document contains a commitment to “protect biodiversity” but lacks concrete measures and does not exclude projects that adversely impact biodiversity. **The Belt and Road Ecological and Environmental Cooperation Plan**, produced by the Ministry of Ecology and Environment, further commits to “help relevant countries along the Belt and Road to fulfill commitments under multilateral environmental agreements (MEAs), such as Convention on Biological Diversity.”²⁵ These themes were reinforced in the Chinese government’s September 2020 position paper which set high level commitments toward strengthening biodiversity outcomes in the Belt and Road Initiative, and even highlighted that biodiversity protection will be prioritized within its cooperation with Africa.²⁶

The 2021 MOFCOM and Ministry of Environment **Guidelines for the Green Development of Foreign Investment Cooperation** is the latest set of guidelines encouraging Chinese companies operating overseas to abide by green principles in implementing the Belt and Road Initiative. The 2021 Green Guidelines are significant in their call for Chinese companies to adhere to internationally accepted standards, such as IFC Performance Standards, rather than default to host country laws. They also expand on the 2013 version to explicitly include climate and biodiversity measures, including through aligning with the Paris Climate Agreement and the Convention on Biological Diversity. While the new guidelines have generally been well-received, they still only constitute a voluntary set of guidelines.

23. Chinese Association of International Contractors. [Guidelines of Sustainable Infrastructure for Chinese International Contractors](#), 2017.

24. MOFCOM. [Regulations on the Administration of Foreign Contracted Projects](#), 2017.

25. Ministry of Ecology and Environment. [The Belt and Road Ecological and Environmental Cooperation Plan](#). May 2017.

26. Building a Shared Future for All Life on Earth: China in Action - Position Paper of the People’s Republic of China for the United Nations Summit on Biodiversity, September 2020.

Company commitments regarding biodiversity

CHINA THREE GORGES CORP. AND SUBSIDIARIES

The China Three Gorges Corporation rapidly began to increase its overseas business portfolio in 2008 after acquiring China International Water and Electric Corporation, and now has about ten subsidiaries and projects in 40 countries across the world. In its 2013 Social Responsibility Report, the company stated that biodiversity is considered to be of “high strategic importance.” The company has stated that it requires environmental impact assessments and implementation of preventive measures prior to beginning construction, in line with Chinese government guidelines and international best practices.

CTG’s 2017 Sustainable Development Policy indicates that among the company’s objectives is to “target environmental conservation and protection of biodiversity.” Among the actions that CTG commits to is to “Respect legally designated protected areas by international agreements such as World Heritage Sites and RAMSAR sites.”²⁷ As of 2016, China Three Gorges’ subsidiary China International Water & Electric reported that it had developed a list of “No-Go areas” that includes national parks, World Heritage Listed Areas, habitats of threatened species and internationally listed and protected wetlands.²⁸

In its response to the findings of this report, CTG noted that in its efforts to advance ecological civilization, “CTG has been making its efforts in the facilitation of building an ecological system that respects nature, features green development, and maintains the harmonious coexistence of man and his environment....In terms of international projects development, CTG follows international guidelines, undertakes the responsibilities in environmental protection, social protection, and sustainable development. We remain committed to environmental protection, biodiversity protection, and dialogues with local communities near the project.”

POWERCHINA AND SUBSIDIARIES

Power Construction Corporation of China (PowerChina) is a Fortune 500 company that owns 14 subsidiaries including PowerChina Resources and Sinohydro International. Sinohydro is mainly a project contractor, undertaking conventional construction (EPC) contracts, while PowerChina Resources focuses on construction and operation (BOT) projects.

PowerChina has in the past made commitments to follow World Bank Environmental and Social Safeguards Policies in countries with insufficient regulatory frameworks, but it is unclear in which projects, if any, these standards have been applied as a requirement from the company.

The company has committed to abide by a number of environmental guidelines, such as the IFC EHS Guidelines on Air Emissions and Ambient Air Quality (2007) and Wastewater and Ambient Water Quality (2007), but none that specifically related to biodiversity. The nearest such mention is in Sinohydro’s 2014 statement of ethical principles: “We are also committed to limiting the impact of our business activities on the environment. We continue to take steps to preserve biodiversity and affected ecosystems, protect World Heritage areas, and to restore any disturbed areas in a timely manner.”²⁹



Indochinese Tiger | Photo courtesy of Samuele Giglio on Unsplash

27. China Three Gorges. [Sustainable Development Policy](#). 2017.

28. Powerpoint on Environmental Management and OHS. 2016. CIWE.

29. Sinohydro Corporation. [Statement of Ethical Principles](#). 2014.

4. Case Studies





Isimba

Uganda

China International Water & Electric

Julius Nyerere Dam

Tanzania

Sinohydro

Jiasa River

Yunnan, China

HydroChina

Mongton

Myanmar

China Three Gorges

Three Gorges Dam

China

China Three Gorges

Nam Ou Cascade

Lao PDR

PowerChina

Don Sahong

Lao PDR

Sinohydro

Batang Toru

North Sumatra, Indonesia

Sinohydro



Koukoutamba



Guinea



Sinohydro

Dam to be built in a national park that's one of the last strongholds of the critically endangered Western chimpanzee

Basics:

 **Project owner:** Senegal River Basin Development Organization (OMVS)

 **Capacity:** 294 MW

 **Cost:** \$812 million

 **Financiers:** Unknown

 **Status:** Pre-construction

Biodiversity snapshot:

- **Western Chimpanzee:** critically endangered
- **Fouta Djallon torrent frog:** newly described, endangered
- **Lebbiea grandiflora:** endemic and critically endangered; construction could cause species extinction
- **Others present: leopard** (vulnerable), **hippopotamus** (vulnerable), **black and white colobus** (vulnerable), **four critically endangered species of vultures**
- Impacts largest remaining continuous population of **Western chimpanzee**, an estimated 4000 present within the national park

Summary

The Koukoutamba dam would be located on the Bafing River, a tributary of the Senegal River, on a remote stretch of the Fouta Djallon highlands in Guinea, West Africa. Although the government has said the dam is necessary to address power shortages within Guinea, only a quarter of Koukoutamba's power would be consumed within Guinea and the rest would be exported.³⁰

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. The national park is home to the single largest population of the Western chimpanzee, a subspecies whose population has declined by 80% in the last 25 years. The Wild Chimpanzee Foundation estimates that the dam will result in the deaths of up to 1500 chimpanzees within the national park.³¹

The World Bank was among the early proponents of the Koukoutamba Dam and financed a range of technical and environmental studies through the Senegal River Basin Development Organization (OMVS), which is the project owner. In 2018, the World Bank withdrew its support from Koukoutamba and canceled its plans to finance the dam after the scope of the project's impacts became clear. The World Bank was concerned in particular that its own private sector arm, the International Finance Corporation (IFC), created the Moyen Bafing National Park as a chimpanzee habitat offset.

Shortly thereafter, Sinohydro signed the reported \$812 million contract to build the dam. In addition to significant biodiversity impacts, Koukoutamba would displace an estimated 8700 people, while thousands more would see their livelihoods impacted.

Project impacts

The construction of Koukoutamba would entail significant and irreversible impacts to critically endangered species and critical natural habitats.³² The selection of a project site located within the Moyen Bafing National Park is indicative of the extent of the project's impacts. At least 130 km² of the park would be submerged by the dam's reservoir, much of which is chimpanzee habitat.³³

CREATION OF THE MOYEN BAFING NATIONAL PARK

The impacts on the critically endangered Western chimpanzee would be especially pronounced, and are the subject of greatest concern to scientists. 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 km² span, which the official 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."³⁴

The establishment of the national park was believed to be the Western chimpanzee's best hope of survival, after habitat loss, deforestation and hunting resulted in an 80% decline in the species' population over the past two decades, prompting IUCN to add the Western chimpanzee to its list of critically endangered species

30. World Bank. [Project Paper](#) for Power Sector Recovery Project. February 2018.

31. Wild Chimpanzee Foundation. [Biological Inventory for the Creation of the Moyen Bafing National Park](#), November 2016.

32. Koukoutamba Project Environmental and Social Impact Assessment, October 2018.

33. The Biodiversity Consultancy. Moyen Bafing Chimpanzee Offset Feasibility Assessment, 2017.

34. Official announcement of the creation of the Moyen Bafing National Park, September 2017.

in 2016. Guinea, which is home to fully two-thirds of the subspecies, has witnessed a significant decline as mining, road construction and hunting have caused the population to plummet. To date, the chimpanzee population within the national park has been largely spared because of its inaccessibility and the religious and cultural taboos against hunting or consuming wildlife 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.”³⁵ The World Bank, in its review of the environmental impact assessment (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.”³⁶

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.³⁷

The Wild Chimpanzee Foundation estimates that up to 1500 chimpanzee deaths would result from the construction of Koukoutamba. This number would likely be even higher if the worker’s camp is built within the national park, which is reportedly being considered.

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 km² 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.³⁸
- 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 *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.”³⁹ 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.

35. Wild Chimpanzee Foundation. [Biological Inventory for the Creation of the Moyen Bafing National Park](#), November 2016.

36. World Bank Comments on the Koukoutamba Project ESIA, 2018.

37. *ibid.*

38. The Biodiversity Consultancy. *Moyen Bafing Chimpanzee Offset Feasibility Assessment*. 2017.

39. Arcus Foundation. *State of the Apes: Infrastructure Development and Ape Conservation*. 2018.

In a written response, Sinohydro noted that: “During the construction of the project, the detailed social and environmental management plan (PGES) is formulated according to the EIA approved by the government of the country where the project is located to prevent and reduce the impact of the construction on the ecological environment of the project area. After the completion of the project, the ecological environment affected in the construction process shall be repaired and restored according to the contract requirements.”

This will not, however, prevent the irreversible impacts on chimpanzees and their habitats described in the case study, as attested to by the World Bank and others.

IMPACTS ON FRESHWATER SPECIES

The project environmental impact assessment lacks detailed information on the presence and distribution of freshwater species, particularly downstream of the dam. As the World Bank noted in its comments, “From a biodiversity standpoint, the most severe data gaps in the ESIA are for the 300+ km of Bafing River downstream of the [Koukoutamba] Dam, which will undergo major hydrological changes, particularly in the dry season.”

The EIA identified 26 different fish species potentially impacted, but did not identify or assess possible impacts on fish populations downstream of the dam, including whether there are any endemic species. The World Bank noted that “certain West African rivers...harbor aquatic plants, fish, and other species found nowhere else on Earth; in view of the anticipated impacts from KKT, the biodiversity of the Bafing River also needs to be carefully assessed.”

The downstream impacts on freshwater species are likely to be severe given that the dam’s operating regime would see downstream flows ten times higher than usual during the dry season. There has been considerable research that has documented how such extreme variation from natural flows has contributed to the decline of freshwater species globally. These downstream impacts would be exacerbated by the plan to fill the reservoir in just one rainy season, withholding between 80 and 90% of the river’s flow.

These impacts on fish biodiversity and stocks both upstream and downstream of the dam would also be felt by local communities who rely on fishing to supplement their diets and income. The dramatic changes in flows downstream of the dam would also impact communities that practice flood recession agriculture.

Lessons

- The dam’s location within a national park should have excluded the project from Sinohydro’s consideration.
- Irreversible impacts on critical natural habitats of critically endangered chimpanzees should have ruled the project out.
- The withdrawal of and critical comments by the World Bank should have been a red flag over the severity of concerns and impacts.

Timeline

- **2012**
World Bank feasibility study leads to selection of Koukoutamba as the site for OMVS dam
- **September 2017**
The Moyen Bafing National Park is established to protect the critically endangered chimpanzees
- **March 2018**
The draft project EIA is prepared, which the World Bank rejects because of irreversible impacts on chimpanzee populations and on the national park
- **February 2019**
Sinohydro signs agreement to construct the Koukoutamba Dam

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% 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 and accessible only via poor roads. Most critically, cultural and religious taboos among the predominantly Peulh (Fulani) local communities 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 2016 following an 80% decline over the past 25 years.





Batang Toru



North Sumatra, Indonesia



Sinohydro

Construction of Batang Toru dam could cause the first extinction of a great ape species, the Tapanuli orangutan




Basics:

 **Project owner:** North Sumatra Hydro Energy

 **Capacity:** 510 MW

 **Cost:** \$1.6 billion

 **Financiers:** Unknown. Bank of China has withdrawn from the project. The World Bank, Asian Development Bank and Asian Infrastructure Investment Bank all declined to be involved in the project.

 **Status:** Under construction

Biodiversity snapshot:

Scientists have found over 310 species of birds, 80 species of reptiles, 64 species of frogs and toads, and more than 1,000 tree species in the Batang Toru ecosystem. The botanical survey conducted for the project found a new species of myco-heterotrophic plant and evidence of Dipterocarpus Cinereus, a tree thought to be extinct. Batang Toru is one of the few areas in the world where three ape species coexist within the same geographical range. A number of species identified in the project area are on the IUCN Red List, among them:

- **Sumatran tiger:** Critically Endangered
- **Sumatran orangutan:** Critically Endangered
- **Tapanuli orangutan:** Critically Endangered
- **Siamang:** Endangered
- **Pangolin:** Critically Endangered
- **Asian tapir:** Endangered
- **Mitred leaf monkey:** Endangered
- **Agile gibbon:** Endangered
- **Pig tailed macaque:** Vulnerable

Summary

The Batang Toru Hydropower Project would be located on the 170 km long Batang Toru River in the lowlands of the Batang Toru Ecosystem, in the southern part of North Sumatra. The project was initially proposed in 2012 to meet regional energy needs and to ease Indonesia's budgetary deficit by eliminating the need to import diesel. The project has since been shown to no longer be needed because other energy projects had come online elsewhere sufficient to meet demand.⁴⁰

Sinohydro was contracted by the project developers North Sumatra Hydro Energy (NSHE) in 2015 to construct the dam and associated transmission lines, despite the presence of orangutan and other rare species. Works began in September 2017, but by November 2017 scientific reports revealed the orangutan species in the project area to be a newly discovered and distinct species of orangutan, named the Tapanuli orangutan. This discovery prompted immediate calls to halt construction of the dam amid warnings that destruction of the orangutan habitat would precipitate their extinction. Local campaigners have also pointed out the lack of consultation with local communities and the anticipated impacts the dam would have on livelihoods and diets by diminishing fish stocks.

The Bank of China withdrew from the project and construction was halted in September 2019, though works have since resumed. The project developers have acknowledged the Bank of China's withdrawal will delay the project considerably, although they have reiterated their commitment to complete the project by 2025.

Project impacts

Construction of the Batang Toru dam would entail significant impacts on biodiversity. The area that would be impacted by the dam consists of the last primary lowland forest of the Batang Toru Ecosystem. Even prior to the

discovery of the Tapanuli orangutan as a distinct species, the area was known to harbor a high density of biological diversity. In addition to orangutans, scientists have found high numbers of other land and riparian species, including the Sumatran tiger, pangolins, and siamangs - the largest of the gibbons. The project and its related infrastructure would destroy this unique habitat and make the area more accessible to poachers and illegal loggers.

IMPACTS ON THE NEWLY DISCOVERED TAPANULI ORANGUTAN

As part of the preparation phase, project developer NSHE commissioned a biodiversity monitoring survey among the set of initial assessments. While the report was deficient and has had to be updated multiple times since, even the 2015 version acknowledged that the project area is "an integral part of the Batang Toru Ecosystem," which is recognized for its rich biodiversity and "genetically unique orangutan population."⁴¹ Even months prior to Sinohydro's involvement in the project, the 2015 biodiversity survey expressed the need for the project to proceed with caution due to the presence of critically endangered species, including orangutans.

In November 2017, shortly after construction of Batang Toru began, scientific reports revealed the orangutan species in the project area to be the Tapanuli orangutan, not the Sumatran orangutan as previously believed. The Tapanuli orangutan was a newly discovered species and distinct from the other two known orangutan species. With fewer than 800 individual Tapanuli orangutans remaining, experts immediately warned that the Tapanuli orangutan was facing imminent danger of extinction, with its prime habitat to be directly impacted by construction of the Batang Toru dam. Indeed, the Tapanuli orangutans are found only in the Batang Toru Ecosystem and live in the lowlands where the infrastructure associated with Batang Toru is to be built, and in three areas of adjacent highlands.

The clearing and initial infrastructure that has taken place has already begun to disrupt and fragment the habitat for Tapanuli orangutans. Leading scientists on great apes

40. B2E2. [Analysis of Electricity Demand in North Sumatra Province and the Planned Batang Toru Hydroelectric Power Plant's Impacts](#), January 2020.

41. PanEco. [Biodiversity Monitoring Report](#), August 2015.

have expressed concern that the project's infrastructure would destroy or isolate three out of five habitat blocks of the Tapanuli orangutan. The Batang Toru hydropower project is situated at a key location for connectivity between these sub-populations. They have identified that fragmentation of the populations will decrease genetic diversity and accelerate extinction.

In response to these developments, the IUCN Section on Great Apes, the Indonesian Ministry of Environment and Forestry, and the world's foremost experts on great apes called for a halt to dam construction. The IUCN Primate Specialist Group's Section on Great Apes went further to call for a moratorium on all developments in the Tapanuli orangutan's range, and for an independent study to determine the implications for the Tapanuli orangutan of the various threats to orangutans occurring in the project area, and whether the threats can be mitigated.⁴²

As a result of international attention and sustained pressure from Indonesian and international groups, the Bank of China quietly withdrew its funding for the project. While Sinohydro had reportedly halted construction by September 2019 when the funds ran out, more recent reports suggest that construction had resumed by mid-2021.

IMPACTS ON FRESHWATER SPECIES

As a diversion type hydropower project that would divert much of the river's flows from the main stretch of the river, the project would effectively split the river in two, preventing fish and other species from migrating upstream or downstream. The environmental and social impact assessment (ESIA) identifies that the project will negatively impact most fish species, in particular migrators who travel to spawn. It reports that "one of the most significant impacts of the project in the bypass reach" is a decrease in connectivity that will "negatively affect most fish species in that area."⁴³ Species distribution, access to spawning grounds, reduced habitat area, isolation of populations, and erection of a permanent barrier will significantly impact freshwater species and river ecology as a whole.

Lessons

- Discovery of a new and critically endangered ape species within the project area should have prompted Sinohydro to immediately halt construction and consider withdrawal from the project.
- Even prior to scientific confirmation of a new orangutan species, the known presence of orangutans (all of which are critically endangered) should have prompted a rigorous assessment aligned with IFC Performance Standard 6 to determine whether it would be possible to achieve no net loss of orangutan populations in the project area.

Timeline

- **August 2015**
Biodiversity assessment identifies presence of "genetically unique orangutan population" in project area
- **November 2015**
NSHE signs project construction contract with Sinohydro
- **September 2017**
Construction begins
- **November 2017**
Tapanuli orangutan confirmed as distinct species, listed by IUCN as critically endangered
- **2019**
Bank of China withdraws from the project
- **September 2019**
Sinohydro halts construction
- **Mid-2021**
Sinohydro resumes construction

42. [IUCN calls for a moratorium on projects impacting the Critically Endangered Tapanuli orangutan](#). April 2019.

43. North Sumatra Hydro Energy. ESHIA Addendum, February 2017.

Tapanuli Orangutan:

The world's most recently discovered and rarest ape

It is rare to discover new mammal species that are as large as orangutans. The last discovery of a great ape species was in 1929. The 767 remaining specimens of Tapanuli orangutan are exclusively located in the forests of the Batang Toru ecosystem, in a range of less than 1000 km². While the Tapanuli orangutan is officially the newest recorded ape species, DNA studies show that the Tapanuli is actually the most ancient among orangutan species.

Like all orangutans, the Tapanuli move more easily in the trees than on the ground. While they tend to be solitary and build a new nest each night, the females in particular tend to return to home ranges, even when parts of the area are destroyed.⁴⁴ Orangutans are only found in the wild in Indonesia and Malaysia, and all three subspecies are considered critically endangered and their populations are declining. The primary causes are habitat loss from palm oil plantations, mining, and infrastructure, as well as the induced impacts, such as hunting, that these activities bring. The Tapanuli orangutans are by far the rarest and most imminently in danger of extinction.



Tapanuli Orangutan | Photo courtesy of Pat Whelen from Pexels

44. [The Tapanuli orangutan: Status, threats, and steps for improved conservation](#). Conservation Science and Practice. April 2019.



Tapanuli Orangutan | Photo courtesy of Ludwig Kwan from Pexels



Julius Nyerere Dam

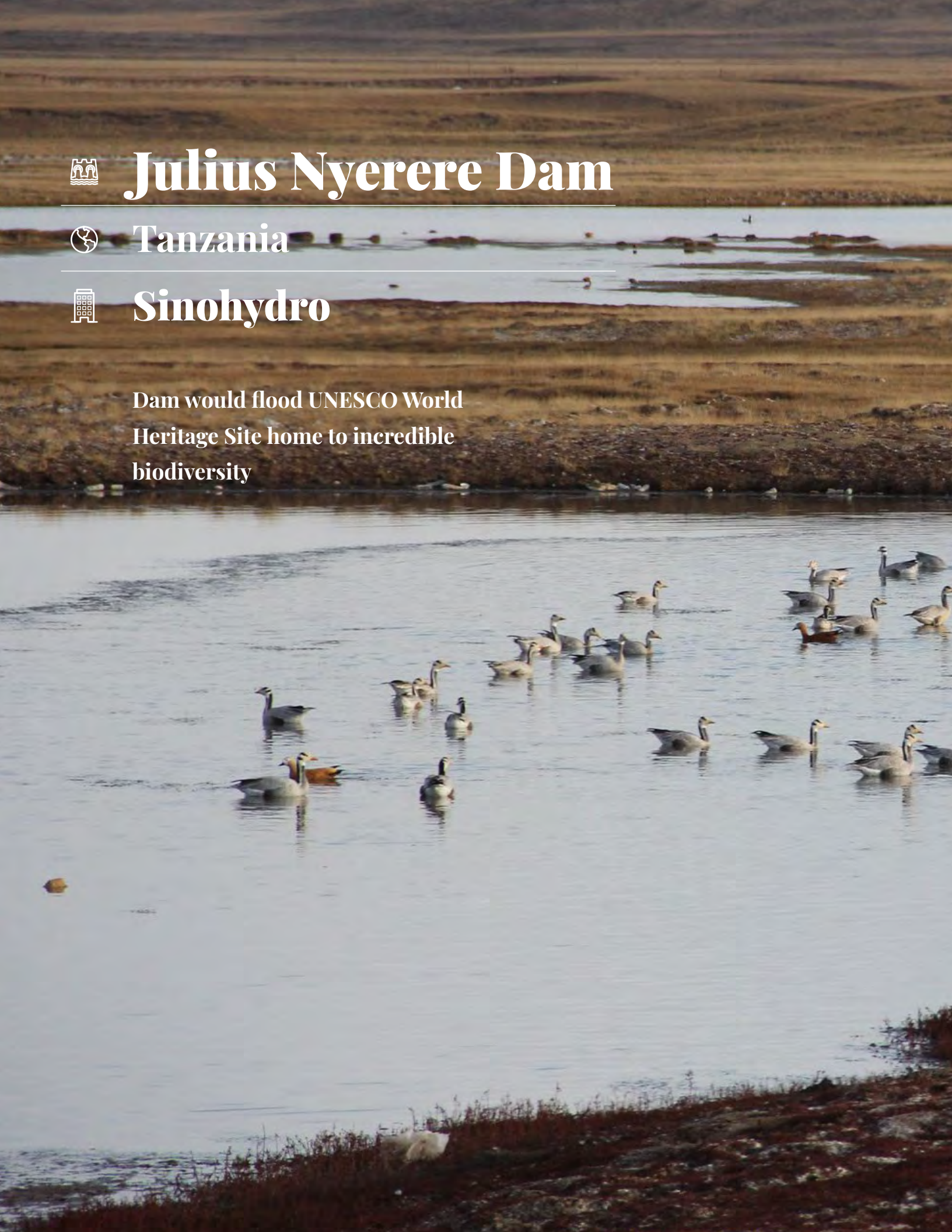


Tanzania



Sinohydro


**Dam would flood UNESCO World
Heritage Site home to incredible
biodiversity**






Basics:

 **Project owner:** Government of Tanzania

 **Capacity:** 2115 MW

 **Cost:** \$3.6 billion (\$7.5-\$10 billion according to some estimates)

 **Financiers:** Unknown

 **Status:** Under construction

Biodiversity snapshot:

The dam would impact the habitats of some of the most iconic and charismatic African wildlife, including hipopotamuses, elephants, cheetahs, lions, giraffes, and the critically endangered black rhinoceros. The dam is being built in the middle of one of Africa's largest wildlife parks, whose diverse habitats of grasslands to tropical forests host rich biodiversity.

Summary

The Julius Nyerere dam is currently under construction on the Rufiji River in Tanzania, the country's largest river. Until recently referred to as Stiegler's Gorge before being rebranded in homage to the country's founder, the dam would become Africa's second largest hydropower dam by installed capacity behind only the Grand Ethiopian Renaissance Dam on the Nile.

The dam is being built in the middle of the Selous Game Reserve, a UNESCO World Heritage site recognized for its outstanding biodiversity value, which serves as home to significant populations of many of Africa's most iconic species. With the dam's reservoir projected to be the sixth largest in Africa, it would severely disrupt the site's outstanding ecological value and biodiversity, including several endangered species such as the black rhinoceros. It would also jeopardize the Rufiji Delta, an important Ramsar site, as well as the livelihoods of 200,000 people living downstream of the dam. The World Wildlife Fund notes that it is "unprecedented to risk losing the integrity of not one, but two globally significant protected areas to a hydropower project."⁴⁵

Despite the Tanzanian president's impatience to get the dam underway, it has struggled to attract the necessary financing. The dam was briefly proposed in 2014 but ultimately dropped after the World Bank declined to get involved over the project's impacts. Other financiers have been wary of taking on the project's massive price tag and the risks, including to their reputation, prompting the government to commit to self-financing the dam. With a conservative price tag of \$3.6 billion, the Julius Nyerere Dam would rank among Africa's largest investments. Independent studies have indicated, however, that the dam's costs have been seriously underestimated,⁴⁶ raising questions over whether the dam will ultimately be completed.

In 2018, the government of Tanzania awarded the construction contract to a pair of Egyptian companies, though many observers raised questions over whether they have the expertise to carry out such a large and complicated project. Meanwhile, intense scrutiny over the impacts on the Selous World Heritage site culminated in UNESCO taking the unusual step in June 2019 of threatening that the site was in danger of losing its World Heritage status. Just two months later, Sinohydro signed a reported \$1 billion deal as a subcontractor to carry out much of the work involved.⁴⁷

Project impacts

The Nyerere dam would create a vast reservoir – at 1200 km² it would be among Africa's largest – above Stiegler's Gorge that would drastically change the landscape, blocking migration routes for both iconic African fauna and fish species. The impacts downstream would, if anything, be even more severe, blunting the seasonal floods that sustain one of the world's greatest sites for diversity along the 180 km stretch to the coast, including a delta that's also a renowned Ramsar site.

IMPACTS ON THE SELOUS GAME RESERVE

The Selous Game Reserve is considered one of Africa's most important protected areas because of the rich biodiversity that it harbors. It is also among the largest UNESCO World Heritage sites, having been inscribed in 1982 in recognition of the outstanding universal value of the wildlife it contains. While the reservoir would submerge a vast 1200 km² – itself an area larger than many national parks – that would represent just 3% of the reserve. It would, however, have an inordinate impact because of its siting near the center of the reserve. Even more critically, the gorge itself, whose power the dam would harness, plays a vital role in sustaining an incredible variety of species downstream.

45. World Wildlife Fund. [The True Cost of Power](#), 2017.

46. *ibid.*

47. [PowerChina Unit Pens USD969 Million Tanzania Hydro Contract in Third Big Deal This Year](#), August 2019.

The highly seasonal dynamics of the river make the area below the gorge, an area known as the heart of the Selous, “the richest habitat area with the largest concentration of fauna and flora,” according to Dr. Barnaby Dye in a paper for the World Wildlife Fund.⁴⁸ The river below the gorge morphs into “a large flat landscape of shifting river beds, marshes and lakes” that serve as ecological hotspots that attract wildlife during the dry season.⁴⁹ The dam, however, would greatly diminish the annual flood pulses that are critical to the Rufiji River’s functioning, while larger-than-usual flows during the dry season could disrupt important biological processes. As noted by Dr. Joerg Hartman, “this will significantly affect the natural dynamics of downstream freshwater and coastal ecosystems, and prime habitats of many species.”⁵⁰

In addition to direct impacts of the reservoir and biodiversity impacts below the dam, there is serious concern over the induced impacts of such a major construction undertaking in what is currently quite a remote location. The project would entail erection of a workers camp for upwards of 1200 construction workers within the reserve. Of even greater consequence, the construction of high quality roads 120 km into the reserve will exacerbate the already persistent problem of poaching, which had nearly wiped out the reserve’s elephant and rhinoceros populations. Other developments within the reserve, such as oil exploration by Shell, have caused similar harms that have persisted for years and even decades after.

The Tanzanian government’s plans to build the Nyerere Dam within the UNESCO site has prompted a significant and nearly unprecedented response from the UNESCO World Heritage Committee, which expressed its “utmost concern about the ongoing Stiegler’s Gorge dam project despite a high likelihood of serious and irreversible damage to the Outstanding Universal Value (OUV) of the property” and threatened to delist the Selous Game Reserve as a World Heritage site.⁵¹ In its public statement on the dam, the World Heritage Committee cited its call for a prohibition on the construction of dams within World Heritage sites.⁵²

IMPACTS ON FRESHWATER SPECIES

The Nyerere dam’s impacts on freshwater species would be significant and manifold. The dam itself would be an obstacle for migratory fish species that travel upstream, including to Kilombero River, a tributary which accounts for 60% of the Rufiji’s flow and is itself host to a Ramsar protected site. In its comments on the project EIA, IUCN notes the “significant negative impacts on freshwater biodiversity in the Rufiji River (especially on migratory fish) which may in turn result in potentially significant impacts on the livelihoods of thousands of people dependent on fisheries in the upstream catchment, including the Kilombero Valley.”⁵³

Even more significant would be the twin effect of withholding considerable amounts of sediment, and disrupting the natural flood pulses that sustain freshwater and other species downstream. In his analysis for WWF, Joerg Hartman notes that this “will change habitat conditions for all aquatic organisms, including endangered species (for example, Dugong and sea turtles), subsistence fishing species, and commercially relevant species,” with impacts expected to be particularly severe at the Rufiji delta.⁵⁴

48. World Wildlife Fund. [The True Cost of Power](#), 2017.

49. Rivers without Boundaries. [Heritage Dammed](#), 2019.

50. World Wildlife Fund. [The True Cost of Power](#), 2017.

51. UNESCO. [UNESCO expresses concern over the state of conservation of Selous Game Reserve](#), February 2018.

52. UNESCO. [UNESCO reiterates its grave concern over planned dam construction within Selous Game Reserve World Heritage property](#), December 2018.

53. IUCN. [Technical review of the EIA for the Rufiji Hydropower Project](#), April 2019.

54. World Wildlife Fund. [The True Cost of Power](#), 2017.

As noted by Dr. Barnaby Dye:

The river also plays a crucial underpinning role in the Ramsar-protected Rufiji River Delta. As well as renewing fertility and providing irrigation for habitats and farmland in the delta, the annual flood also maintains its salinity balance: Without river water flowing in the same volume to the delta, salty seawater would infiltrate upstream. The river's existing balance is key to maintaining East Africa's largest mangrove forest.⁵⁵

Meanwhile, the significant changes to the Rufiji's flow regime as a result of the dam's operation would curtail the algal blooms that support the economically important prawn industry, impacting as well a number of migrating freshwater species, including whale sharks.



Lessons

- PowerChina should abide by UNESCO World Heritage Committee's call for the prohibition on construction of dams within World Heritage sites.
- PowerChina should withdraw its involvement due to the dam's impacts on multiple important protected areas and the sustained local and global public outcry over these impacts.

Timeline

- **2011**
UNESCO expresses concern over planned developments within the Selous Game Reserve, including Stiegler's Gorge
- **2014**
UNESCO inscribes Selous Game Reserve on list of heritage sites in danger over poaching
- **2017**
Tanzanian government announces plans to build Stiegler's Gorge dam, later renamed Julius Nyerere dam, in the middle of the Selous Game Reserve. UNESCO urges Tanzania to consider alternatives to the project.
- **2018**
Tanzanian government awards construction contract to two Egyptian companies
- **June 2019**
UNESCO threatens to delist World Heritage site over the dam's impacts
- **August 2019**
Sinohydro signs subcontracting agreement for nearly \$1 billion in works on the dam

55. Rivers without Boundaries. [Heritage Dammed](#), 2019.

Selous Game Reserve:

A key sanctuary for African wildlife

The vast Selous Game Reserve in southern Tanzania, roughly the size of Switzerland, serves as home to a high variety of habitats from forests to wetlands, and from woodlands to grassland. This variety is what makes the reserve so rich biologically. Its annual transition from dry to rainy season is marked by the picturesque sand rivers that occur when riverbeds that have lain dry for months receive torrents of rain.

The reserve was once home to large and thriving populations of African elephants and the critically endangered black rhinoceros, but decades of unchecked poaching caused their populations to dwindle, a trend that has only recently begun to reverse. Conservationists fear that construction of the dam in the middle of the reserve, as well as other planned developments, would be a major setback after recent success in animal populations rebounding.





Nam Ou Cascade



Lao PDR



PowerChina

Hydropower cascade spanning the entire Nam Ou River, an important and biodiverse tributary system within the Mekong River Basin

Basics:



Project owner: PowerChina



Project type: Hydropower cascade of seven dams developed in two phases



Capacity: 540 MW (Phase 1); 732 MW (Phase 2)



Cost: \$2.73 billion



Financiers: China Development Bank; China Export Import Bank (Phase 1);
China Construction Bank (Phase 2)



Status: In operation

Biodiversity snapshot:

At least 20 species impacted along the Nam Ou cascade are listed as either endangered or critically endangered according to the IUCN Red List, among them:

- **Siamese Giant Barb:** Critically Endangered
- **Mekong Freshwater Stingray:** Endangered
- **Asian Box Turtle:** Critically Endangered
- **Yunnan spiny frog:** Endangered
- **White Cheeked Gibbon:** Critically Endangered
- **Francois's Langur:** Endangered
- **Sunda Pangolin:** Endangered
- **Chinese Pangolin:** Endangered
- **Large Antlered Muntjac:** Endangered
- **Indochinese Tiger:** Endangered
- **Fishing Cat:** Endangered
- **Green Peafowl:** Endangered
- **Big-headed Turtle:** Endangered

Summary

The Nam Ou Cascade Hydropower Project comprises six run-of-river dams and one storage reservoir, with a combined generating capacity of 1.27 GW. The cascade includes two phases. Phase 1, consisting of Nam Ou 2, 5 and 6, is completed and in operation. Phase 2, consisting of Nam Ou 1, 3, 4 and 7, is expected to be fully operational in late 2021.

The project is owned and operated by PowerChina Resources under a Build-Operate-Transfer (BOT) contract. The Nam Ou Cascade represents the first time that a Chinese company has obtained the rights to develop a cascade along an entire river basin outside of China. The Nam Ou Cascade complex is also the largest hydropower cascade in Lao PDR, spanning over 350 km on the Nam Ou River. Under the BOT contract model, the company is responsible for every aspect of the project, from financing, compliance with local laws, completing proper environmental and social assessments, undertaking impact monitoring and mitigation, and ensuring timely delivery of the project. The project has a 29-year concession period during which the company will earn profits from the operation of the dams. Following the concession period, the project's operation will be transferred to the Government of Lao PDR.

The Nam Ou dams are expected to cause severe impacts on the biodiversity and ecology of the Nam Ou Basin and the wider Mekong River Basin. The projects will also have significant impacts on the food sources, livelihoods and cultures of local populations, including ethnic minority and indigenous peoples. Construction of the Nam Ou Cascade has disrupted the connectivity of the Nam Ou River system. The majority of the Nam Ou mainstream has been transformed from free-flowing river into a series of reservoirs, with profound implications for the river's overall productivity and species biodiversity, including fish, amphibians and invertebrates, and aquatic plants and algae. The dams prevent fish migration both from the

Mekong and the Nam Ou mainstream to its tributaries. Together with a loss of spawning habits for many species, this will result in a significant decline in biodiversity.⁵⁶

The Nam Ou Cascade is also contributing to the impacts of hydropower on the Mekong mainstream and within the lower Mekong Basin, including destruction of migratory fish species, alterations of water flows and blocking sediment transport in the Mekong River. None of the projects include facilities for fish passage or sediment flushing, and as such, predicted impacts on fish migration and sediment transport have not been mitigated.

Project impacts

The Nam Ou River spans approximately 480 km and is a transboundary river basin of both national and international importance, shared by Lao PDR and Vietnam. Within Lao PDR, the Nam Ou Basin flows through mountainous and upland areas, narrow forested valleys and limestone karst formations. The Nam Ou is the seventh largest Mekong tributary in contribution to water flows into the Mekong, and contributes 4.8% of the Mekong's sediment load. Previous studies conducted by the Mekong River Commission (MRC) on aquatic health assessed the Nam Ou as in the top 80th percentile in terms of overall river health, the second highest in Lao PDR.⁵⁷

The Nam Ou catchment area includes 14,596 km² of natural forest, and the river basin is a recognized biodiversity hotspot with a variety of endemic and threatened fish species and serves as an important migration corridor providing key fish spawning, nursery and feeding grounds.⁵⁸ The lower part of the Nam Ou, from Muang Ngoy to Pak Ou, is listed by the International Union for Conservation of Nature (IUCN) as a key biodiversity area (KBA) because of the presence of a critically endangered fish species, the giant barb, as well as other fish and aquatic species. A section of the catchment falls within the Phou Den Din and Phou Hippi National

56. International Finance Corporation. [Nam Ou Basin Profile](#). 2017.

57. Mekong River Commission. A multivariate approach to defining "significance" in regard to the tributaries of the Mekong River System. 2009.

58. International Finance Corporation. [Nam Ou Basin Profile](#). 2017.

Protected Areas (NPA), a recognized biodiversity hotspot housing endemic and threatened species, including Asian elephants, Indochinese tigers, white-cheeked gibbons and large antlered muntjac.⁵⁹ The basin also sustains populations of otters, reptiles and birds, including species recorded as endangered on the IUCN Red List.

The Nam Ou Basin in Laos is home to over 400,000 people, including Khmu, Akha, Songsiri, Hmong, Lue, and Lao ethnic and indigenous groups.⁶⁰ The Nam Ou River and its tributaries have historically sustained local cultures and ways of life, including traditional practices, belief systems and identity.

IMPACTS ON BIODIVERSITY AND ECOSYSTEM HEALTH

The Nam Ou is recognized as one of the most important tributaries of the Mekong in terms of biodiversity. An estimated 139 species of fish are found in the Nam Ou Basin. At least 35 of these species have been found to be endemic and at least 86 are native to the Mekong Basin. Five species are known in no other drainage area and may be endemic to the Nam Ou River Basin.⁶¹ Fish migration is an important part of the river system's seasonal cycle, with fish moving upstream from the Mekong into the Nam Ou and from the Nam Ou mainstream into tributaries to breed. Other aquatic plant and animal species, such as freshwater prawns, river weed, amphibians and reptiles, feature prominently in local economies, livelihoods and diets within the basin, but have not been documented through systematic studies.

A series of studies of the Nam Ou Cascade sponsored by the IFC predict that the projects will have a severe impact on the biodiversity in the Nam Ou Basin, in particular for fish species, due to loss of connectivity and conversion of the river ecosystem from free-flowing river to a series of reservoirs. In fact, most project reservoirs back up almost to the foot of the dam above. One study commissioned by

the company estimates a loss of 66% of fish biodiversity in the Nam Ou, with a cumulative impact on the wider Mekong Basin.⁶² The IFC's Basin Profile predicts the disappearance of critically endangered and endangered species due to construction of the Nam Ou Cascade projects.

The Nam Ou dams will alter seasonal flow regimes in the Nam Ou Basin, with major impacts on aquatic species and downstream ecosystems. Six of the projects are run-of-river with limited or no storage capacity. However, their operations are designed to meet daily power generation schedules and may produce significant changes in water levels on a daily or even hourly basis, with potentially destructive impacts on downstream ecosystems and habitats.

IMPACTS ON LOCAL AND INDIGENOUS PEOPLE

The Nam Ou Cascade has displaced thousands of villagers to resettlement sites and reduced their access to fisheries and natural resources important for their livelihoods. The cumulative impact assessment (CIA) summary by the IFC concludes that impacts on the river ecosystem will have corresponding social and economic impacts due to loss of agricultural and forest land, reduction in fish catches, increase in demand and prices of fish and non-timber forest products (NTFPs), and pressures on wildlife. The IFC's Basin Profile found that a significant proportion of the people living along the Nam Ou and its main tributaries would be highly vulnerable to these changes because of their reliance on water resources and access, and that the overall resilience capacity of these populations is low.

Fishing is a key source of food security and livelihoods; one study found that 70 percent of sampled households rely on fishing in the Nam Ou.⁶³ Other important river-related livelihoods include a prawn fishery located in the mountainous areas near Muang Ngoy, and the collection and sale of river weed (*kai*), which is a significant source of income, particularly for women and elders. Villagers throughout the Nam Ou Basin also rely on the collection of

59. International Finance Corporation. [Nam Ou Basin Profile](#). 2017.

60. Ibid.

61. Ibid.

62. IFC. [Cumulative Impact Assessment of the Nam Ou Cascade: Summary](#). 2016.

63. Ibid.

non-timber forest products for livelihoods and household use. These livelihoods sources have been destroyed or significantly reduced due to dam construction, without adequate compensation or acknowledgement of their loss. The river also provides water supply, agriculture and navigation for local populations. Tourism, another important source of income for local people within the basin, has been significantly affected due to construction of the dam cascade.

CUMULATIVE IMPACTS ON LOWER MEKONG BASIN

The Nam Ou Cascade is contributing to wider impacts of hydropower development on the Mekong mainstream and within the lower Mekong basin, including destruction of migratory fish species, alterations of water flows and blocking sediment flows downstream. The CIA summary estimates that 70% of sediment transport from the Nam Ou to the Mekong River will be trapped by the cascade, approximately 4.2 million tonnes per year. The summary asserts that: “these changes will alter the overall river morphology, aquatic habitats and productivity right through the whole river system.”

Other research has examined cumulative impacts of hydropower development and other activities on the Mekong and its major tributaries. For example, the Stockholm Environment Institute (SEI) released a study in November 2017 which notes that dam construction, together with riverbed mining and climate change, has caused a drastic reduction in sediment and nutrient transport in the Mekong Basin, with severe implications for ecosystems, agriculture, fisheries and local livelihoods.⁶⁴ The study found that if all dams in the Mekong basin are constructed, including the Nam Ou Cascade, sediment load reaching the Mekong Delta would be reduced by 97%, with dire consequences for the future sustainability of the Mekong Delta and its populations. The MRC Council Study, released in 2018, examined the cumulative impacts of existing and proposed hydropower developments within the Lower Mekong Basin and produced similar findings and conclusions.⁶⁵

ENVIRONMENTAL IMPACT ASSESSMENT AND PROJECT STUDIES

PowerChina has undertaken environmental impact assessments for each of the individual projects in the cascade, but despite calls and requests from civil society organizations, these have not been made publicly available. The full cumulative impact assessment has also not been made publicly available.

Despite research available which points to extensive and cumulative impacts of the Nam Ou Cascade on the ecosystems and biodiversity of the Nam Ou and the wider Mekong basin, the Nam Ou Power Company (NOPC) appears to take a relatively narrow view of environmental responsibility, largely focusing on the issue of waste management at the dam sites. The overall health of the river and maintenance of flow regimes that support critical ecosystems are not issues that have been widely acknowledged or considered by the project developers to date. No measures have been undertaken to develop a regime for environmental flows in the cascade management to ensure that outcomes for biodiversity and ecosystem health are optimized, despite recommendations in the IFC’s Basin Profile.⁶⁶

64. Stockholm Environmental Institute and UNESCO. [Case Study on Sediment in the Mekong River Basin](#), 2017.

65. Mekong River Commission. [Study on Sustainable Management and Development of the Mekong River](#), 2018.

66. International Finance Corporation. [Nam Ou Basin Profile](#), 2017.

Lessons

- It is necessary to carry out robust cumulative impact assessments prior to construction to understand, prevent and mitigate the often considerable impacts of multiple dams on a single river.
- Hydropower dams, especially in cascades, should be designed and operated in a way that best approximates natural flows and minimizes the impacts on freshwater ecosystems, through the development and implementation of a robust environmental flows regime.
- Fish passages and sediment flushing mechanisms should be integrated into the design of dams to ensure that migratory fish species are sustained and that important sediments continue to nourish downstream areas.
- Proper due diligence should have identified the severe impacts of destroying fish and other aquatic species on the food security and livelihoods of local indigenous and ethnic minority people, and disqualified the project from consideration.
- All environmental, social and cumulative impact assessments should be disclosed to the public and made available for public comment.

Timeline

- **1995**
Hydropower development plans for the Nam Ou begin in 1995 but are abandoned over scale of social impacts and lack of financing
- **2009**
HydroChina recommends development of two storage reservoirs with a total of seven hydropower dams based on feasibility study
- **April 2011**
Sinohydro and the Government of Lao PDR sign a masterplan for the development of all seven dams
- **6 November 2012**
China Development Bank agrees to provide a loan worth \$770 million to the Nam Ou Hydropower Company
- **December 2012**
Project construction formally begins
- **November 2019**
Nam Ou 1 is inaugurated and is the final dam to be completed of the cascade



Local villagers fishing on the Nam Ou River | Photo by International Rivers



Don Sahong



Lao PDR



Sinohydro

Project predicted to destroy local population of endangered Irrawaddy dolphin and blocks a critical passage for year round fish migration in the Lower Mekong Basin.



Basics:

 **Project owner:** Mega First Corporation Berhad

 **Capacity:** 260 MW

 **Cost:** \$500 million

 **Contractor parent company:** PowerChina Resources

 **Status:** Operational

Biodiversity snapshot:

IUCN Red List Species & Status:

- **Mekong Dolphin:** Endangered
- **Mekongina erythrospila:** Near threatened
- **Julien's Golden Carp:** Endangered

Summary

The Don Sahong Hydropower Project is located on the Mekong mainstream in southern Lao PDR, less than 2 km upstream from the Cambodian border. The 260 MW project completed construction in late 2019 and formally commenced operations in January 2020. The Don Sahong dam is constructed on the Hou Sahong channel of the Lower Mekong River mainstream and blocks the full length of the channel at a height of 32 meters. Prior to the dam's construction, the Hou Sahong channel was the main Mekong channel through Khone Falls that sustained year-round migratory fish passage between the upper reaches of the Lower Mekong River to the Mekong Delta. Studies have warned that the Don Sahong dam will have significant impacts on Mekong fish populations and biodiversity,⁶⁷ as well as the food sources, livelihoods, and culture of thousands of people.⁶⁸ The lead project developer of the Don Sahong dam is Mega First Corporation Berhad, which owns the project through a joint venture with Electricité du Laos - Generation (EDL-Gen). The project developer contracted Sinohydro to build the dam for a reported \$320 million in October 2015.

Project impacts

Khone Falls is a complex ecological system consisting of a "large number of small to large channels separated by many large and small islands."⁶⁹ Siphandone, the area where the project is located, is well known for its biodiversity, including a population of Irrawaddy dolphins. Construction of the dam has altered fish migration patterns, harming the Mekong River's ecosystems and threatening the livelihoods and food security of hundreds of thousands of people.⁷⁰ Local communities near the

project site and downstream are most at risk, including ethnic minority and indigenous populations. Many live on a subsistence basis and rely on fish and aquatic resources for income and food.

THREAT TO THE IRRAWADDY DOLPHIN

The Don Sahong dam site is located just one kilometer from a core habitat of the Irrawaddy dolphin that is endangered locally. This group of six dolphins is the last remaining in Lao PDR. They inhabit a transboundary deepwater pool on the border between Laos and Cambodia. There are only 85 Irrawaddy dolphins estimated to remain in the Mekong, many of which are found in downstream sections of the Mekong River in Cambodia. An independent review of the Don Sahong environmental impact assessment (EIA) concluded that the project poses a high risk to the already vulnerable species and is likely to cause the extirpation of the remaining dolphin population in Lao PDR.⁷¹ Conservation organizations, including World Wildlife Fund, have published research on the threat posed by the project to the Mekong River's Irrawaddy dolphin population.⁷²

IMPACTS ON MEKONG FISHERY AND BIODIVERSITY

The Mekong River houses the world's largest freshwater fishery, and rich aquatic biodiversity rivaled only by the Amazon, with over 1300 species. In the Mekong Basin, 87 % of known species are migratory. Fish generally migrate between downstream feeding habitats, such as the Tonlé Sap, and Cambodian floodplains, and upstream breeding zones in Northern Cambodia, Laos, and Thailand.

The Khone Falls area is well known for its abundant and versatile fisheries, with more than 201 fish species known to reside in the area at least part of the year. Don

67. Mekong River Commission. [Technical Review for the Proposed Don Sahong Hydropower Project](#), February 2015.

68. World Wildlife Fund. [Summary of Scientific Reviews on Don Sahong Dam EIA Related to Project Design and Mitigation Measures](#). February 2014; Ian G. Baird, *The Don Sahong Dam*, Critical Asian Studies, 2011.

69. Ian G. Baird. [The Don Sahong Dam: Potential Impacts on Regional Fish Migrations, Livelihoods and Human Health](#), August 2009.

70. Ian G. Baird. *The Don Sahong Dam: Potential impacts on regional fish migrations, livelihoods, and human health*, 2011.

71. International Rivers, *Trial and Error Too Risky for the Don Sahong Dam: A Technical Review of the Don Sahong's 2013 Environmental Impact Assessment*, January 2014.

72. World Wildlife Fund. [The Don Sahong dam and the Mekong dolphin](#), February 2014.

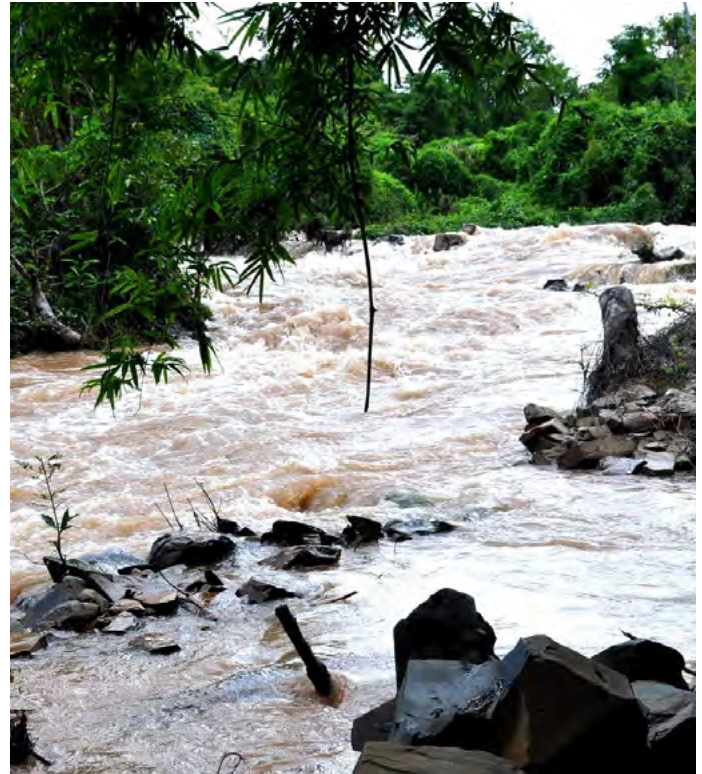
Sahong blocks the Hou Sahong channel, the main channel allowing for year round fish migration prior to the dam's construction. Prior to construction of the dam, at least 100 species were reported to migrate through the Hou Sahong channel, some traveling from as far as the Mekong Delta in Vietnam. Construction of the dam has blocked the Hou Sahong channel to fish passage, affecting dry season fish movement between the Lower Mekong floodplains and Tonlé Sap and the upper reaches of the Lower Mekong Basin. These seasonal migrations are critical to the breeding, spawning and feeding lifecycles of many fish species in the river.

FOOD SECURITY AND LIVELIHOODS

Fish catch is a critical component of the diet and livelihoods of Mekong River communities. Between 40 to 70% of the region's animal meat protein comes from inland fisheries. A decrease in fish supply due to the Don Sahong dam will increase fish prices in the market, leaving poorer communities unable to afford fish. The most significant environmental and socio-economic impacts of the Don Sahong dam would therefore be felt by local and regional inland fisheries, threatening regional livelihoods and food security in the Lower Mekong Basin. A 2012 study found that a reduction in long-distance migrating fish – an important supply of iron – “would have a strong detrimental impact on the rural population ... and pos[e] a risk to public health.”⁷³ Research conducted by Cambodia's Fisheries Administration, WWF and the Australian National University has demonstrated that the protein, micronutrients and calories associated with Mekong fisheries cannot easily be replaced.⁷⁴



Irrawaddy Dolphin



FLAWS IN EIA AND UNPROVEN MITIGATION MEASURES

The Don Sahong dam's EIA was reviewed by the Mekong River Commission through its technical review process⁷⁵ as well as several independent experts commissioned by International Rivers.⁷⁶ These reviews identified a number of flaws in the assessment. Key issues included:

- Lack of baseline assessment and vague and limited information about fish migration for specific species in the Hou Sahong channel, along with the other 16 channels in the Khone Falls area;
- A lack of credible data with which to conduct comprehensive analysis of the complex flow regime for each channel, to understand how the hydrology will be altered by the project;

73. IFRDI, Food and nutrition security vulnerability to mainstream hydropower dam development in Cambodia, 2012.

74. International Rivers. [Devil's Bargain? Hydropower vs Food Trade-offs in the Mekong River Basin](#), December 2014

75. Mekong River Commission. [Technical Review for the Proposed Don Sahong Hydropower Project](#). February 2015.

76. International Rivers. 2014.

- No transboundary impact assessment for the project carried out despite the dam being located on a shared river less than 2 km from the Lao/Cambodian border and;
- No meaningful consultation with communities downstream in Cambodia, or indication of specific measures of compensation for local affected communities.

While the EIA and project developer have acknowledged the project's impacts on fisheries, they claim that the impacts will not be significant due to the project's mitigation measures, which include blasting and widening other channels that run running parallel to Hou Sahong to enable alternative routes for fish migration.⁷⁷ However these measures are unproven, as no similar measures have previously been utilized in the context of the Mekong's rich and diverse fishery. The project developer is relying on an "adaptive approach" to fishery mitigation, continuing to conduct studies and implement fish monitoring programs under a Fisheries Monitoring and Action Plan (FishMAP) that will "continue to evolve and be adapted as needed for a minimum period of ten years into project operation."⁷⁸ This trial and error approach has been undertaken alongside construction and operation of the project, and is constrained by limited baseline assessment by which to measure success. The project developers are yet to publish the results of studies demonstrating the efficacy of the fishery mitigation measures.

Lessons

- The dam's significant impacts on a critical fish migration channel important for scores of fish species in the Mekong River, together with the food security of thousands of local people, should have disqualified the project from consideration.
- The project's likelihood of extirpating locally endangered species, in this case the Mekong dolphin, should have disqualified it from consideration.
- Companies should prioritize biodiversity impact

considerations in due diligence procedures, regardless of contract type.

- A transboundary impact assessment and consultation process should be required for any project considered on transboundary rivers.
- An adaptive approach to impact mitigation is inappropriate, particularly in the case of migratory fish species that are critical to the diets of communities living along the length of the river.

Timeline

- **2006**
Mega First and Lao PDR sign MOU for feasibility studies
- **2008**
Project Development Agreement signed
- **Early 2014**
Experts convey fundamental concerns over Don Sahong's impacts on fish migration among other irreversible impacts
- **Oct 2015**
Sinohydro signs construction contract
- **Jan 2016**
Project commences construction
- **Jan 2020**
Project commences commercial operations

77. Don Sahong Project Environmental and Social Impact Assessment. 2013.

78. Ibid..





Jiasa River



Yunnan, China



HydroChina

Dam that threatens last remaining habitat of China's Green Peafowl suspended after court rules it would violate China's Environmental Protection Law



Basics:

 **Capacity:** 270 MW

 **Cost:** \$532 million

 **Status:** Suspended

Biodiversity snapshot:

Green Peafowl (*Pavo muticus*): considered endangered according to the IUCN Red List, though populations within China are believed to be less than 500 individuals, thus considered critically endangered within China according to China's Biodiversity Red List.

Summary

The 270 MW Jiasa River Hydropower Project is intended to provide electricity to nearby copper and iron mining operations in biodiversity-rich Yunnan Province, which is home to the headwaters of a number of China's and the region's rivers. The dam was proposed as part of the planned hydropower expansion throughout Yunnan Province and China as a whole.

Construction of the dam began in 2016 but soon afterwards became the subject of a lawsuit filed under China's newly enacted Environmental Protection Law. The suit, filed by local NGOs, argued that the dam would submerge the last habitat of the green peafowl - a species considered critically endangered by Chinese authorities - and could prompt its extinction within China. The court ordered in March 2020 that the company must suspend construction.

Project impacts

The Jiasa River dam would risk causing the extinction within China of the green peafowl by flooding what is believed to be its last remaining habitat sufficient to sustain the species. Since 2009, the green peafowl has been listed as endangered under the IUCN's Red List and categorized by China as a critically endangered species.⁷⁹ The drastic decrease in its population within China has been ascribed to dam-building and deforestation within its habitat, among other causes. As of 2018, less than 500 of the birds were estimated to be left in the wild within China, and found along the Jiasa River.

Company is taken to court over impacts to peafowl

The design of the project began in 2011, with Kunming Engineering, a shareholder of Xinping Co., conducting the environmental impact assessment (EIA) in 2014, which identified the presence of 50-70 green peafowl in the reservoir area. It was not until 2015 that the construction company was confirmed. It is important to note that the Chinese environmental impact assessment law allowed

companies to conduct the studies themselves. Despite finding evidence of green peafowl, construction of the dam began in 2016, which saw the removal of forests and leveling of the land. In 2017, researchers provided additional evidence of the presence of green peafowl in the project area with photographs and recordings. This prompted local NGOs Friends of Nature, Shan Shui and Wild China to submit an urgent request to the Ministry of Environmental Protection calling for a temporary halt to hydropower construction.

In July 2017, Friends of Nature submitted an environmental public interest lawsuit, the first of its kind under China's 2015 Environmental Protection Law. Work on the dam was then suspended by the company in August 2017, and in 2018 the government of Yunnan province launched a province-wide survey, cataloging rare species, including the green peafowl. The survey estimated the remaining peafowl population to be around 500. The survey served as the basis for Yunnan's ecological "redlines," which would protect the dry tropical valleys and plateaus of the Jiasa River and provide protection for endangered species including the green peafowl and rare Cycas trees. It was during this time that the green peafowl was inscribed on the province's own Biological Species Red List and its last natural habitat was confirmed to be where the Jiasa hydropower plant was being built.

In March 2020, the Kunming Intermediate People's Court ruled that the Jiasa River dam would be officially suspended until a new and more robust environmental impact assessment could be carried out. This comes after several years of China's gradual improvement of environmental protections through implementation of "ecological red-lines." By the end of 2020, these red lines are expected to be completed on a national level, according to HydroChina. The 2020 court order required a halt to the cutting of plants in the hydropower station's submerged area, as well as stopped the exploitation or storage of water resources. The order also specified that a post-environmental impact assessment would need to be carried out in accordance with the Ministry of Ecology and Environment to determine requirements for the rehabilitation of the area.⁸⁰ The company has since

79. [China's dams threaten green peafowl](#), Science Magazine. June 2019.

80. [Green peafowl's last habitat vs. 3.7-billion-yuan dam](#), CGTN. March 2020.

indicated that “at present, [HydroChina] has abandoned the Jiasa River Hydropower Project permanently on our own initiative.”

In addition to impacts on peafowl habitats, the Jiasa River dam would inundate over 30 km² of land, including agricultural lands, and require the resettlement of between 3000 and 5000 people. It is unclear what impacts the restriction of water flow and change in seasonal flows would have on downstream villages, cultivated land, and wild flora and fauna. There is also concern over the potential cumulative and induced impacts that the dam would cause, including by enabling additional industrial developments in the area that would further the destruction of one of China’s last unspoiled tropical forests.⁸¹

Lessons

- The 2014 EIA was done according to Chinese national laws; however, it did not consider key evidence that the green peafowl lived in the area.
- Delays and losses could have been avoided if the environmental assessment had been of higher quality before construction of the diversion tunnel and sloping of the banks for the project.
- The EIA was conducted by a shareholder of the dam, and while in compliance with local laws, independent verifications and recommendations by experts on the species would have concluded the habitat’s importance as implied by the court ruling.

Timeline

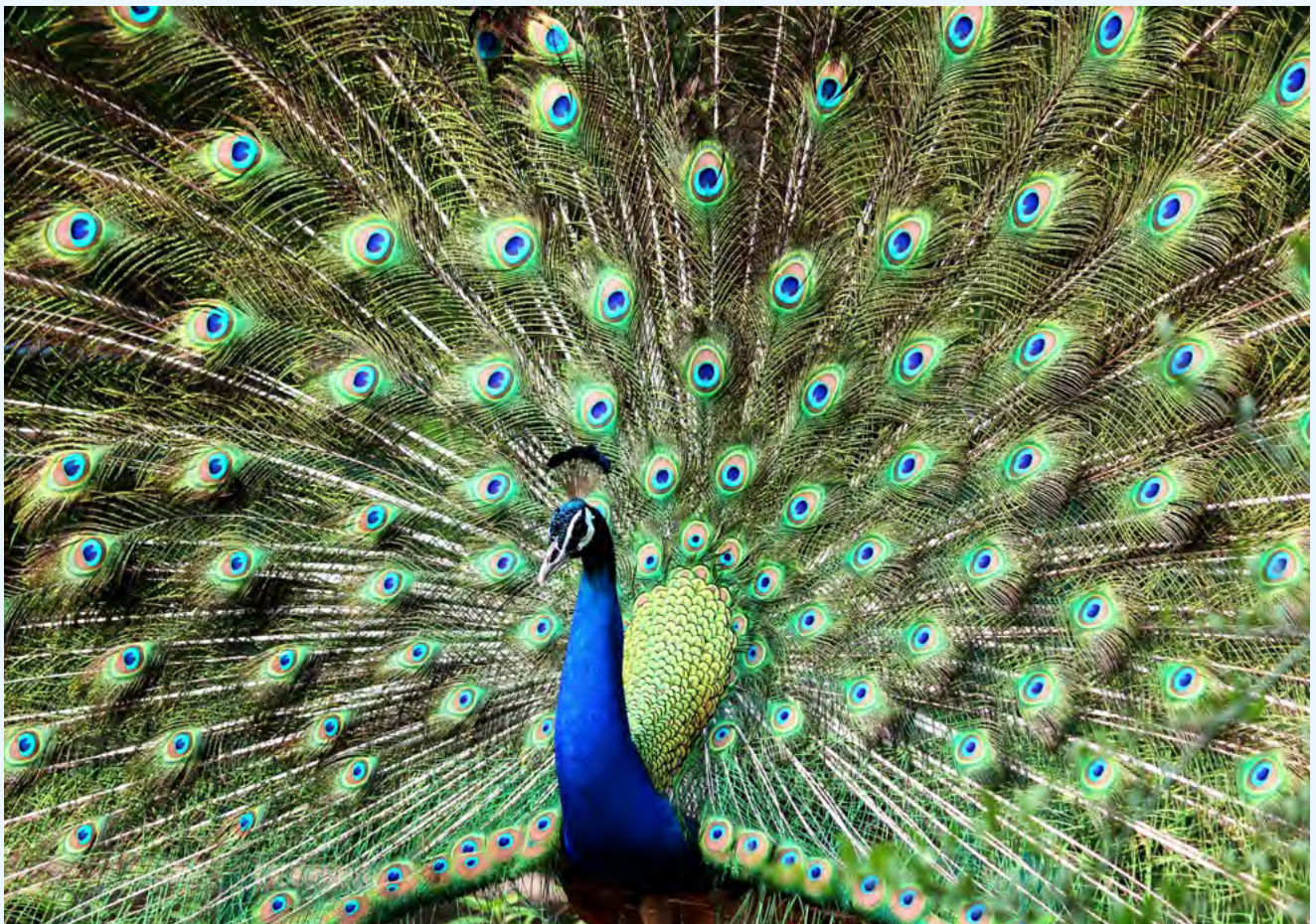
- **29 March 2016**
Construction starts on the Jiasa dam project
- **10 March 2017**
Green peafowl discovered in the Jiasa River valleys of Xinping and Shuangbai counties; NGOs submit urgent call to halt construction
- **30 March 2017**
Friends of Nature, Shan Shui and Wild China submit an urgent request to the Ministry of Environmental Protection calling for a temporary halt to hydropower construction on the Jiasa River
- **8 May 2017**
The MEP’s environmental impact assessment department holds a green peafowl conservation seminar, attended by the hydropower company among others
- **August 2017**
Friends of Nature submits an environmental public interest lawsuit to Chuxiong Intermediate People’s Court; Xinping company suspends construction
- **June 2018**
Yunnan’s ecological redlines are published, protecting the dry tropical valleys and plateaus of the Jiasa River and providing protection for the endangered species including the green peafowl and rare Cycas trees
- **20 March 2020**
Kunming Intermediate People’s Court orders construction to be suspended

81. [NGOs call for work to stop on Yunnan dam that may wipe out China’s last green peafowl habitat](#), Global Times, May 2017.

About the Green Peafowl

The green peafowl is China's only native peafowl, known for its brilliant plumage. Less than 500 remain in China and only about 20,000 of them can be found globally, primarily in Southeast Asia. The green species is an iconic image found throughout China's ancient works of art and literature, and is referred to as the "king of birds."

Yunnan's Dai ethnic minority refer to the bird as the *golden peafowl* due to the bird's apparent ability to alter the color of its feathers due to changes in lighting throughout the day. In addition to habitat destruction, poaching and pesticide pollution have also drastically challenged the ability for birds to live in their natural habitats as humans further encroached on their tropical ecosystems.



Green Peafowl | Photo courtesy of Naushil Ansari from Pexels





São Manoel



Brazil



China Three Gorges


Dam on the biodiversity-rich Teles Pires River in the Amazon jeopardizes important species and violates the rights of indigenous peoples who have long been stewards of the area's lands and rivers.




Basics:

 **Capacity:** 700 MW

 **Cost:** \$490 million

 **Financiers:** Brazilian National Economic and Social Development Bank (BNDES) with loan guarantees from the China Development Bank

 **Status:** Operational since September 2017

Biodiversity snapshot:

The São Manoel dam is located in the Tapajós Basin, one of eight areas of Amazonian biological endemism, where many species are found nowhere else on earth. The area is so rife with biodiversity that researchers continue to discover new plants, animals, birds and fish.

Some of the species reported around the site include the:

- **White-cheeked spider monkey:** Endangered
- **Giant anteater:** Vulnerable
- **Oncilla:** Threatened
- **Tucuxi dolphin:** Endangered
- **Giant armadillo:** Vulnerable
- **Pink dolphin:** Endangered

The Teles Pires River is especially important in terms of fish biodiversity, which has been severely impacted by the São Manoel dam and three upstream dams that were built concurrently.

Summary

The São Manoel Hydroelectric Power Plant is the last in a cascade of four large dams on the Teles Pires River in western Brazil. At 700 MW, São Manoel is the second largest dam in the cascade on the 1370 km long Teles Pires River, which joins the Jurena River to form the Tapajós, an important tributary to the Amazon. The river forms part of the Tapajós Basin, an area equivalent to the size of Spain that has been targeted for hydropower generation with a total of 43 large dams and over 100 smaller hydro projects either under construction or planned - the most of any Amazon sub-basin.

The area where the São Manoel dam was built has been inhabited by indigenous peoples, including the Munduruku, Kayabi and Apiaká, for millennia. Indigenous groups have long staunchly opposed hydropower development on their lands and on the stretch of river that sustains freshwater and other species that are integral to their lives, livelihoods and culture.⁸²

In 2013, China Three Gorges (CTG), Eletrobrás Furnas and Energía de Portugal (EDP) formed a consortium called São Manoel Energia (EESM) to compete for the dam concession, which was tendered in December of that year. Prior to the auction for the dam concession, the São Manoel project had been the focus of a lawsuit filed by Federal Public Prosecutors regarding the lack of Free, Prior and Informed Consultation and Consent with indigenous peoples, as required under Brazilian law. At that time, the simultaneous construction of various dams on the Teles Pires, with no prior consultations, had led indigenous people to take hostage government employees and consultants preparing studies for the São Manoel dam. Other lawsuits had also been filed about the lack of an assessment of project impacts on indigenous peoples, and in response to threats to isolated indigenous groups in the region. Subsequently, lawsuits were filed regarding downstream impacts on biodiversity in conservation units and indigenous territories.

CTG and its partners in São Manoel Energia carried out no due diligence on violations of human rights and environmental legislation prior to their decision to participate in the auction. After successfully bidding on the project, the consortium neglected to seriously address impacts on biodiversity and livelihoods of indigenous peoples, which led to additional lawsuits.

With the construction of São Manoel and upstream dams proceeding rapidly in the absence of any significant mitigation measures, major impacts on water quality, freshwater ecosystems and fish biodiversity ensued, seriously undermining the food security and livelihoods of indigenous peoples. Moreover, the construction of São Manoel and upstream dams led to the destruction of a series of sacred sites such as the Sete Quedas rapids, which are also important in terms of fish biodiversity. This situation of conflict led the Munduruku people to organize a peaceful occupation of the São Manoel dam site in June 2017. After promises were broken, they again occupied the dam site in October 2017. The reaction of CTG and its partners in EESM was not to dialogue with the indigenous peoples whose rights had been violated, but rather to treat them as criminals, requesting a riot squadron of the National Guard to expel them from the dam site.

During project construction, at least two indigenous sacred sites of major cultural and religious significance were destroyed. São Manoel and the other dams along the Teles Pires have devastated the ecology and river connectivity on which these groups, and the freshwater species that sustain them, depend. The dams have blocked key migratory fish species and flooded the nesting grounds of turtles that are an important part of indigenous diets, livelihoods, and cultures.

In a written response, CTG noted that "Since the acquisition of this project, many relevant measures have been actively taken in terms of environmental protection and social responsibility."

82. [Kayabi, apiaká and munduruku manifesto against hydroelectric developments in the Teles Pires River](#), Nov 2011.

Project impacts

The biodiversity impacts of the São Manoel dam are significant, particularly when considering the dam's contribution toward the wider cumulative impacts of multiple dams on the river. It is because of these larger impacts on the freshwater species and the people who depend on them that World Wildlife Fund described dams under consideration in the Tapajós basin as "incompatible with the conservation of the basin's biodiversity" and might result in a "collapse in the functioning of aquatic systems."

BIODIVERSITY IMPACTS

Many Amazonian fish live in limited ranges and have adapted to flow, depth, temperature, sediment and oxygen levels; all of which are changed by dams.⁸³ When rivers are dammed, migrators have trouble spawning upstream and juvenile fish cannot make their way back downstream. Moreover, habitats such as flooded forests that are essential for fish feeding and reproduction are seriously disrupted or eliminated. Dams in the Amazon have, for example, already greatly impacted giant catfish. Fragmentation due to dams has been shown to impact predators, including two species of river dolphin. WWF and local scientists have found that fish ladders designed for dams in the Amazon have not been successful.

Together with other dams on the Tapajós and its tributaries, São Manoel's physical infrastructure, reservoir flooding, and the erratic flooding and erosion of riverbanks and sand bars have destroyed habitats and nesting beaches of turtles. Turtle conservationist Richard Vogt states that dams on the Tapajós have destroyed the populations of 11 species of turtles, with six facing complete extinction.⁸⁴ Local communities have also reported a significant drop in fish populations, both during construction and once the dam began operating. The impacts have been particularly severe on larger fish species whose migrations have been impeded by the dam.

Beyond the immediate impacts, the environmental impact assessment (EIA) for the São Manoel dam did not consider nor attempt to mitigate the cumulative impacts of the project as part of a four-dam cascade on the ecosystem or on affected communities, in violation of Brazilian law. Forty kilometers upstream from the São Manoel dam is the 1,819 MW Teles Pires dam, followed upriver by the Colider and Sinop dams. There has been no coordination between the dam companies on issues such as ecological flows, maintaining water quality and dam safety.

With the devastation of local livelihoods caused by São Manoel and upstream dams, particularly with regard to fish and turtles, indigenous peoples have been pressured to seek other sources of subsistence, notably illegal gold mining. The Tapajós River and its tributaries contain higher amounts of methylmercury as a result of gold mining. Dam reservoirs cause the chemical to accumulate in certain areas which means that riparian species, especially those higher in the food chain contain and transmit dangerous levels of this chemical, including to communities who depend on the fish for their diets and livelihoods.⁸⁵

During the diversion of the Teles Pires River after completion of the coffer dam, an oil spill associated with the São Manoel construction site occurred in November 2016; compounding impacts on fish and riparian species and related health issues among downstream indigenous communities.

Activities associated with dam construction such as road building, logging and deforestation stimulated by the dam project have also had a toll on biodiversity, well beyond the construction phase.

In its response, CTG noted that the "São Manoel Project Company has formulated environmental programs...to monitor and protect fish in the river where the power station is located."⁸⁶ Regarding turtles, CTG responded that the project company has "carried out the corresponding environmental programs...and conducted environmental education activities for indigenous people to promote breeding and protection" of turtle species.

83. Mongabay. Top scientists: Amazon's Tapajós Dam Complex "a crisis in the making", Claire Salisbury. 28 November 2016.

84. *ibid.*

85. *ibid.*

86. CTG notes the following measures taken: fish monitoring program, genetic research program, limnology and water quality monitoring program, fish rescue program, and fish breeding and telemetering program.

IMPACTS ON INDIGENOUS PEOPLES

The Teles Pires River and its tributaries are the principal drinking and food sources for indigenous peoples. The construction of the São Manoel dam has deteriorated the water quality, causing local people to suffer from gastrointestinal problems. The dam has decreased populations of migratory fish which are “the most important source of protein for regional human populations.”⁸⁷

This decline in freshwater species, including the fish and turtles that are central to local diets, has had a particularly severe impact on fishermen who have reported fish catches plummeting to as low as 15% of their catch compared to the years before the dam. These impacts have been the basis for multiple court cases after what one federal prosecutor described the dam as “caus[ing] irreversible damage, especially to the Kayabi people, whose territory is located less than a kilometer from the dam.”⁸⁸ Indigenous groups were successful in several of these court cases about violations of human rights, including the lack of Free, Prior and Informed Consent (FPIC), incomplete environmental impact assessment and non-compliance with mitigation measures, but they were later overturned after political interference.

The São Manoel dam has destroyed two sacred spaces of fundamental cultural value to the Munduruku, Kayabi and Apiaka. These spiritual spaces are also important areas of biodiversity with *Dekuka’a* (Mountain of the Monkeys) is where the animal spirits live and *Karobixexe* (the Seven Falls Waterfall) is said to be inhabited by spirits including the “Mother of Fish” and the spirits of ancestors. It is also a breeding ground for migratory fish.⁸⁹ The flooding of *Karobixexe* worsened after the construction of São Manoel. There was controversy when workers at the Teles Pires site found funeral urns and other archeological artifacts and sent these objects to a museum. The Munduruku were

outraged about this theft.⁹⁰ Despite evidence to the contrary, EDP has stated the EESM was not involved in this incident.

LACK OF CONSULTATION LEADS TO PROTESTS AND OCCUPATION OF DAM SITE

When the company informed indigenous peoples that filling the dam’s reservoir would begin in August 2017 despite not obtaining a license from the federal environmental agency (IBAMA), 200 representatives from various Munduruku villages peacefully occupied the main work camp of the São Manoel dam.⁹¹ They iterated that they were not the invaders on this land and secured a meeting with the president of the National Indian Foundation (FUNAI), directors of IBAMA, Federal Public Prosecutors and representatives from the EESM consortium including China Three Gorges Corporation. Their grievances were received and then never properly addressed, despite promises to do so. The EESM consortium did not agree to terms laid out by the Munduruku⁹² and declined to participate in subsequent meetings. The Munduruku occupied the construction site again in October 2017, and the federal government, at the request of EESM, deployed the military to protect the construction of the dam.



87. *ibid.*

88. Mongabay. Brazil’s indigenous Munduruku occupy dam site, halt construction by Sue Branford and Maurício Torres on 19 July 2017.

89. Consortium of Latin American NGOs. UPR Review for China, Third Cycle. Civil Society’s Evaluation of the Extraterritorial Obligations of the People’s Republic of China: Case Studies from Argentina, Bolivia, Brazil, Ecuador and Peru. March 2018.

90. Latin America Bureau. Amazon indigenous group recovers sacred urns. January 2020.

91. Munduruku People. Letter from Munduruku concerning July 2017 occupation of São Manoel construction site. July 2017.

92. A request for a 20-ton truck and a transit house in Jacareacanga was met, but there was otherwise little agreement between the parties. EDP.

Lessons

- Companies need to carry out due diligence before making decisions about their involvement in bidding for projects, particularly with regard to socio-environmental risk assessments and violations of human rights and environmental legislation, including pending lawsuits. In the case of São Manoel, widespread protests and opposition against the dam project among indigenous communities prior to CTG's involvement should have disqualified the project from consideration.
- Engaging from an early stage with indigenous communities should include the requirement to secure their right to Free, Prior and Informed Consent on significant decisions that affect their territories and rights. Negligence by government agencies to respect the right to FPIC of indigenous peoples is not an excuse to ignore this right. Moreover, there are other moments when FPIC is essential, such as in the preparation of mitigation plans, where companies such as CTG have major responsibilities, which are often neglected.
- Companies should require that cumulative impact assessments be carried out on all projects with multiple other dams either existing or planned on the same river. These assessments should prescribe specific actions to mitigate harms on biodiversity and ensure steps are taken to permit fish migration.
- Assessments should have been conducted in accordance with principles of the Convention on Biological Diversity which recognizes the "close and traditional dependence of many indigenous communities on biological resources" and their sustainable and equitable sharing of natural capital.



Timeline

- **2006**
Brazilian government approves plans for São Manoel dam.
- **2010**
São Manoel dam is included in National Policy for River Transportation (hidrovia).
- **2013**
Indigenous groups voice opposition to São Manoel, Public Prosecutor files court case alleging the project violates their right to Free, Prior, and Informed Consent
- **2014**
China Three Gorges joins project consortium whose bid wins the contract to build and operate São Manoel dam; construction begins.
- **2014-2015**
Violations related to the construction of the project are reported to the UN Human Rights Council.
- **July 2017**
200 indigenous Munduruku occupy the construction site. EESM consortium requests and is granted military deployment to protect the construction site from occupiers in order to avoid further delays.
- **2018**
NGOs document impacts of São Manoel on indigenous peoples and submit these to the UN Human Rights Council to inform its Universal Periodic Review for China.
- **2018**
Construction is completed and dam becomes operational. Turtle nesting grounds are flooded and fish migration is blocked.



Mong Ton



Myanmar




China Three Gorges

Dam would obstruct one of the last free-flowing rivers in Southeast Asia, prompting massive biodiversity loss on a river that has received protection from dams within China

Note: This project case was prepared based on an earlier project design. Latest information about the redesigned project is indicated where available.



Basics:

 **Capacity:** 7110 MW (now 2680 MW)

 **Financiers:** Unconfirmed

 **Status:** Pre-construction

Biodiversity snapshot:

IUCN red list species & status:

- **White-rumped vulture and slender billed vulture:** Critically endangered
- **Siamese crocodile:** Critically endangered
- **Giant Asian Pond Terrapin and Bigheaded Turtle:** Endangered
- **Fishing Cat:** Vulnerable
- **Asian Small Clawed Otter:** Vulnerable
- **8 endangered and 4 vulnerable fish species**



Summary

The Mong Ton Hydropower Project is a major dam project planned for the Salween (Thanlwin) River mainstem in Myanmar's Shan state. At its original 7110 MW design, the project would create an 870 km² (380 km in length) reservoir capable of storing a vast 37.8 km³ of water. If built, the reservoir would be the largest in Myanmar by volume and the 26th largest in the world, only slightly smaller than the Three Gorges reservoir on the Yangtze in China.⁹³ The extent of the reservoir and other technical information related to the dam at its revised 2680 MW design are not yet publicly available.

According to available information, the project would be jointly developed by a Chinese consortium (56%), which consists of China Three Gorges Corporation (56%), Sinohydro (22%) and China Southern Power Grid (22%).⁹⁴ Thailand's EGAT International would own a 30% share and the remainder would be held by interests within Myanmar.

The project has been redesigned at the request of the Government of Myanmar. According to CTG, the plans have been adjusted multiple times under the guidance of the Ministry of Energy and Electricity (MOEE) since November 2010 to reduce negative impacts. While no details of the redesign are publicly available, in its written response, CTG has stated that Mong Ton will have an installed capacity of 2,680 MW and that "further research into the environmental and social impacts of the project implementation will be conducted through follow-up feasibility studies and ESIA work."

According to a Baseline Assessment conducted as part of the International Finance Corporation's (IFC) Strategic Environmental Assessment on Hydropower in Myanmar (SEA), alternative designs considered by Myanmar authorities include two cascade schemes: a two-dam

scheme and a three-dam scheme. Both options would significantly reduce the storage volume and inundation area, but would maintain the total project length of approximately 378 km⁹⁵ and serve as a barrier to aquatic species.

THE SALWEEN BASIN

The Salween River - known as the Nujiang in China and the Thanlwin in Myanmar – is the second longest river in Southeast Asia after the Mekong, flowing 2,400 km from the Tibetan plateau through Yunnan in China, entering Myanmar in the northeast before flowing into the Gulf of Martaban.⁹⁶ The Salween is one of the last remaining free-flowing rivers in Asia, draining a watershed of 283,335 km². Its extensive basin supports biodiversity comparable with the Mekong river basin and is home to about 10.5 million people. The basin is an important transboundary river system, shared between China (48%), Myanmar (45%) and Thailand (7%).⁹⁷

The Salween basin houses rich, and as yet understudied, biodiversity. It is home to an estimated 92 amphibian species, and 212 fish species including 47 endemic species.⁹⁸ The Salween delta and associated wetlands support populations of the unique Fishing Cat, the Asian Small-clawed Otter and the Siamese Crocodile, and diverse turtles including the Giant Asian Pond Terrapin and Bigheaded Turtle as well as endemic bird species.⁹⁹ The IFC's SEA recommended that additional baseline studies and biodiversity surveys should be undertaken, which would likely identify the presence of additional aquatic and terrestrial species in the basin.

In 2003, key parts of the mid-region watershed of the upper Nu-Salween in China were included within the Three Parallel Rivers of Yunnan National Park, a UNESCO World Heritage Site. This Site is renowned as an epicenter of

93. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment, Baseline Assessment Report: Hydropower 2017.

94. China Three Gorges Corporation. Annual Report, 2010.

95. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment: Final Report, 2020.

96. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment: Final Report, 2020.

97. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment Baseline Assessment: Terrestrial Biodiversity, 2017.

98. *ibid.*

99. WWF. [World's Top 10 Rivers at Risk](#). March 2007.

Chinese biodiversity, containing over 6,000 plant species and believed to support over 25% of the world's and 50% of China's animal species. In 2016, China introduced a moratorium on dam construction on the mainstem of the Nu River, the portion of the basin within its territory.¹⁰⁰

PROJECT IMPACTS

While an environmental impact assessment was conducted for the Mong Ton dam in 2014 and 2015, no specific details have been published regarding the project's impacts.

The Mong Ton dam would be located in a part of the Salween basin that is particularly biodiversity-rich. Nearly 85% of the Middle Salween sub-basin is comprised of key biodiversity areas (KBAs), including the Thanlwin southern forest KBA and the Golden Triangle Area, an important habitat for aquatic plant and insect species.¹⁰¹ The project's 380 km-long storage reservoir would isolate 15 river reach types between the dam and the Myanmar-China border, nine of which are rare or very rare.¹⁰² The flood zone would envelop the Nam Pang River, a tributary of the Salween, inundating a geographically unique and biodiversity rich area made up of waterfalls and braided channels, known as the "thousand islands" ('Kunhing' in Shan language).¹⁰³

The Salween mainstem is an important migration route for fish, including species of hilsa, which would be blocked by construction of the Mong Ton dam. There would also be major changes to fish and aquatic species habitat due to the project reservoir. Changes to flow regime and reduced nutrient content would exert additional pressure on the lower Salween and coastal fisheries.¹⁰⁴ The Integrated Biodiversity Assessment Tool (IBAT) database found the

highest freshwater fish biodiversity in the middle Salween, where the Mong Ton dam will be constructed, indicating the presence of 91 fish species. The IFC's SEA noted that the number of endangered and near threatened fish species may increase if field surveys are done to map the distribution of important, rare and threatened species.¹⁰⁵

Given the project's size and location, the IFC's SEA stated that the project could have significant adverse impacts on mainstem processes, including, inter alia:

- Significant changes to the flow regime, including a substantial increase in dry season flows and a decrease in the frequency and size of high flow events;
- A substantial adverse impact on water quality due to changes in temperature, oxygen, and nutrient content during reservoir storage;
- A major reduction in river sediment load, in turn degrading the downstream river channel and all but eliminating sediment delivery to the coastal zone.¹⁰⁶

If project construction proceeds, the substantial influx of construction workers would also increase encroachment into forests and the exploitation of non-timber forest products (NTFPs), as well as increasing pressure on wildlife and fish stock.¹⁰⁷

In a written response, CTG acknowledged that "The construction of the Mong Ton Dam will result in the fragmentation of river habitats, thus affecting the habitat, inter-population exchanges, composition, and population of certain fish species." Responding to broader concerns over impacts to biodiversity, CTG claimed that "these negative effects can be mitigated and controlled by taking the corresponding environmental protection measures."

100. The Guardian. [Joy as China shelves plans to dam 'angry river.'](#) by Tom Phillips. December 2, 2016.

101. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment: Sub-basin Evaluation, 2017.

102. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment: Final Report, 2020.

103. See documentary "[Drowning a Thousand Islands](#)" by Action for Shan State Rivers, 29 September 2016.

104. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment, Baseline Assessment: Final Report, 2020.

105. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment, Baseline Assessment Report: Fisheries, Aquatic Ecology and River Health, 2017.

106. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment Baseline Assessment: Final Report, 2020.

107. *ibid.*

THREATS TO IMPORTANT AND UNDERSTUDIED BIODIVERSITY

The Salween basin houses seven ecoregions, including the Northern Indochina subtropical forests and the Kayah-Karen montane rainforest, and 836 km² of protected areas in Myanmar alone.¹⁰⁸ The basin is dominated by subtropical forests, globally recognized for biodiversity. The Kayah-Karen montane ecoregion is the fourth richest in the Indo-Pacific region for mammals, with 168 known species.¹⁰⁹ The basin also houses karst limestone formations, including in a higher elevation montane region, indicating rare river reaches that are likely to provide important ecological functions and hold specialized biodiversity. According to the IFC's SEA Baseline Assessment, the Thanlwin River basin wetlands is recognized as globally important for fish diversity and endemism.. However, overall there have been limited biodiversity surveys undertaken in the Salween basin, resulting in few KBAs being designated. The Baseline Assessment notes that further studies would likely reveal additional areas of ecological sensitivity and importance to biodiversity.¹¹⁰

SOCIAL AND LIVELIHOODS IMPACTS; INCREASED RISK OF CONFLICT

The IFC's SEA study emphasized the importance of respecting ethnic cultures and traditions and protecting the livelihoods of local people in the Salween basin in the context of hydropower development.¹¹¹ In Myanmar, the Salween flows through Shan, Karenni, Karen and Mon States. These areas are home to ethnic minority peoples and have been the sites of longstanding conflict between the Burmese government and armed ethnic groups. The Salween basin has a legacy of contested governance and extensive human rights abuses. The IFC's SEA Study

notes that "Armed conflicts have been directly linked to HPP [Hydropower Power Projects] in this [Salween] basin," and that "BAU [business-as-usual] development has high potential to aggravate grievances and conflict, particularly the mainstem HPPs [including Mong Ton] with substantial impacts on natural resources."¹¹²

he construction of the Mong Ton dam would require extensive resettlement, although accurate estimates for the number of people displaced are not available. CTG indicated that 2,991 people would be directly displaced by the redesigned project. The CTG figures do not include those people uprooted by the Myanmar army during forced relocations between 1996-1998, when large numbers of refugees fled from Shan State to northern Thailand. Many of these people have been unable to return to their homelands due to decades of armed conflict.

The project's environmental impacts would in turn cause major impacts on people's fishing and farming livelihoods and access to forests, grasslands, NFTP's and other natural resources. In the IFC's SEA study, the area of the Salween where the Mong Ton dam is sited returned the highest social vulnerability ratings in the Salween basin, indicating that resilience to major livelihood changes is low.¹¹³

OPPORTUNITY FOR TRANSBOUNDARY CONSERVATION

The Salween is among a limited number of free-flowing major rivers worldwide still remaining undammed and unregulated, and retaining large-scale geomorphic functioning. The IFC's SEA study, recognizing the importance of protecting mainstem functions and free-flowing rivers, recommended against building dams on the Salween mainstem, together with four other mainstem river basins in the country.¹¹⁴ The IFC's SEA study, recognising the importance of protecting mainstem

108. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment, Baseline Assessment Report: Terrestrial Biodiversity, 2017.

109. Ibid.

110. Ibid.

111. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment: Final Report, 2020.

112. IFC. Myanmar Hydropower Sector Strategic Environmental Assessment Baseline Assessment: Final Report, 2020, p. 39.

113. Ibid.

114. Ibid.

functions and free-flowing rivers, recommended against building dams on the Salween mainstem, together with four other mainstem river basins in the country.¹¹⁵ This recommendation, together with China's 2016 moratorium on dams on Nu River, provide a critical opportunity to protect the Salween River into the future. The shared borders with China and Thailand likewise provide opportunities for transboundary biodiversity protection and conservation initiatives.

The Salween basin thus far includes relatively little area established as protected areas. However, if the Salween Peace Park is formally recognised, such an area would significantly increase. The Salween Peace Park initiative is a community-driven initiative to establish 5,200 km² as a locally managed sanctuary to protect indigenous cultural heritage and endangered wildlife. The initiative has the commitment of local authorities and is supported by the Karen Environmental and Social Action Network (KESAN).¹¹⁶ The process of seeking recognition for the park anticipates developing agreements and collaboration with Thailand's adjacent Salween National Park and Salween National Wildlife Sanctuary.

Lessons

- It would be inappropriate to develop a large-scale dam that would block one of the last free-flowing rivers in Southeast Asia, prompting massive biodiversity loss on a river that has received protection from dams within China.
- The dam would block fish migration, destroy habitat and inundate critical biodiversity in a richly biodiverse and understudied area.
- The dam would have major impacts on local ethnic and indigenous populations, eroding livelihoods and potentially escalating tensions and risk of conflict.

115. *ibid.*

116. See kesan.asia/salween-peace-park-initiative/

Timeline

- **March 2007**
Initial ground-breaking ceremony for the project (then known as Tsang Dam)
- **2008**
Construction stalled because of local opposition
- **November 2010**
Consortium signed a new MoU with MoEE
- **November 2013**
Feasibility study submitted to MoEE
- **October 2014**
Snowy Mountains Engineering Corporation (SMEC) of Australia commenced EIA but its status remains unclear
- **January 2017**
MOEE issue letter requesting updates to feasibility study
- **2016-2021**
Mong Ton undergoes redesign
- **2021**
Project is redesigned to a cascade with 2680 MW capacity



Immense biodiversity is found all along the Salween River | Photo by International Rivers.



Isimba



Uganda



China International Water & Electric

**Dam submerged a portion of a biodiversity
offset on Uganda's White Nile**





Basics:

 **Project owner:** Government of Uganda

 **Capacity:** 183 MW

 **Cost:** \$566 million

 **Financiers:** China Export-Import Bank

 **Status:** In operation

Biodiversity snapshot:

IUCN red list species & status:

- **Victoria tilapia:** Critically endangered
- **Ningu carp:** Critically endangered
- **Haplochromis brownae:** Critically endangered, possibly extinct)
- **Leopard:** Vulnerable
- **Hippopotamus:** Vulnerable
- **Home to 88 different bird species and 20 haplochromine cichlids, at least one critically endangered**

Summary

The Isimba dam is located on Uganda's White Nile, some 50 km downstream from the river's source, Lake Victoria. Operational since 2019, Isimba is designed to meet the country's present and future energy needs. Isimba is the second of several dams built in recent years after the Bujagali dam, located 40 km upstream. Once the other dams are built, Uganda will have energy supply far in excess of its demand.

Isimba has met local and international opposition over its impacts on the Kalagala Offset Area, a biodiversity reserve established as a condition for World Bank financing of the Bujagali dam, intended to protect the area from flooding caused by future hydro projects. The dam directly impacts the Kalagala offset, home of the Kalagala Falls which is an important cultural and spiritual site.

Isimba was also built on one of the White Nile's last remaining sections with important rafting rapids. Isimba's reservoir has submerged several important whitewater rapids, negatively affecting the rafting industry which drives the local economy in an underserved part of the country. It has also led to significant indirect impacts on locals in addition to the reservoir directly displacing over 2000 people, many of whom went uncompensated for years.

Project impacts

IMPACTS ON THE KALAGALA OFFSET

In 2007, the Government of Uganda and the World Bank signed an agreement to establish a biodiversity offset at Kalagala Falls in order to compensate for the loss of rapids, and damage to the environment and people when the Bujagali dam was built. Isimba's reservoir impacted the Kalagala Offset Area, which is home to a site of significant cultural, spiritual, and biodiversity value for local communities. China International Water & Electric (CWE) claimed that Isimba would not affect the falls, and thus

did not propose any mitigation measures. A subsequent assessment showed that portions of the offset would be impacted, and the World Bank was compelled to establish a new offset upstream of Kalagala.¹¹⁷ In November 2016, CWE acknowledged that portions of the Kalagala Offset Area would be impacted.

Available documents show that lower dam heights were considered in the design of Isimba that would not impact the offset, but these were rejected in favor of the maximum height. By impacting the Kalagala Offset, the reservoir has also submerged five rapids, which has significantly impacted the whitewater rafting industry, one of few large employers in an underserved part of the country.

BIODIVERSITY IMPACTS

At the request of the Government of Uganda, CWE contracted Makerere University of Kampala to conduct a biodiversity assessment in August 2018, before flooding but after much of the reservoir area had been cleared. It had to then resort to assessing the biodiversity values upstream and downstream of the site to estimate potential losses. The biodiversity assessment noted that by the time it was conducted, "most trees and larger shrubs within the future reservoir area had been cut, and removed."¹¹⁸ The study focused on the area that was to be flooded by the Isimba Hydropower Plant and covered 12.7 km of free-flowing river.

The study warned that local extinctions were possible and identified critically endangered and unique fish species which inhabit rocky habitats that would disappear after flooding. The study identified that the site was the most important micro and macro habitat for reptiles and a nesting ground to reptiles and amphibians. The Isimba dam is expected to flood nesting grounds for the crested crane, Uganda's national bird and an endangered species. A plant species, millicia excelsa, was found in the site to be flooded - the plant requires protection in the country due to its nationally endangered status. The biodiversity assessment acknowledged the necessity to conduct baseline studies and recommended extensive restoration and independent monitoring for years to come in order to

117. NEMA. Addendum to the Isimba dam Environmental Impact Assessment. July 2017.

118. Makerere University of Kampala. Biodiversity in the Isimba Reservoir Area, edited by Derek Pomeroy. 2018.

minimize loss of biodiversity.¹¹⁹ CWE noted in its response that it worked with government authorities to relocate wildlife that was subject to submerging by the reservoir. It also noted that it handed over the project, including any responsibilities regarding biodiversity programs, following completion of its contract in April 2021.

IMPACTS ON FRESHWATER SPECIES

The Isimba dam was constructed along a biodiversity-rich stretch of the White Nile River, which is home to many endemic fish and other species. Some of these fish species were particularly prevalent around the Kalagala Falls and the Isimba site, which is common since river rapids are often host to a great diversity of fish species. This includes a significant diversity of haplochromine cichlids, whose bright colors make them popular in the aquarium hobby. The environmental and social impact assessment (ESIA) noted that the impacts on the cichlids would be “considered direct, large, negative and irreversible.”¹²⁰ The river is also home to several migratory fish species, some of whose numbers have dropped significantly in the years since the Bujagali dam was built, impacting local fishermen. Isimba’s impacts on these species is of particular concern to fishermen, who comprise roughly 15% of the local population, and who asked in vain that fish passages be installed so that fish can reach their spawning grounds.



119. *ibid.*

120. NEMA. Addendum to the Isimba dam Environmental Impact Assessment. July 2017.

Lessons

- The Isimba dam’s impacts on a biodiversity offset should have excluded the project from CWE’s consideration.
- CWE should ensure that all environmental and social impact assessments, including biodiversity impacts, are conducted prior to construction and in line with international standards, and are disclosed to the public.

Timeline

- July 2007**
 World Bank and Government of Uganda sign Kalagala Offset Agreement, protecting the area around the falls, as a condition for World Bank support for the Bujagali dam
- July 2013**
 CWE signs EPC contract to construct Isimba dam
- April 2015**
 CWE begins construction of Isimba dam
- July 2015**
 World Bank releases statement of concern over Isimba dam’s expected impacts on the Kalagala offset
- August 2018**
 CWE commissions a biodiversity assessment after construction was already well advanced
- March 2019**
 Impoundment of Isimba’s reservoir floods what had been areas protected under the Kalagala offset



Lom Pangar



Cameroon




China International Water & Electric

The dam's vast reservoir has impacted critically endangered gorilla populations and is expected to severely impact freshwater ecosystems along the 900 km Sanaga River.





Basics:

 **Reservoir storage capacity:** 6 billion m³

 **Capacity:** 30 MW

 **Cost:** \$195 million

 **Financiers:** World Bank, African Development Bank, among others

 **Status:** Construction of the dam was completed ahead of time, but provision and installation of turbines and transmission lines has been delayed for nearly 3 years already and are expected to be installed only in 2022. (World Bank. Lom Pangar Project Implementation Completion Report, December 2019.)

Biodiversity snapshot:

IUCN red list species & status:

- **72 medium to large mammals present within national park and surroundings, 12 of which are on the IUCN red list (Lom Pangar Project Environmental and Social Impact Assessment, March 2011.)**
- **Western lowland gorilla:** Critically endangered
- **Central chimpanzee:** Endangered
- **Black colobus:** Vulnerable

Summary

The Lom Pangar dam is located on the Lom River in a remote part of eastern Cameroon, 13 km upstream from the confluence with the Sanaga River. With an expected installed capacity of just 30 MW, Lom Pangar's vast reservoir would primarily be operated to regulate the flows of the Lom River to the 918 km Sanaga River – Cameroon's largest river whose basin covers a quarter of the country. This would boost year-round output from existing dams on the Sanaga, as well as make additional planned dams downstream more attractive. Long backed by the World Bank, Lom Pangar is seen as crucial to the development of a hydropower cascade on the Sanaga to fuel Cameroon's industrial ambitions, namely for the benefit of aluminum smelting.

While Cameroon is in need of greater electricity generation, Cameroonian civil society and other observers have argued that the Lom Pangar scheme, and the dams that it facilitates downstream, are geared almost entirely toward the expansion of aluminum smelting and would do little to address persistent energy shortages for residential consumers. Aluminum smelting is extremely energy intensive and the world's largest mining companies have long shipped raw bauxite to Cameroon to take advantage of preferential electricity rates.

In addition to questioning the project's purported development rationale, civil society has raised objections over significant environmental concerns, particularly the dam's location next to the Deng Deng National Park and the direct and induced impacts on a key habitat for over 900 critically endangered Western lowland gorillas. They have also flagged the considerable impacts on freshwater ecosystems along the length of the Sanaga River caused by both heavily regulating the river's flow and incentivizing construction of additional dams.

The World Bank approved a \$132 million loan in 2012, and China International Water & Electric (CWE) was contracted to carry out most of the works, including constructing the dam and providing and installing the turbines and transmission lines.

Project impacts

Cameroon forms part of the Congo Basin rainforest, the source of a significant share of the continent's biodiversity, and serves as home to apes such as the central chimpanzee and gorillas, both of which are endangered. Because of their role in dispersing seeds and maintaining forest health, these apes have been called "forest gardeners" and are noted for their contribution toward sustaining the rich biodiversity in Cameroon. Yet despite steps taken by the government to reverse the decline of these iconic species through establishing protected areas, their habitats are increasingly under threat from developments such as mining and logging in previously inaccessible areas.

An important number of Cameroon's gorillas inhabit the Deng Deng National Park and its environs. The Deng Deng was established first as a forest reserve in 1971, containing one of Africa's last hardwood forests and key habitats for endangered lowland gorillas and chimpanzees as well as African forest elephants, buffaloes and bongos, giant Pangolin, Yellow backed duiker, among others. The forest, because of its rich biodiversity value, was a critical issue during the construction of the Chad-Cameroon oil pipeline. The project sponsors, including the World Bank, insisted that the pipeline be rerouted so as not to cut through the forest. The Bank backtracked on this commitment, however, when it consented to allow Lom Pangar's vast 540 km² reservoir to submerge a portion of the forest, including 300 km² of intact forest. In exchange, the government agreed to enhance the reserve's status to that of a national park.

However, the change in status has been inadequate to prevent impacts on the park, and the apes that inhabit it, from reservoir flooding, poaching, electrocution and habitat degradation – issues that were raised during project preparation. The World Bank acknowledged that the influx of between 7000 and 10,000 people to the area seeking jobs or secondary employment was likely to put pressure on the park.¹²¹

Indeed, the project's Panel of Experts raised in their report of May 2013 concerns about the potential degradation

121. *ibid.*

of the Deng Deng Forest due to the fact that both the construction and the lodging camps of the workers are less than 2 km from the Park.¹²² The report noted that this proximity had the potential of increasing illegal poaching inside the Park. An access gate was installed to filter entry into and out of the site but it has proved insufficient, as rangers in Cameroon are often not well equipped to deal with heavily armed hunters.

These fears were borne out when in 2015 the ministry reported that 1,270 kg of wild meat was seized, including 20 kg of chimpanzee, and 290 kg of monkey and gorilla.¹²³ The Panel of Experts similarly reported substantial evidence of hunting in the park, with the presence of temporary hunting huts built by poachers and used cartridges.

While there are hopes that the conclusion of works at the site will reduce pressures on the park and the apes and other species it contains, a recent study noted that the park's long-term conservation outcomes are "Dependent on both company compliance with financing commitments (30 year annual payments) and securing longer term financing, and whether Deng Deng will be protected in perpetuity."¹²⁴ As noted in State of the Apes, the park "and its great ape population remain at risk of further degradation once the project concludes, unless urgent action is taken to ensure oversight beyond the project completion date and a secure revenue stream for the park... given that the attention of financiers is typically finite."¹²⁵ Indeed, when the World Bank closed its involvement in the project, it noted that the financing mechanism to fund the park had not been established. It also claimed that its target of maintaining the gorilla population had been met, despite no survey being conducted during the previous three years after which much of construction took place.¹²⁶

IMPACTS ON FRESHWATER SPECIES

The World Bank noted that filling the reservoir would "trigger major impacts [including] changes in seasonal water flows that modify the ecology of the Sanaga River downstream to the estuary,"¹²⁷ a distance of nearly 1000 km. However, these impacts were not adequately assessed. Among the impacts not accounted for are those resulting from the lack of seasonal variations and fluctuations in water level at the Sanaga River estuary, where the river meets the Atlantic Ocean. This is caused by filling the Lom Pangar reservoir and optimizing releases for maximum electricity generation. Fluctuations in the salinity at the mouth of the Sanaga are critical for the continuation of fishing and other ecosystem services that local communities depend upon. The Sanaga River sustains mangrove forests at its mouth that are rich in biodiversity, which typically provide "coastal protection during high tides and storms, and spawning grounds for fish that supported the livelihoods of local communities."¹²⁸

Indeed, the Environmental and Social Management Plan (ESMP) notes that "[i]t is possible that the marine fauna and flora of the estuary could be affected, although existing information is insufficient to estimate the magnitude of changes in terms of the range of species, their distribution or their abundance. These changes will most likely be gradual."¹²⁹ Further, "[d]ue to the lack of knowledge of this environment and the influence of tides on the water level...[the cumulative impact assessment] recommends to better assess the estuary's ecosystems and to evaluate the actual impacts using a monitoring program."¹³⁰ It is a glaring omission that no baseline data of the ecosystem value of the estuary have been collected, and that the government would instead attempt to assess impacts and react to them once the impacts manifest.

122. Lom Pangar Panel of Experts Report, May 2013.

123. Ministère des Forêts et de la Faune (MINFOF). Annual Report of the Deng Deng National Park. 2015.

124. Kormos et al. Great Apes and Biodiversity Offset Projects in Africa: The Case for National Offset Strategies. November 2014.

125. Arcus Foundation. State of the Apes: Infrastructure Development and Ape Conservation. 2018.

126. World Bank. [Lom Pangar Project Implementation Completion Report](#), December 2019.

127. World Bank. Lom Pangar Project Appraisal Document, March 2012.

128. Promoting Development, Protecting Environment, World Resources Institute, Feb. 17, 2010.

129. [Lom Pangar Project Environmental and Social Management Plan](#). February 2012.

130. *ibid.*

The ESMP further discusses lessons from the cumulative impact assessment, including that fish migration along the course of the Sanaga River depends on regular flooding to reach areas where they spawn. The ESMP suggests that the “impact will probably be limited,” but notes that “no information is currently available to assess the impact that the regulation [of the Sanaga] might have on fishing, fisherman and their income.”¹³¹ Again here, as in the estuary, no biodiversity baseline information has been collected.

In its review of the project, the US Agency for International Development raised concerns about the “adequacy of aquatic and terrestrial biodiversity baseline data for direct, indirect and cumulative impact analyses, including the types of habitat that will be impacted.”¹³²

CWE noted in its response that it worked to fulfill its obligations to implement environmental and social measures in line with the contract.

Lessons

- Cumulative impact assessments examining the potential impacts on the entire length of a river, including on coastal ocean areas, wetlands, and estuaries should be conducted for regulating dams.
- Projects located in close proximity to the critical natural habitats of ape populations should be avoided because of the unacceptable level of risk of induced impacts.
- Financing mechanisms, to ensure the long-term viability of national parks established as offsets, should be established and functional prior to project completion.

Timeline

- **1999**
World Bank and Cameroon government route Chad-Cameroon pipeline around Deng Deng forest
- **October 2011**
CWE wins contract for construction of Lom Pangar dam. CWE was later debarred from World Bank procurement for a period of three years for irregularities on a separate World Bank contract
- **March 2012**
World Bank approves loan for Lom Pangar
- **September 2015**
Partial impoundment of Lom Pangar reservoir submerges a portion of the previously protected Deng Deng forest
- **June 2019**
World Bank concludes project support indicating target gorilla population has been met despite having conducted no study over the previous three years

131. *ibid.*

132. USAID Review of MDB projects, October 2011.





Inga 3

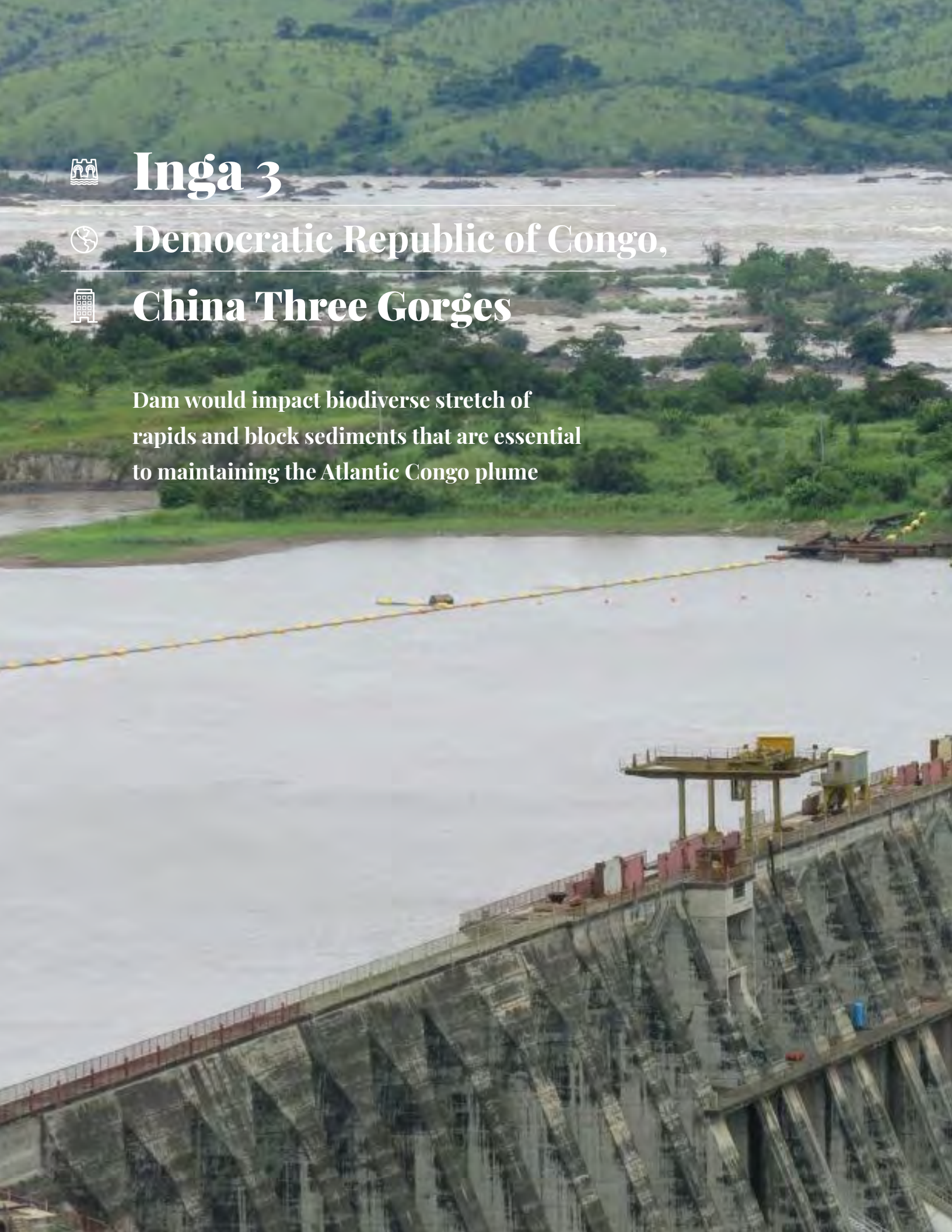


Democratic Republic of Congo,



China Three Gorges

Dam would impact biodiverse stretch of rapids and block sediments that are essential to maintaining the Atlantic Congo plume





Basics:

 **Capacity:** 4.8 or 11 GW

 **Cost:** \$14-\$18 billion

 **Financiers:** To be determined

 **Status:** Proposed

Biodiversity snapshot:

IUCN red list species & status:

- **146 fish species identified in the Inga rapids area, with many more species not having been identified or studied. The Lower Congo is host to a unique array of freshwater species, 30% of which are endemic.**
- **Chimpanzee** : Endangered
- **Hippopotamus**: Vulnerable

Summary

The Inga 3 dam has long been planned on the Congo River, the world's second largest river by volume, and recently found to be the world's deepest river. The river's powerful rapids at the Inga site are said to possess the largest hydropower potential in the world, which has for decades attracted dam planners who have dreamed of harnessing the mighty Congo's power. With a design between 4.8 GW and 11 GW, Inga 3 is considered to be the first phase of the Grand Inga scheme, which at its stated capacity of 40 GW, would become the world's largest hydropower complex.

The Congo River nourishes immense biodiversity. It is home to at least 700 fish species and it supports the world's second-largest rainforest. It also empties its vast sediment load into one of the largest carbon sinks in the world, the Congo Plume in the Atlantic. The incredible velocity at the Inga site likewise makes it a hotspot for extremely rare endemic freshwater species that have only recently begun to be studied and documented. The river is unique in that it has large rapids and waterfalls very close to the mouth while most rivers have these features upstream.

Inga 3 has been through many iterations, with each attempt to capitalize on the Inga site as a silver bullet for meeting Africa's needs, collapsing one after the other. The current version of Inga, wherein South Africa would be the major off-taker, would require the construction of thousands of kilometers of transmission lines through multiple countries - what would amount to the world's longest transmission line - including through sensitive habitats. Plans to develop the site have been thrown in doubt since the World Bank took the unusual step of canceling its involvement over governance concerns.

The project has also been opposed by local residents, between 10,000 and 37,000 of whom would be displaced, depending on the design selected. China Three Gorges is currently leading the consortium to develop Inga 3, but the project has since struggled to find financing amid a great deal of uncertainty over the project's design, size,

complexity, and who would pay for the estimated \$14 to \$18 billion necessary to carry it out.

Project impacts

Researchers have identified over 300 different species of fish in the Lower Congo. According to the World Bank, 146 fish species have been identified at or near the Inga rapids alone, four of which are endemic and one of which is on IUCN's Red List. Given that the river is up to 100 meters deep, other fish species are certainly yet to be discovered.¹³³

As explained by Research Outreach, "Despite the harsh conditions of the central stream of the lower Congo, this stretch of the river boasts an exceptionally high diversity of fish species. The lower Congo occupies just 2% of the area of the total Congo basin, but contains nearly 30% of all species, and 30% of those are endemic to the lower Congo, meaning that they are only found in this region."¹³⁴ Recent efforts have begun to document and study the unusual freshwater species that live in the depths underneath the Inga rapids, which had been largely unknown previously.

Indeed, the World Bank in its assessment of Inga 3 noted the "dearth of information on the possible presence and behavior of migratory fish species, which would be particularly impacted." The World Bank proposed that a biodiversity survey be conducted to establish baselines and document the breadth of species present. "Given the importance of the aquatic diversity in the Inga area, it would be appropriate to initiate as soon as possible long-term support for scientific research that will guide efforts to mitigate these impacts in both" the 4.8 GW and 11 GW designs.¹³⁵

133. World Bank [Integrated Safeguards Data Sheet: Inga 3 Technical Assistance](#). 2013.

134. Research Outreach: [Fishes in the lower Congo River. An extreme case of species divergence and convergent evolution](#).

135. World Bank [Integrated Safeguards Data Sheet: Inga 3 Technical Assistance](#). 2013.

The Congo River sustains mangrove forests at its mouth which are rich in biodiversity and protected by a national park. The mangrove islands are home to manatee populations and other endangered species, and to several villages. Mangroves help protect coastal areas from the ravages of large storms, and are highly vulnerable to impacts from damming.

The river's large sediment load has also created the Congo Plume, a fan on the floor of the Atlantic Ocean with a size of 300,000 square kilometers. The fertile plume produces a large amount of phytoplankton, which sequester carbon when they die. The Congo Plume is a carbon sink of global importance, and would be at risk if the sediment flow which sustains it is interrupted by dams. By impeding sediment flows, dams have had devastating impacts on estuary ecosystems, including their fisheries and mangroves, at the mouths of the Indus, Mississippi, Nile, Volga and many other rivers. Kate Showers, a geographer and researcher at the University of Sussex, warns that because of the potential impacts on the Congo Plume, "plans to divert, store or otherwise intervene in Lower Congo River dynamics are truly alarming."¹³⁶

In addition to riverine biodiversity, the World Bank notes that the dams will also affect the habitats of endangered Chimpanzee, vulnerable Hippopotamus and other mammal populations.¹³⁷ Beyond impacts near and downstream of the Inga site, the project's footprint would potentially be enormous, with very little known about the routing of the transmissions lines and the impacts they would have on communities, wildlife, and protected areas along the way. The prospect of constructing thousands of kilometers of transmission lines through the Southern African bush is likely to have severe impacts.

In its response, CTG noted that "The Inga 3 project is in the early research phase. Restricted by relevant factors, in-depth demonstrative research on the project plan has not been carried out yet, nor has the research for EIAs and SIAs. At an appropriate time in the future, the company will strictly abide by [relevant] environmental policies, regulations and systems" as required.

Lessons

- Sufficient resources need to be allocated to studying the biodiversity present at the Inga rapids and mitigating identified impacts.
- The transmission lines route should be determined based on rigorous study of options to minimize impacts on wildlife, protected areas, and human populations.
- The suite of environmental and impact studies should be comprehensive and adequately resourced and take into account a full cumulative impact assessment of existing and planned hydropower development at the Inga site.

Timeline

- **October 2013**
South Africa concludes agreement with DRC government to purchase Inga's power
- **March 2014**
World Bank approves technical assistance grant to support development of Inga 3
- **September 2016**
World Bank cancels support for Inga 3 citing governance concerns
- **End-2016**
China Three Gorges-led consortium and Pro-Inga consortium, primarily European, each submit bids to construct Inga 3
- **October 2018**
DRC government sign a joint exclusive development agreement with CTG-led and ACS-led consortiums
- **January 2020**
Spain's ACS withdraws from Inga 3 Dam

136. Kate B. Showers, [Congo River's Grand Inga hydroelectricity scheme](#). Water History, 2009.

137. World Bank [Integrated Safeguards Data Sheet: Inga 3 Technical Assistance](#). 2013.

The unique biodiversity of the Lower Congo

The extreme and varied conditions of the Lower Congo have produced a number of rare and unusual endemic species, including recently identified sightless fish that inhabit the depths of the Congo River. These bottom dwellers live over 100 meters below the surface, in habitats created by the river's enormous power. The river is so turbulent that fish have been documented suffering decompression sickness (the "bends") from surfacing at great speed by force of the currents.

Indeed, these currents have been shown to have effectively created numerous isolated habitats within the same stretch of river, each inhabited by different species. The conditions in the Lower Congo have also led to research into concurrent evolution, where fish species otherwise extremely different from one another - for example cichlids and catfish - have evolved similar characteristics such as depigmentation.



The Congo River providing biodiverse habitats and supporting local communities | Photo by Roberto Saltori.





Three Gorges Dam

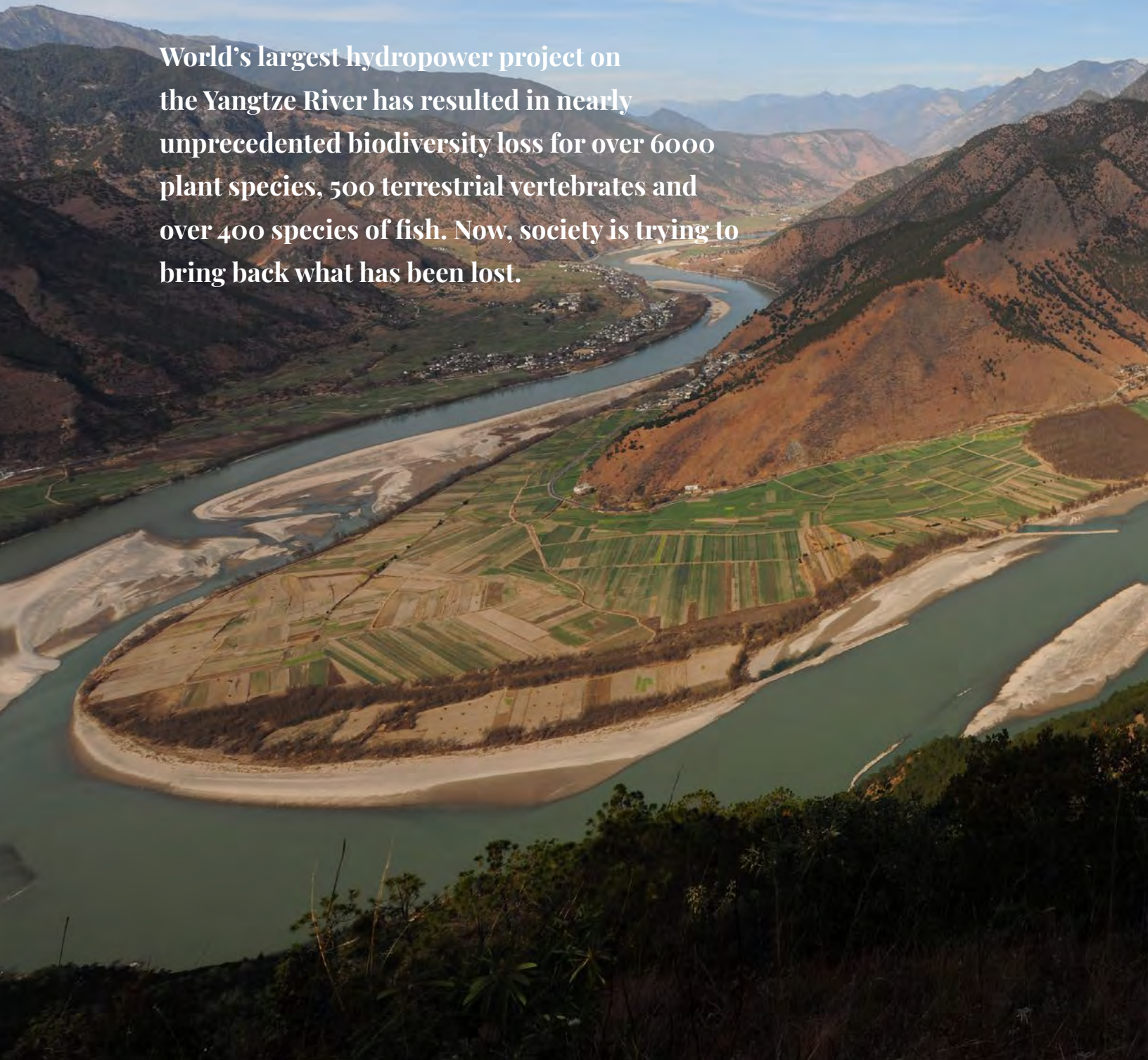


China




China Three Gorges

World's largest hydropower project on the Yangtze River has resulted in nearly unprecedented biodiversity loss for over 6000 plant species, 500 terrestrial vertebrates and over 400 species of fish. Now, society is trying to bring back what has been lost.





Basics:

 **Project owner:** China Yangtze Power (subsidiary of China Three Gorges Corporation)

 **Capacity:** 22,400 MW

 **Cost:** \$31.765 billion

 **Status:** In operation

Biodiversity snapshot:

IUCN red list species & status:

- **Chinese Alligator:** critically endangered
- **Yangtze River Dolphin:** critically endangered
- **Yangtze Giant Softshell Turtle:** critically endangered, Functionally extinct
- **Chinese Giant Salamander:** critically endangered
- **Chinese Paddlefish:** extinct (Science of The Total Environment 2010) but listed as Critically endangered (IUCN last updated in 2009)
- **Yangtze Sturgeon:** critically endangered*

The Yangtze has had more species become extinct than any other river in the world. While efforts are being made to restore the habitat for many animals, the river's ability to sustain some of the precious life within has been severely limited.

* Yangtze River Fisheries Research Institute. *Eco-operation of Three Gorges Reservoir Based on the Requirement of the Spawning of Four Major Carps in the Central and Lower Yangtze Region*. 2011.

Summary

The Three Gorges dam sits 40 km upstream of the city of Yichang, Hubei province, on the mainstream of Asia's longest river, the Yangtze, which traverses 6,000 km to the eastern reaches of the country. The region is considered to be one of China's most important for biodiversity. Construction of the dam's first phase began in 1994, but by that time the sheer scale of environmental impacts of the project had prompted the US Bureau of Reclamation and the Canadian government to withdraw offers of assistance. The second and largest phase began in 2003, aimed at providing flood control, electricity generation, navigation of container ships, and drought alleviation, with the anticipation that the energy produced would help fuel the country's growth. In 2007, it entered into full operation.

The Three Gorges Dam was and continues to be the largest hydropower project in the world, at 22 GW installed capacity, which surpasses the installed capacity of the entire Czech Republic. Given the project's enormous size, authorities created a state-owned entity, the China Three Gorges Project Development Corporation, to raise the billions of dollars in required finance from international and domestic sources and undertake project construction.

The ecological toll of the project has been immense and has contributed to the extinction or near extinction of several species. The Chinese national and provincial governments have recently begun taking steps toward ecological restoration and protection of remaining species. The social impacts have also been extreme, with the dam's vast reservoir submerging cities and villages and prompting the forced displacement of more than 1.2 million people.¹³⁸

Project impacts

The construction of the Three Gorges dam has caused significant and irreversible impacts to critically endangered species and critical natural habitats. Over 1,300 cultural and

archeological sites and 100,000 hectares of agricultural land have been submerged by the reservoir, while also impacting the habitats of over 6,000 plant species, 500 terrestrial vertebrates and 400 species of fish along the Yangtze River.

DEVASTATING IMPACTS ON BIODIVERSITY AND HABITATS, NOW LOOKING TO MAKE AMENDS

According to Yangtze River Fisheries Research Institute, fish populations of the four species of carp have declined by close to 90% due to changes in river flows. Their spawning requirements had historically been triggered by changes in the water temperature during the late spring, while spawning sites also faced degradation due to dredging and disconnection of floodplains from the mainstream.¹³⁹

Stakeholders have evaluated the use of environmental flows regimes to mitigate against the damages posed by the Three Gorges Dam to sensitive habitats. Using carp as the target species, environmental flows were incorporated in 2011 for drought mitigation during the early part of the year, and to mimic the Yangtze's natural flood pulse in May to promote carp spawning. While it is still not possible to conclude on the results due to a lack of reporting on water quality, habitat, fishing pressure and hydrology, the density of eggs and larvae reaching the lower branches of the Yangtze were reportedly three times higher in June 2014 than when they first began in 2011.¹⁴⁰

When it comes to incorporating environmental flows after the fact, as in the case of Three Gorges dam, it is extremely difficult to reverse the clock on lost biodiversity. The complexity of natural ecosystems is challenged by the corresponding complexities found in the competing demands of operating multipurpose dams. Protecting the economic interests of freight navigation, electricity production, flood control, and drought alleviation generally supersedes the ecological health of one or two species, much less all species. Understanding and integrating appropriate measures to protect the environment at the outset prior to construction is far more economical than later restoration efforts.

138. Peter Gleich. Three Gorges Dam Project, Yangtze River, China. January 2009.

139. Cheng et al. Managing the Three Gorges Dam to Implement Environmental Flows in the Yangtze River. July 2018.

140. Chen et al. Assessment of eco-operation effect of Three Gorges Reservoir during trial run period. January 2015.

IMPACTS ON FRESHWATER SPECIES

A study in 2003 indicated that six species were at high risk of complete extinction with another 14 facing an uncertain future, with another two dozen that may only survive in the tributaries.¹⁴¹ At least one, the Chinese Paddlefish, has gone extinct and the Yangtze Chinese Softshell Turtle is functionally extinct as of 2019. CTG noted that “the construction of the Three Gorges Reservoir had an impact on the economic botany of the region, along with endangered and endemic species, however, it did not lead to extinction of any endangered species.” There are positive signs for the Yangtze Sturgeon being farmed inland; however, it requires a biodiverse environment to survive in the wild. This is why there have been recent steps taken to prevent further disturbances of their habitat by redesigning bridges and efforts to restore wetlands.¹⁴²

The changes and additions to the environmental flows dating back to 2011, while seemingly impactful for some species, are not enough to resuscitate key species which were on the verge of extinction due to their habitats being destroyed or were in decline because of myriad reasons, including overfishing, pollution and construction of dams. As humans further encroach on these sensitive ecosystems, it becomes increasingly difficult to step back and make feasible reparations quickly enough.

In a written response, CTG indicated that it “as adopted measures such as establishing nature reserves; conducting research on species conversation, stock enhancement and releasing, and environmental dispatch and delivered fruitful results. Environmental dispatch in particular has shown obvious benefits to the natural reproduction of downstream fish”.

Lessons

- The dam is located in one of the most biodiverse regions on the planet, and ecological considerations should have been prioritized during project design to prevent needless impacts on biodiversity.
- Irreversible impacts on critical natural habitats of the critically endangered Chinese Alligator, Yangtze River Dolphin, Yangtze Giant Softshell Turtle (functionally extinct), Chinese Giant Salamander, Yangtze Sturgeon, and the Chinese Paddlefish, which is now extinct, should have prompted authorities to seek expert advice to ensure their protection.
- The withdrawal of key international state supporters due to foreseen environmental damages should have been a red flag and affirmation that loss of biodiversity would take place.

Timeline

- February 1992**
 Politburo Standing Committee agrees to the construction of the project
- April 1992**
 The Canadian government cancels development assistance for the project
- December 1993**
 The U.S. Bureau of Reclamation terminates agreements for technical services 1994 t
- 1994**
 Construction begins
- 2003**
 First phase is completed and the first water is impounded. The level of water in the reservoir rises to 135 meters in June; the first electricity is produced
- 2006**
 Dam is completed

141. Peter Gleich. Three Gorges Dam Project, Yangtze River, China. January 2009.

142. CGTN. Ecological restoration underway to reduce Three Gorges construction impact, September 2019.

5. Key Findings and Recommendations

DAMS IMPACTING PROTECTED AREAS, INCLUDING UNESCO WORLD HERITAGE SITES

A recently published study revealed that 509 dams, 14% of the dams currently under construction or planned in the next two decades, are set to be built in protected areas.¹⁴³ This is on top of 1,249 large dams already in place within existing protected areas. Nearly half of the cases examined in this report were either built within or had impacts on a protected area, including one UNESCO World Heritage site. The issue of dams impacting World Heritage sites has been increasing,¹⁴⁴ prompting the World Heritage Committee in 2016 to call for a prohibition on dams built within World Heritage sites.¹⁴⁵

PowerChina's subsidiary Sinohydro is the primary contractor on works at the Julius Nyerere dam in Tanzania, for example, which is under construction in the middle of the Selous Game Reserve, a UNESCO World Heritage Site. This despite official objection from the World Heritage Committee, which took the unusual step of threatening to delist the project from its heritage status altogether. In addition to directly submerging habitats of some of Africa's most iconic and endangered species such as the black rhinoceros, the construction of 120 km of roads into the heart of the reserve will exacerbate the already persistent problem of poaching, which had nearly wiped out the reserve's elephant and rhinoceros populations. The dam would also impact Ramsar-protected areas both upstream and downstream. Sinohydro is also the contractor on the Koukoutamba dam in Guinea, which would be built within a recently established national park.

In Uganda, meanwhile, China Three Gorges subsidiary China International Water & Electric (CWE) built the Isimba dam, which submerged a portion of the Kalagala biodiversity offset. In addition to the site's spiritual and cultural value, it serves as an important breeding ground of the endangered crested crane, the national bird displayed on Uganda's flag. Isimba has also submerged a significant number of whitewater rapids, crippling the adventure tourism industry on the White Nile, which represents one of the few significant sources of employment in an otherwise underserved part of the country. CWE also built the Lom Pangar dam in Cameroon, which submerged a portion of the Deng Deng National Park only a few years after the Chad-Cameroon oil pipeline was rerouted at great expense to avoid impacting the park.

A GROWING NUMBER OF DAMS ARE IMPACTING ENDANGERED GREAT APE POPULATIONS

Five of seven great ape species are considered critically endangered - one step away from extinction - while the other two are also endangered with their populations decreasing. This concerning trend has been exacerbated by infrastructure developments, including dams, directly impacting ape habitats and bringing human settlement into previously inaccessible areas. According to one estimate, "by 2030, fewer than 10% of ape ranges in Africa and only about 1% of those in Asia will remain untouched by infrastructure development and the associated habitat disturbance."¹⁴⁶ Developments bringing humans in direct contact with ape populations have recently become increasingly concerning in light of apes' particular vulnerability to contracting and dying from COVID-19.¹⁴⁷

143. Thieme et al. Dams and protected areas: Quantifying the spatial and temporal extent of global dam construction within protected areas. May 2020.

144. Rivers without Boundaries. [Heritage Dammed](#). 2019.

145. UNESCO. State of Conservation of World Heritage Properties, 2016.

146. Arcus Foundation. State of the Apes: Infrastructure Development and Ape Conservation. 2018.

147. IUCN SGA. [Great apes, COVID-19 and the SARS CoV-2](#). March 2020.

The most prominent and worrying example in recent times of dams impacting apes is that of the Batang Toru dam, a highly controversial project in North Sumatra, Indonesia. PowerChina subsidiary Sinohydro resisted urgent global calls to halt the project's construction after orangutans local to the project were discovered to be a previously unknown and distinct species of orangutan, which was named the Tapanuli orangutan. Conservationists warned that construction of the Batang Toru dam alone, which would effectively bisect their sole habitat, could precipitate their extinction within decades.

Sinohydro has also received intense criticism for its agreement to construct the Koukoutamba dam in Guinea, which would result in the deaths of up to 1500 critically endangered Western chimpanzees, and would be built in a national park established explicitly to protect what is one of the subspecies' last bastions. Sinohydro signed the contract to build the dam just months after the World Bank withdrew its support, after it 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."¹⁴⁸

The Lom Pangar dam in eastern Cameroon, built by CTG subsidiary China International Water & Electric, has similarly raised objections from civil society over its impact on endangered ape populations. Of particular concern is the dam's location next to the Deng Deng National Park and the project's direct and induced impacts on a key habitat for over 900 critically endangered Western lowland gorillas, as well as chimpanzees. Captures of gorilla and chimpanzee meat as well as the discovery of hunting structures and spent shell casings within the park prove these fears to be well founded.

HEIGHTENED CONCERN OVER CONSTRUCTING DAMS ON FREE-FLOWING RIVERS

Free-flowing rivers form the bedrock for local cultures and communities and have huge ecological significance, serving as one of the world's last bastions of dwindling freshwater biodiversity. The first dam constructed on a previously free-flowing river has a disproportionately large impact on freshwater ecosystems, and in some cases as much as 40 percent of a river's aquatic species can be lost as a result.¹⁴⁹ Of the world's 177 largest rivers, only one-third are free flowing, and just 21 rivers longer than 1000 kilometers retain an unobstructed connection to the sea. As such, communities and conservationists have emphasized the urgency of keeping currently free-flowing rivers undammed.

At least three of the projects examined are proposed on unobstructed, free-flowing rivers. Of greatest concern are plans - currently on hold - for China Three Gorges to construct the Mong Ton dam on the Salween River in Myanmar. The Salween, also called the Nu River upstream in China, is the longest undammed river in mainland Southeast Asia and supports the livelihoods of over 10 million people, sustaining the rich fisheries and fertile farmland central to the lives of indigenous and ethnic minority communities living along its banks. Myanmar and China Three Gorges have been unable to proceed with dam construction on the Salween largely due to broad-based community resistance. Efforts to keep the Salween free flowing all the way to its source were bolstered in 2016 when China's Yunnan government decided to stop all dam construction in the Nu Valley. During the recent strategic environmental assessment process intended to kickstart the hydropower industry in Myanmar, the International Finance Corporation recommended to cancel plans for dam construction on the Salween mainstem, including Mong Ton.¹⁵⁰

148. World Bank Comments on the Koukoutamba Project ESIA, 2018.

149. Luther Aadland. Barrier Effects on Native Fishes of Minnesota, April 2015.

150. Thompson Chau, Myanmar Times. **IFC Report Recommends Alternatives to High Risk Myitsone**, December 2018.

The Julius Nyerere dam, under construction by Sinohydro in Tanzania, would be the first dam built on the free-flowing Rufiji River. With only two of its tributaries dammed in the basin's upper reaches, the Rufiji is "essentially the last major relatively free-flowing river in East Africa."¹⁵¹ The dam's vast reservoir - it would become Africa's sixth largest - would drastically alter the timing and volume of downstream flows which, in its current natural state, produce incredibly biodiversity-rich seasonal lakes and sustain a vibrant delta that serves as a Ramsar site. The Batang Toru dam in North Sumatra would similarly be the first such project on the river and serve as an impenetrable barrier to migratory fish.

UNASSESSED AND UNADDRESSED IMPACTS ON FRESHWATER SPECIES

Dams are fragmenting rivers and ecosystems, driving an unprecedented loss of freshwater habitat and biodiversity. Scientists have estimated that if all planned hydropower dams and dams currently under construction are completed, 300,000 km of additional unaffected riverine ecosystem will be lost—a 15% reduction from today's total amount of unaffected rivers.¹⁵² A recent study by the World Wildlife Fund found that dams are the biggest culprit in the 83% decline in freshwater biodiversity experienced globally between 1970 and 2014.¹⁵³

A common issue in the cases examined was the lack of data and information on the presence and distribution of fish species impacted by dams. This lack of adequate baseline data makes it impossible to properly assess impacts over time, as well as to identify and implement measures to mitigate impacts. In the case of the Koukoutamba dam in Guinea, to be constructed by Sinohydro, the project environmental impact assessment (EIA) identified 26 different fish species potentially impacted, but did not identify or assess possible impacts on fish populations downstream of the dam. The World Bank noted in its comments that "from a biodiversity

standpoint, the most severe data gaps in the ESIA are for the 300+ km ... downstream ... which will undergo major hydrological changes, particularly in the dry season."¹⁵⁴

The downstream impacts of the Julius Nyerere dam in Tanzania, also under construction by Sinohydro, have not been subjected to rigorous study through the EIA process. In his review of the projects impacts, Dr. Joerg Hartmann noted that the dam would withhold crucial sediments and alter seasonal flows of the Rufiji, which "will change habitat conditions for all aquatic organisms, including endangered species (for example, Dugong and sea turtles), subsistence fishing species, and commercially relevant species."¹⁵⁵ The dam itself would also be an obstacle for migratory fish species that travel upstream to an important tributary that is itself host to a Ramsar protected site.

FAILURE TO CONSIDER OR ADDRESS THE CUMULATIVE IMPACTS OF MULTIPLE DAMS ON A RIVER

Multiple dams on a river basin can cause significant cumulative impacts beyond the direct ones incurred by individual dams, as rivers are altered from their natural flow regimes. These impacts are particularly pronounced on freshwater species that face multiple barriers and find their habitats confined to a short stretch of river, or they experience significant fluctuations in river flows that disrupt fish breeding grounds and aquatic biota that are critical to the food chain.

The Nam Ou Cascade in Lao PDR is a series of seven dams built or under construction on the Nam Ou River, a major tributary of the Mekong. PowerChina Resources owns the rights to develop and operate the cascade for a period of 29 years, the first time a Chinese company has received exclusive rights to develop a hydropower cascade on a river outside China. Studies predict that the projects will have a severe impact on the biodiversity in the Nam Ou Basin, in particular for fish species, due to the loss of

151. Rivers without Boundaries. **Heritage Dammed**, 2019.

152. Opperman, et al. The Power of Rivers: Finding balance between energy and conservation in hydropower development. May 2015.

153. World Wildlife Fund. **Connected and Flowing**. 2019.

154. World Bank Comments on the Koukoutamba Project ESIA, 2018.

155. World Wildlife Fund. **The True Cost of Power**, 2017.

connectivity and the conversion of the river ecosystem from a free-flowing river to a series of reservoirs. A summary of the project's cumulative impacts predicts a loss of 66% of fish biodiversity in the Nam Ou, with additional cumulative impacts on the wider Mekong Basin. However, there is no indication that the company is taking steps to reduce the cascade's cumulative impacts.

The Lom Pangar dam in Cameroon, meanwhile, is primarily intended as a regulating dam to increase the output of existing dams and spur the construction of new dams on the Sanaga River. Constructed by CWE, Lom Pangar's vast 540 km² reservoir has the capacity to store 6 billion m³ of water, timing releases to maximize hydropower generation along the river's 918 km length. A cumulative impact assessment was conducted as per the requirements of the dam's lead financier, the World Bank. While the World Bank acknowledged that filling the reservoir would "trigger major impacts [on] the ecology of the Sanaga River downstream to the estuary," these impacts were not assessed.

SIGNIFICANT HUMAN COST OF BIODIVERSITY LOSS, PARTICULARLY FOR INDIGENOUS PEOPLES

Dam impacts on wildlife and freshwater resources have had a significant human cost. Declines in fish stocks, particularly downstream of dams, have impacted millions of river-dependent populations around the world and jeopardized a key source of protein for local diets. Indigenous peoples, while constituting just 5% of the world's population, serve as stewards of 80% of global biodiversity.¹⁵⁶ So in addition to being subjected to forced displacement from their territories, they have also borne the brunt of dams' impacts on species that are often bound to indigenous cultures and identities.

The São Manoel dam is located on Brazil's Teles Pires River in the Tapajós Basin, one of eight areas of Amazonian biological endemism, where many species are found nowhere else on earth. Indigenous groups, including the Mundurucu, Kayabi and Apiaká, have long staunchly opposed hydropower development on their lands and on the stretch of river that sustains freshwater and other species that are integral to their lives, livelihoods and

culture. China Three Gorges is one of three companies in the consortium that built and now operates the dam, which has caused a significant decline in freshwater species including the fish and turtles that are central to local indigenous diets. The economic impacts have also been particularly severe to fishermen who have reported fish catches plummeting to as low as 15% of their catch in years before the dam.

PowerChina's Nam Ou Cascade, meanwhile, has displaced thousands of villagers, including indigenous communities, to resettlement sites and reduced their access to fisheries and natural resources important for their livelihoods. Fishing is a key source of food security and livelihoods, with a survey estimating that 70% of households rely on fishing in the Nam Ou. The cascade is expected to result in a significant loss of fish catch, undermining food security.

COMPANY POLICIES REGARDING BIODIVERSITY AND DUE DILIGENCE FALL WELL BELOW INTERNATIONAL STANDARDS

A recurring issue encountered in the examination of the cases included in this report, as well as in previous assessments,¹⁵⁷ is the lack of sufficient due diligence procedures to screen for destructive projects. This is in part an extension of companies largely lacking clear requirements regarding biodiversity and clearly defined "no go" policies to exclude problematic projects. It is also indicative of a tolerance for impacts and risks, including reputational risks, that many observers deem too high to prevent the most severe impacts, including the extinction of species.

This was particularly true of cases involving PowerChina, and even more specifically its subsidiary Sinohydro. The presence of orangutans known at the time to be "genetically distinct" in the Batang Toru case should have been sufficient to trigger broader assessment and mitigation of impacts before beginning construction. The discovery that the orangutans local to the project area are in fact a new species should have prompted an immediate suspension of works. Sinohydro's continued

156. National Geographic, [Can indigenous land stewardship protect biodiversity](#), November 2018.

157. See, for example, [Watered Down](#)

involvement in the project even after the Bank of China withdrew financing, and compelling evidence that Batang Toru's completion would lead to the Tapanuli orangutan's extinction, indicate that the company is prioritizing revenues and deadlines over environmental concerns of global significance. This is reinforced by Sinohydro's agreement to construct the Koukoutamba dam in Guinea in the middle of a national park just months after the World Bank's withdrawal over impacts on critically endangered chimpanzees. Similarly, Sinohydro agreeing to perform \$1 billion in works on the Julius Nyerere Dam in the middle of a UNESCO World Heritage site that is an important habitat for some of Africa's most iconic species, speaks to a deeply concerning pattern of disregarding impacts on biodiversity. As a Chinese state-owned enterprise, it also serves to undermine China's standing in promoting an "ecological civilization."

China Three Gorges, for its part, has made commitments to avoid projects impacting protected areas, including World Heritage sites. This has not, however, prevented the partial submerging of the Kalagala Offset Area in Uganda or the impacts on the rights, territories and natural resources of indigenous communities affected by the São Manoel project in Brazil.



Recommendations

Companies should:

- Adopt policies in line with IFC Performance Standard 7 that require the Free, Prior and Informed Consent (FPIC) of indigenous peoples before becoming involved in projects that may impact them.
- Forego projects proposed on a free-flowing river or the mainstem of a major river.
- Require that cumulative impact assessments are conducted for dams on rivers with multiple dams, and that robust mitigation measures are in place.
- Adopt an explicit policy prohibiting dams that are constructed in or have significant impacts on protected areas, including UNESCO World Heritage sites.
- Adopt and implement due diligence procedures with clear bottom lines aligned to international standards, for example requiring no net biodiversity loss and requiring net biodiversity gain in projects impacting critical natural habitats.
- For projects in operation by the company, engage in consultation with affected communities, civil society, government authorities and scientists to discuss ways to minimize impacts on both aquatic and terrestrial biodiversity, including through the adoption of environmental flows regimes aimed at preserving remaining biodiversity.
- Withdraw from projects either proposed or under construction that will entail severe and irreversible impacts on endangered species. Sinohydro should cancel its contracts to build the Koukoutamba, Batang Toru, and Julius Nyerere dams for being inherently incompatible with international standards and China's promotion of the idea of ecological civilization.
- Diversify their portfolios toward less environmentally destructive energy options, such as low-impact solar and wind projects.



Healthy rivers are critical in sustaining communities and ecosystems. Yet our rivers around the world are under threat. As many as 3,700 new dams have either been proposed or are already under construction. Despite the enormous diversity in size, scale and geography of new dams being built, a relatively small number of corporations are responsible for their construction. Thus the policies and practices of these companies have tremendous implications for rivers and human rights. This report provides context for this situation and features seven in-depth case studies of dams at final stages of completion. The case studies are evidence-based and descriptive of on the ground impacts; they cover a wide geography, and are considered to be flagship projects of some of the most influential companies in the hydropower sector. The intention of this report is to provide an incentive and justification for these corporations to compete on their environmental and social track records rather than simply on financial grounds.

