

# A Cascade of Development on the Omo River

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## Downstream Effects of the Gibe III Filling and Associated Commercial Irrigation Projects

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### INTRODUCTION

According to various news reports, the Gibe III Dam, now under construction on the Omo River in Ethiopia, is expected to begin producing power around September of 2014. <sup>[1]</sup> This event can occur only if the reservoir starts filling at the beginning of the wet season rains (called the “Kiremt” <sup>[2]</sup>), which will approximately begin during May of 2014. <sup>[3]</sup> This date signifies the escalation or beginning of a host of serious negative impacts that various experts believe dam operation and associated irrigation plantations will bring about, including:

- Collapse of local livelihoods and widespread hunger among the peoples of the Lower Omo and Lake Turkana watershed;
- An increase in armed conflict over scarce resources;
- Destruction of fragile downstream ecosystems.

This document describes the potential hydrological impacts of filling the reservoir with an emphasis on impacts that will immediately occur during the first year of commissioning. **N.B.: All estimates are for an average water year and commissioning of turbines at the exceptional minimum operating level.**

### FILLING OF THE GIBE III DAM

About 60 – 70% of the Omo River inflow will be captured and held back by the dam during the first year. <sup>[3]</sup> Initially, dam operations will be extremely restricted since water levels must rise to certain elevations before water can be discharged through power tunnel intakes and outlet structures. As the water begins rising, the only available outlet will be a temporary minimum flow conduit that can release approximately 25 m<sup>3</sup>/s - 100 m<sup>3</sup>/s. <sup>[3]</sup> If all goes as planned, one turbine at a time would be commissioned beginning around September 2014, around the same time that a permanent minimum flow outlet would become usable. Flows would then fluctuate between turbine discharge (~ 100 m<sup>3</sup>/s per turbine) and the permanent minimum flow (25 m<sup>3</sup>/s). Therefore, we can expect that discharge from ~ May to November, a 7-month period which spans the wet season, will be approximately equivalent to the driest monthly average flow. <sup>[3]</sup> By May 2015, flows could rise if 6 turbines are commissioned as planned. <sup>[3]</sup>

During regular dam operation, water releases will alternate daily between turbine discharge levels and the minimum flow level, thereby erasing seasonal flow changes. Various project documents <sup>[4,5]</sup> have proposed a 10-day, 1000 m<sup>3</sup>/s controlled flood release in September to mitigate the loss of the Kiremt floods. The inclusion of a high flow event indicates recognition by the dam owners that flow variation is the cornerstone of livelihoods for downstream communities, and healthy river ecosystems. <sup>[6]</sup> However,

independent consultants have criticized this planned flood since its effectiveness is entirely unsubstantiated as its parameters were set with the barest of scientific support.<sup>[3, 7]</sup> Stakeholders are concerned that this planned flood release will not happen at all due to its high cost (from possible loss of hydropower revenue<sup>[3]</sup>) as well as potential for the flood to harm new irrigated plantations being built downstream of the dam.

## COMMERCIAL IRRIGATED AGRICULTURAL PROJECTS

Operation of the dam is inextricably tied to the commercial irrigated agricultural plantations now being expanded in the Lower Omo River Basin. Their existence is possible since the Gibe III will regulate floods and raise dry season flows, thus providing a dependable source of water for crops. Construction of the Kuraz Sugar plantations (projected to cover 161,285 hectares) and accompanying infrastructure, including sugar processing factories and resettlement villages, has started in advance of completion of the Gibe III.<sup>[8, 9]</sup> The Kuraz Sugar plantations, plus additional area identified as suitable for cultivation (47,370 hectares), could eventually require over 50% of the Omo River inflow, depending on irrigation efficiency.<sup>[7]</sup>

Growth is apparently occurring at a rapid pace. A low earthen dam has been constructed across the river approximately 200 river km downstream of the Gibe III that funnels water into an irrigation canal averaging 25 m wide.<sup>[9]</sup> The dam already blocks flow and floods from travelling downstream, and inundates villages upstream.<sup>[10]</sup> The canal abstracts water at the upstream end of more than 500 km of river at the point where flood recession agriculture becomes viable and seasonal flooding of low-lying grazing areas supports livestock.<sup>[5]</sup>

People living in the region have developed diversified livelihood activities to survive in an increasingly insecure region beset by drought, violence and competition for scarce resources (including, now, competition from well-funded, officially sanctioned large-scale farming interests).<sup>[11]</sup> Approximately 90,000 people depend on flood-recession agriculture, and the number doubles when including those who depend on flooding to support their pastoral activities.<sup>[12]</sup> However, the combined effects of extreme low flows caused by the dam and irrigation abstractions will cause a drastic drop in grazing land availability and fishing production as well as almost a complete cessation of recession agriculture<sup>[3, 13]</sup>, thus taking away the foundation of these peoples' livelihoods. Furthermore, forced resettlement of agro-pastoralist tribes is already occurring while their ancestral land is seized for commercial cultivation.<sup>[8]</sup> If these developments continue as planned, massive hardships and widespread hunger will further fall on the Bodi, Chai (Suri), Mursi, Kwegu, Nyangatom, Kara, Daasanach, and Hamar.<sup>[12, 14]</sup>

## LAKE TURKANA

Lake Turkana is the largest desert lake in the world<sup>[7]</sup> and is recognized as a UNESCO World Heritage Site. Although the bulk of its volume is located in Kenya, the Omo River contributes approximately 90% of Lake Turkana's inflows.<sup>[15]</sup> Water levels in the lake are expected to drop approximately 2 meters during the first 1-2 years of the dam filling.<sup>[7]</sup> This drop could cause Lake Turkana's delta to move southwards by approximately 10 km<sup>[3]</sup>. Furthermore, irrigation abstractions in the Lower Omo may eventually cause lake levels to fall around 22 meters. In comparison, the average depth of the lake is approximately 30 meters.<sup>[7]</sup>

The Omo River floods are vital seasonal events for the lake ecosystem. The floods provide a cue for spawning, inundate productive habitat for young fish, and bring nutrients and fresh water into the lake. [7] Previous studies of the lake have found a direct and substantial positive correlation between levels of annual fish catches and lake levels. [16]

Almost 100,000 people live on the immediate lakeshore [7], and an estimated 300,000 people are dependent in some way on the lake's resources for survival – through fishing, pasture, safety, and for drinking water. [11] These resources are already scarce, and their potential loss through both the lake level drop and the loss of seasonal flooding will cause the collapse of subsistence activities as well as increased conflict. The lake acts as a natural buffer between groups including the Turkana, El Molo, Rendille, Samburu, Daasanach, and Gabbra [11], and as the lake shrinks and shifts, groups will increasingly compete for resources. [17]

## RECOMMENDATIONS

Although the Gibe III and associated irrigation projects are projected to provide benefits such as electricity, jobs, and economic benefits for some, the harms caused by these projects will fall squarely on the most vulnerable people in the region. As David Turton (2010) writes on those whom development directly displaces or indirectly displaces by loss of resources, “there is no disagreement . . . that the poorest and most vulnerable members of a country's population are disproportionately affected by it; second, that most of those affected become even poorer as a result; and third, that this pattern has proved extraordinarily difficult to reverse.” [12]

Independent consultants and respected academics have warned for many years that dire consequences are imminent if these projects continue as planned. Although many recommendations have been made concerning paths forward that could lead to a mitigation of some of these negative impacts, Ethiopia has thus far heeded none of them. Whether or not Ethiopia acknowledges the full impact of its development, the final period in which it can develop a less destructive development plan is upon us.

One important first step would be for Ethiopia to engage in an honest and open dialogue with affected peoples in the Lower Omo River Basin, those who live around Lake Turkana, and the Kenyan government. We recommend that Ethiopia delay completion of the Gibe III and commercial irrigation plantations until a legitimate region-wide environmental and socio-economic impact analysis has been completed and publicly released. Ethiopia should engage with international experts and with Kenya on the possibility of developing an integrated water-resources management plan for the Lower Omo. Such a plan would take into account the water needs of all stakeholders in the basin (including those of ecosystems), analyze the carrying capacity of the river in regards to future dams and plantations, and review the potential for environmental flows. For any of these efforts to succeed, Ethiopia must embrace a more inclusive process for decision-making in the basin based on transparency and accountability.

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## References

1. Government of Ethiopia. *Ethiopia: Gilgel Gibe III Near Completion - to Go Operational in September*. All Africa, 17 December 2013. Web.
2. Cheung, W.H., G.B. Senay, and A. Singh, *Trends and spatial distribution of annual and seasonal rainfall in Ethiopia*. International Journal of Climatology, 2008. **28**(13): p. 1723-1734.
3. SOGREA Consultants, *Gibe III Hydroelectric Project : Independent review and studies regarding the Environmental & Social Impact Assessments for the Gibe III Hydropower Project*, May 2010, European Investment Bank.
4. CESI SpA & Mid-Day International Consulting Engineers, *Environmental and Social Impact Assessment*. January 2009.
5. Agriconsulting SpA & Mid-Day International Consulting Engineers, *Environmental and Social Impact Assessment : Additional Study on Downstream Impact*. January 2009.
6. Arthington, A.H., et al., *The Challenge of Providing Environmental Flow Rules to Sustain River Ecosystems*. Ecological Applications, 2006. **16**(4): p. 1311-1318.
7. Avery, S., *Lake Turkana & the Lower Omo: Hydrological Impacts of Major Dam & Irrigation Developments*, 2012, African Studies Centre, University of Oxford.
8. The Oakland Institute, *Omo: Local Tribes under Threat*, February 2013, The Oakland Institute: Oakland, CA.
9. Human Rights Watch, *Satellite Imagery Analysis: Monitoring Ethiopian Agricultural Development on the Omo River (Sugar Block 1) : 2011-2012*. Web.
10. Hurd, W., *Understanding Land Investment Deals in Africa : Ignoring Abuse in Ethiopia DFID and USAID in the Lower Omo Valley*, July 2013, The Oakland Institute.
11. Carr, C.J., *Humanitarian Catastrophe and Regional Armed Conflict Brewing in the Transborder Region of Ethiopia, Kenya and South Sudan: The Proposed Gibe III Dam in Ethiopia*, 2012, Africa Resources Working Group (ARWG).
12. Turton, D. *The Downstream Impact*. 2010. School of Oriental and African Studies, University of London.
13. Mid-Day International Consulting engineers, *Gibe III Hydroelectric Project : Environmental and Social Management Plan*, January 2009, EEPSCO Ethiopian Electric Power Corporation.
14. Africa Resources Working group, *A Commentary on the Environmental, Socioeconomic and Human Rights Impacts of the Proposed Gibe III Dam in the Lower Omo River Basin of Ethiopia*, January, 2009, Africa Resources Working Group (ARWG).
15. Avery, S., *Hydrological Impacts of Ethiopia's Omo Basin on Kenya's Lake Turkana Water Levels & Fisheries*, 2010, African Development Bank.
16. Kolding, J., *A summary of Lake Turkana: an ever-changing mixed environment*. Mitt. Internat. Verein. Limnol., 1992. **23**: p. 25-35.
17. Johnston, L., *USAID Kenya trip report June 18 – July 7, 2010*, 2010. USAID/Washington, EGAT/ESP.