

Table 1 Populations that stand to be most affected by developments in the Lower Omo Valley and Lake Turkana environs, based on most recent census data for relevant districts (Ethiopia) and counties (Kenya) (Central Statistical Agency 2008, 2011; Kenya National Bureau of Statistics 2009). Given immigration into the region and high growth rates, these figures are conservative

	District (Ethiopia) or County (Kenya)	Area (sq km)	Latest census population
Ethiopia	Selamago	4450	27 866
	Nyangatom	2649	17 640
	Dásanach	2102	52 708
Kenya	Turkana	71 598	855 399
Total		80 799	953 613

projects in the region. The network is an international consortium of social and environmental scientists researching the impacts of hydrological, agricultural, and economic change on the societies and ecosystems of the Omo-Turkana Basin, the Omo-Turkana Research Network (OTuRN, <https://www.canr.msu.edu/oturn/>). Workshop participants were selected from the network by Hodbod and Stevenson to ensure representation across disciplines (in natural and social sciences and humanities) and of the presumed critical elements of the social-ecological system, i.e., hydrology, water quality, ecosystem services, wildlife ecology, food security, political science, and livelihoods. The participants were 65% male and 35% female; represented multiple levels of seniority, from professors to PhD candidates; and were from academic institutions in five countries [Kenya (5), UK (5), Germany (4), Ethiopia (2), and USA (1)]. The rapid pace of developments in the region means that graduate students make up a substantial proportion of those currently carrying out relevant field studies (~ 40%).

Steps 4 and 5 followed an expert elicitation process based on the qualitative, in-person elements of the expert elicitation process (Ayyub 2001; Swor 2011) and involved an iterative process of mapping the elements of the SES in order to create a final model achieved by consensus and presented in Fig. 2.

Steps 6 and 7 began in Nairobi, where experts presented their own findings on how the technological developments were creating change in the specific element of the SES their research studied. The elements on which we focus in this paper fulfill the following criteria: (a) change has already begun to occur, (b) we have data to begin to analyze, and (c) these changes pose the most severe potential impacts on livelihoods. Appendix S1 outlines the disciplinary expertise of the workshop participants and authors, and the datasets used by each to inform the expert

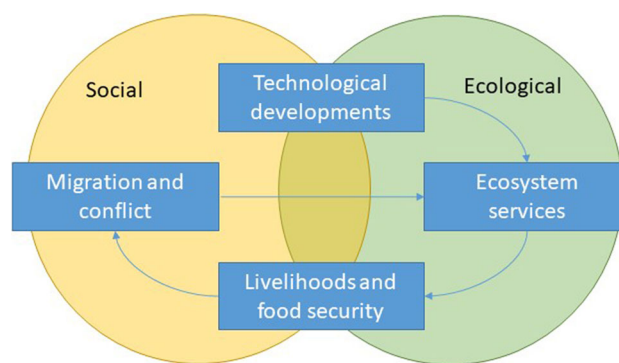


Fig. 2 Conceptual model of the key elements within the Omo-Turkana Basin SES. Technological developments refers to dam construction and large-scale irrigated agriculture. Elements affected within the ecological subsystem include flood regime, lake levels, biodiversity, and irrigation potential

elicitation and scoping review. There are elements of the SES where data do not exist—these are highlighted in the conclusion. Given that Gibe III is the most significant major technological development in the region, the majority of data relate to this intervention.

Each participant followed a scoping review methodology to create a written summary of SES impacts, based on both published and unpublished data. Given the rapid nature of changes in the region, and the early stage of career of those who have carried out timely and relevant fieldwork (~40% of our participants being graduate students), a considerable proportion of the data are unpublished. Scoping reviews aim to map the existing literature in a field to examine the extent and nature of research activity in that area; to determine the value and potential scope of undertaking a full systematic review; to summarize and disseminate research findings; and to identify research gaps in the existing literature (Arksey and O'Malley 2005; Levac et al. 2010; Pham et al. 2014). While we were not planning the review to be a precursor to a systematic review, we aimed to achieve the other three goals: to demonstrate the extent of existing research, to share research findings, and to expose gaps in the literature. Once written, the individual elicitations were compiled by Hodbod and Stevenson and then the paper draft was sent for iterative editing by the authors until there was consensus on the presentation of data and the equity analysis presented within the discussion. The results section is organized as shown in Fig. 2. After describing the intervention and study context, we present data on impacts on the ecosystem, and impacts on social systems. The final sections summarize these findings in light of a social-ecological systems framing, and appraise the distribution of costs and benefits among stakeholders.