

Chapter 6

RESILIENCE DYNAMICS IN A RAPIDLY CHANGING SOCIAL-ECOLOGICAL SYSTEM: SHIFTING INEQUALITIES IN ETHIOPIA'S LOWER OMO VALLEY

Jennifer Hodbod, Department of Community Sustainability, Michigan State University

Edward G. J. Stevenson, Department of Anthropology, Durham University

Mercy Fekadu Mulugeta, Institute for Peace and Security Studies, Addis Ababa University



Photo taken by Jennifer Hodbod in Nyangatom woreda, July 2018. I have the right to reproduce this photo.

KEY MESSAGES

- Local communities utilized diverse forms of livelihood and broad social networks to adapt to new regimes and maintain distinctive cultural identities and effective sovereignty over their territories.
- Regime shifts have been initiated by ‘fast’ decisions by external actors rather than ‘slow’ internal dynamics. Such ‘fast’ decisions are more difficult for traditional livelihoods and social networks to cope with.
- The most recent regime shift, associated with the Gibe III dam, has led to a landscape-scale transformation that has compromised the resilience of communities downstream of the dam.
- While none of the regimes the Lower Omo has experienced have been free of inequalities, the current regime is characterized by new and pernicious forms of inequality.
- To avoid a total collapse of the current social-ecological system, agro-pastoralist communities must be supported in adapting their livelihoods to cope with changing environmental conditions.

ABSTRACT

We assess changes in the structure and function of the Lower Omo social-ecological system over time using a social-ecological resilience framing. The objective is to demonstrate the dynamics of the system and equity dimensions within past regimes, to give context to the current regime and its equity challenges. Our analysis shows there have been three major regime shifts in the Lower Omo in the past 150 years, each initiated by relatively rapid actions by external actors, usually the state. Local communities have utilized diverse forms of livelihood and broad social networks to adapt to new regimes and maintain distinctive cultural identities and effective sovereignty over their territories. However, the most recent regime shift, associated with the Gibe III dam, has led to a landscape-scale transformation that has potentially pushed communities downstream of the dam to the limits of their resilience.

LIST OF ACRONYMS

| | |
|-------|---------------------------------|
| ES: | Ecosystem service |
| KSDP: | Kuraz Sugar Development Project |
| NGO: | Non-governmental organization |
| NPs: | National Parks |
| SES: | Social-ecological system |

BIO SKETCHES

Jennifer Hodbod is an Assistant Professor in the Department of Community Sustainability, Michigan State University. She is an internationally known scholar in the resilience of food systems, particularly pastoralist systems, and has authored 17 papers in this area. An environmental social scientist, she has ten years' experience in Ethiopia and is co-lead of Omo-Turkana Research Network (OTuRN), the first multi-disciplinary network of researchers active in the Omo-Turkana Basin.

Edward G. J. Stevenson is an Assistant Professor of Anthropology at Durham University. His research focuses on resource access and human well-being. He uses mixed methods and epistemologies to investigate inequities in access to water and food, with a focus on Ethiopia and Kenya. He is co-lead of the Omo-Turkana Research Network (OTuRN) and editor of Mursi Online.

Mercy Fekadu Mulugeta is an Assistant Professor at the Institute for Peace and Security Studies (IPSS) of Addis Ababa University. She has extensive experience in security, borderland governance, parliaments, and e-democracy. She has authored 15 articles and policy pieces. She has conducted research for national institutions including the House of People's Representatives and the Human Rights Commission in Ethiopia and the East African Community and the African Union, regionally.

INTRODUCTION

In the last two decades, resilience has become a popular term in academic, public, and policy discourses. While the term is interpreted in a variety of ways, a commonality across diverse definitions is that resilient systems persist in the face of disturbance (Biggs et al. 2015). In this chapter, we treat resilience as the capacity of a system to respond to change through adaptation or transformation while maintaining structure, function, and identity (Walker et al. 2004), as per the social-ecological systems (SES) literature.

Resilience is a useful concept because it highlights the dynamic nature of SES, complex systems in which humans are a part of nature (Berkes & Folke 1998). A resilience framing orients us to the ubiquity of shocks and disturbances (whether social, economic, or environmental) and the ways such disturbance may not only destroy but also spur renewal – whether through small and adaptive or large and transformative steps – towards more desirable and resilient futures (Folke et al. 2010). In this chapter, we consider the shocks that have affected the Lower Omo circa 1880-2020 – a period which has seen major social-ecological transitions, each of which has altered the capacity of actors to respond to the next shock. In brief, we ask: What contributed to resilience in the Lower Omo over this period, and what eroded it? How did resilience differ across different groups? And how can resilience be better incorporated into policy, planning, and management going forward?

To explore a SES, the chapter is structured around three questions. We first define the system's spatial and temporal boundaries, i.e., answer the question, *resilience of what?* We must then understand what shocks (or key changes) the system has been subject to, and the impacts on structure and function, i.e., *resilience to what?* As human groups may compete for access to ecosystem services, we must simultaneously ask *resilience for whom?* That is, which actors' or groups' interests are considered when deciding whether the criteria for resilience are being met? Examining the differentiated impacts of these shocks across social groups within the system allows us to explore equity dynamics over time.

METHODS

Our approach to answering these questions draws on literature from history, anthropology, and environmental sciences as well as insights from our own research in the Lower Omo (Ethiopia). Literature included scientific articles, books, local development plans, and gray literature regarding the social and environmental history of the Lower Omo. The principal primary data utilized in the chapter comes from the project, “Shifting In/equality Dynamics in Ethiopia: from Research to Application” (SIDERA). SIDERA focused on Nyangatom woreda (district) on Ethiopia's southern border with Kenya (Figure 1) and studied ecosystem services, livelihoods, wealth, food security, and conflict through focus groups, interviews, and ethnographic observation, as well as remote sensing. We place our findings in the context of deeper historical analyses for the Lower Omo, using qualitative analysis through a complex systems approach to understand the historical structure and function of the Lower Omo.

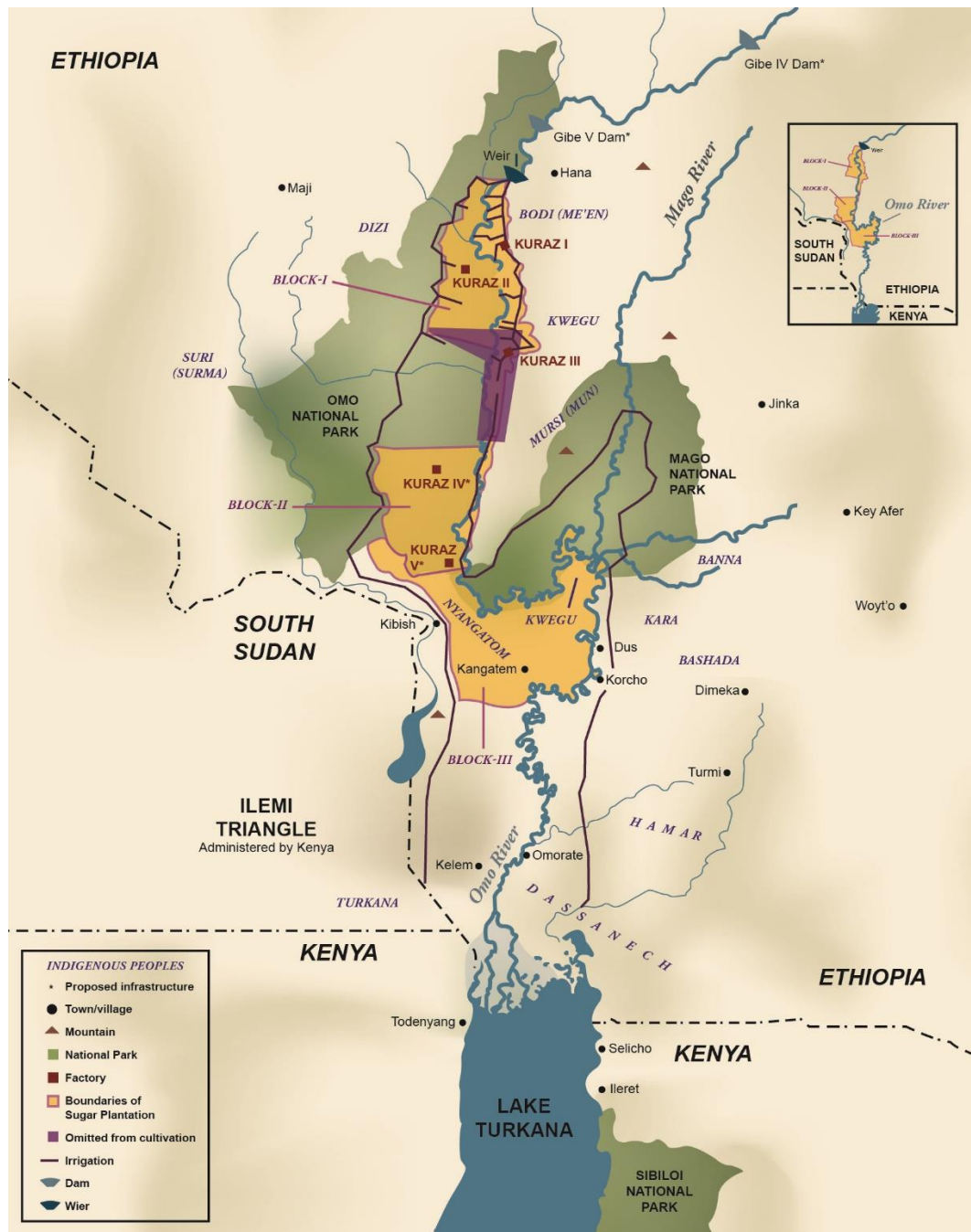


Figure 1. Situation of the Lower Omo within the Omo-Turkana Basin (Hodhod et al. 2019a). Plans for the Gibe IV and V have now been replaced by the Koysha Dam, located between the two.

Some of the terminology used in this chapter merits explanation. *Structure* refers to the ways that components within a system are connected. Both human subsystems and ecosystems have their own (interlinked) structures reflecting the elements they are made up of – respectively, the social networks of human actors and the organization of biotic and abiotic components of the ecosystem. The elements in the human subsystem and ecosystem carry out *functions* – processes or roles that result in a particular outcome. As schematized in Figure 2, the human subsystem (e.g., politico-territorial groups, cultures) engage in *actions* (e.g., agriculture, construction of hydroelectric dams) in the ecosystem (e.g., the Lower Omo). Humans rely on ecosystem functions to support *ecosystem*

services (ES) – the services humans receive from nature (see Chapter 5; Berkes & Folke 1998). Ecosystem services can provide benefits directly to humans e.g., food production (a provisioning ES) and a sense of place (a cultural ES – the non-material benefits people obtain from nature). The ecosystem also provides other functions through regulating and supporting ES such as regulating the quality of water or providing flood control (Berkes & Folke 1998).

The combination of structure and function create an identity for the system – a *regime* that characterizes a period of stability (Biggs et al. 2018). Regimes are punctuated by periods or events that change the structure and function of the SES with substantive impacts on the suite of ES provided, i.e., *regime shifts*, which indicate resilience was insufficient to maintain the structure and function (Biggs et al. 2018). By studying how structure, function, and identity change over time we can identify different regimes, demarcated by regime shifts.

An SES demonstrates resilience if, when faced with a shock or disturbance, it can rely on learning and self-organization to change and adapt while maintaining structure and function (Gunderson & Holling 2001). If, when faced with a shock, the actors in the system choose to change function entirely to ensure their survival, this also demonstrates resilience achieved through transformation (Walker et al. 2004). In contrast, a system demonstrates a lack of resilience if when faced with a shock its function and/or structure collapse, leading to a regime shift (Gunderson & Holling 2001). For example, when faced with drought, agro-pastoralist households may change their planting schedule (maintaining function through adaptation, thus resilient) or may migrate for alternate work (changing function through transformation, thus resilient). If, when faced with drought, households are left without any harvest and starve or become dependent on food aid this indicates a collapse in function and lack of resilience. There are also different implications for resilience at different scales – while households may maintain function by migrating, the migration may change overall ecosystem function by changing the actions.

We conceive of the Lower Omo as an SES with a distinctive – albeit dynamic – structure and function. We use a historical analysis approach to identify changes in structure and function (i.e., regimes and regime shifts) and thus resilience dynamics over time. We must note that these are not linked to quantifiable trends in individual components, but the identity as informed by all elements of the SES and their interaction. E.g., a collapse in crop production due to a drought does not necessarily indicate a regime shift at the system scale unless it is followed by a long-term change in land use and thus the societies dependent on it. We identify elements that have been central to these resilience dynamics to understand what has enabled and constrained resilience in the region (as understood through adaptation, transformation, or neither). The result is an analysis that identifies historical drivers of system change and the key elements for system functioning, which can be used to inform policy for supporting resilience in the future.

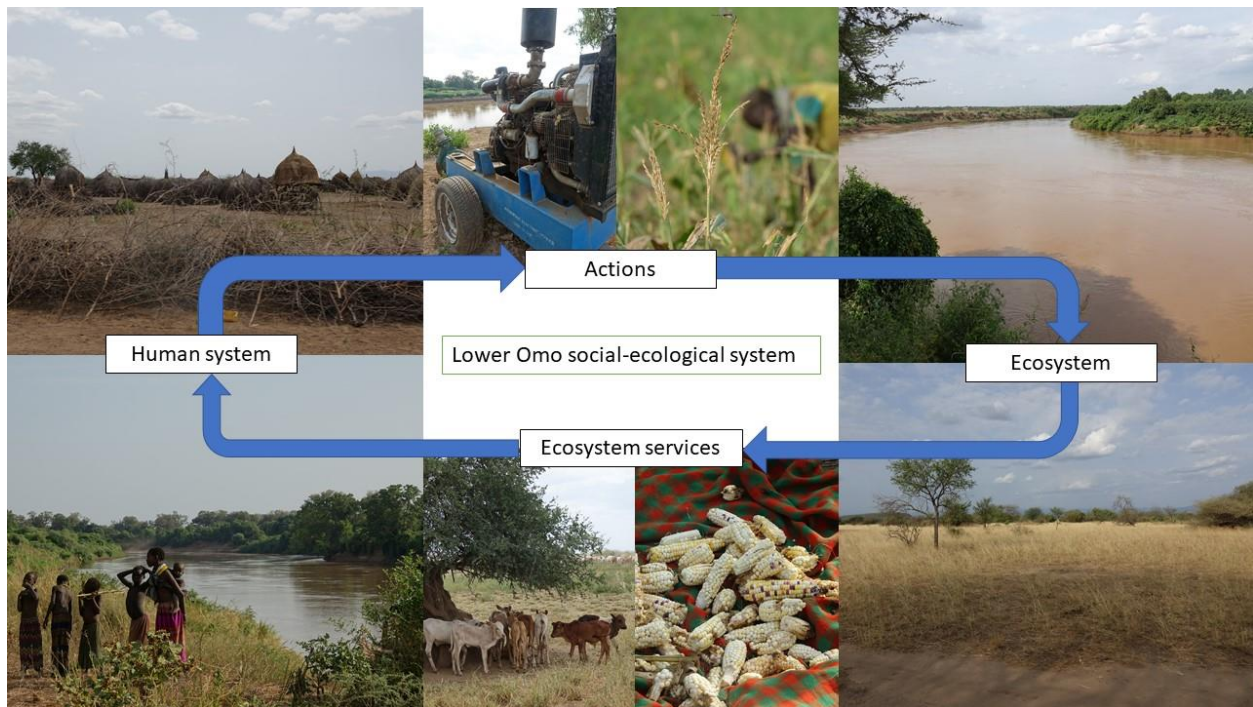


Figure 2. Conceptual model of the Lower Omo social-ecological system showing the interconnections between the human subsystem, the actions taken by humans (e.g., agriculture) in the ecosystem, and the ecosystem services thus received (e.g., food production). Photos taken by Jennifer Hodbod in Nyangatom woreda, July 2018. I have the right to reproduce these photos.

RESILIENCE OF WHAT? THE LOWER OMO SOCIAL-ECOLOGICAL SYSTEM

The Lower Omo is the lowland portion of the Omo Valley in Ethiopia, dominated by the Omo River and where the river meanders towards its terminus in Lake Turkana in Kenya (Figure 1). The ecosystem is characterized by a climate that varies from semi-arid to arid, contrasting markedly with the cooler and wetter adjacent highlands (see Chapter 5; Jillo et al. 2017).

To fully answer ‘resilience of what?’ requires outlining the structure of the human subsystem and functions associated with different social groups. The Lower Omo is home to at least ten politico-territorial groups¹ totaling approximately 200,000 people (Hodbod et al. 2019a; Turton 2010), with distinct identities and histories but a common dependence on the riverine environment for their livelihoods. These groups practice diverse livelihood strategies, including arable agriculture, pastoralism, and fishing (see Chapter 4; Carr 2017). Especially important to the resilience of the people of the Lower Omo, particularly in the drier southern part of the basin, was the practice of flood recession agriculture (Turton 2010). After the annual flood receded, communities would plant subsistence crops (sorghum, maize, cow peas, pumpkin, watermelon) in the rich silt left along the riverbanks (Matsuda 1996; Hodbod et al. 2019b). Until the regular flooding of the Omo was ended by the construction of the Gibe III dam (discussed further below), flood recession agriculture

¹ The term politico-territorial group refers to a human community sharing a sense of common allegiance and collectively identifying with a particular territory. The term is more accurate in this context than the more familiar ‘ethno-linguistic group’ because political identity does not correspond neatly either to spoken language or to self-described ethnicity (see Turton 2002; Girke 2018).

was the primary source of food for many groups, including the Kara (Girke 2013), Mursi (Turton 1987), and Nyangatom (Pertaub et al. 2019).

In addition to flood recession agriculture, grasslands and shrublands recharged by the river's flood are used for grazing, riverine forest is used for collecting wild foods, and fishing is carried out (Hodbod et al. 2019a; Jillo et al. 2017; Pertaub & Stevenson 2019). All politico-territorial groups of the region depend on livestock, albeit to different degrees—e.g., the Mursi keep relatively large herds of cattle, whereas the Kwegu keep sheep and goats but are historically more reliant on fishing (Hodbod et al. 2019a). For most of the region's indigenous peoples, wildlife and wild plants (e.g., large ungulates, wild greens) are important supplements to the staple diets of sorghum, maize, and dairy products, while honey production is an additional source of calories and income (Buffavand 2016). Within communities, extended families allocate labor to a diversity of livelihood strategies to maximize access to both animals and crops. For example, the Bodi divide family labor between herding camps and cultivation sites (Fukui 2001). Communities also exploit seasonally fluctuating resources via diverse social networks and mobility, to maintain complex social and material exchange between politico-territorial groups specializing in other livelihoods (Carr 2017).

In 2015 the sluice gates of the Gilgel-Gibe III hydroelectric dam (hereafter referred to as Gibe III) closed and created a new ecological boundary between the region upstream and downstream, which constituted a more regulated SES. Damming of the river was a massive disturbance to the SES of the Lower Omo; it represents a stark intervention that changes the structure and function of the ecosystem, and thus the ecosystem services available from it. Below we explore the impacts of the dam within the context of a longer series of historical shocks in the region.

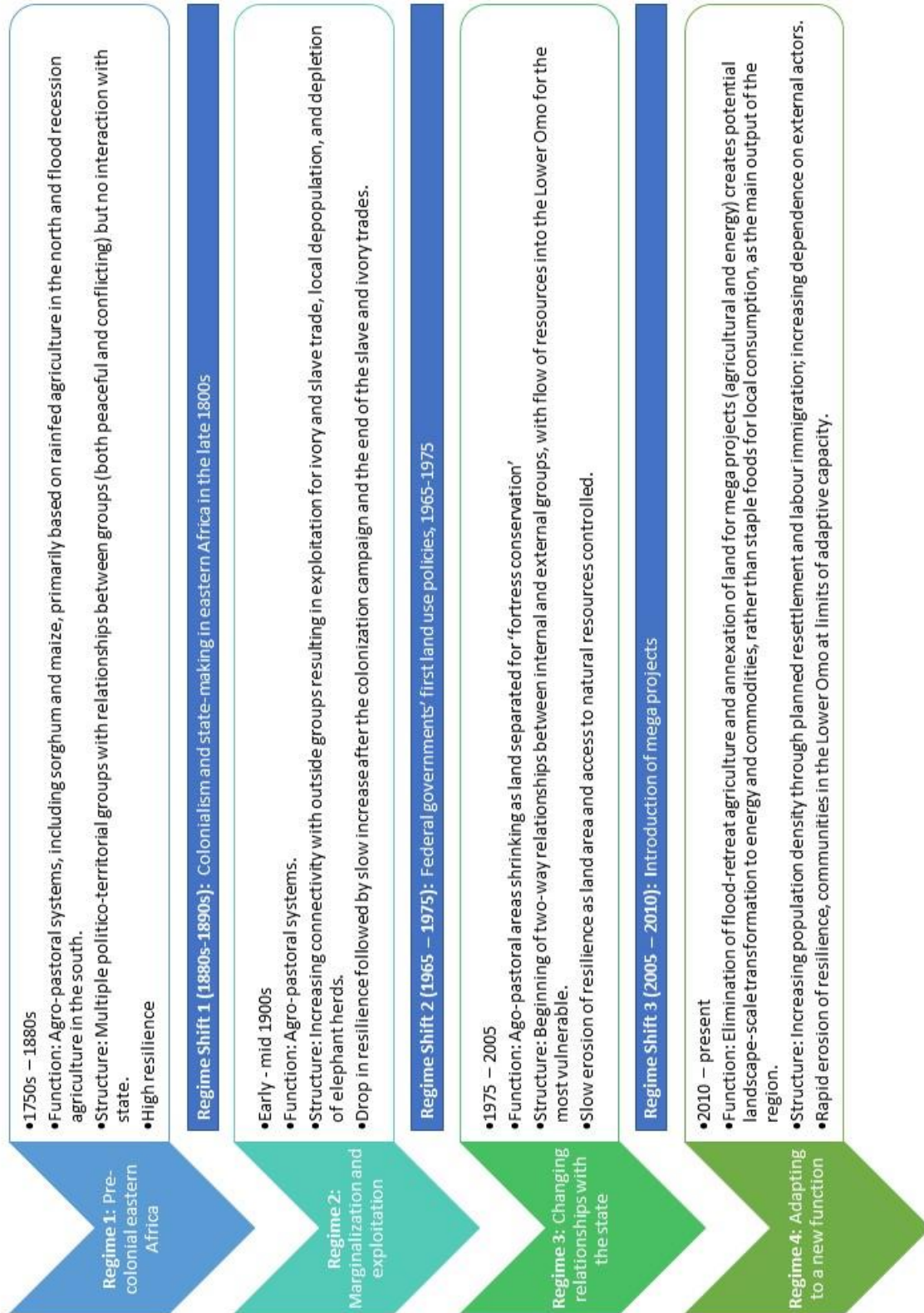
RESILIENCE TO WHAT, FOR WHOM?

Overview

A social-ecological resilience framing alerts us to the complex relations between humans, other organisms, and the environment, and the dynamics of these relations over time. To answer 'resilience to what, for whom', we explore what shocks the system underwent before Gibe III, and how people weathered them. 'Resilience for whom?' is a pressing question when we consider changes in the SES because it is not sufficient to build a resilient system if the system does not deliver the ecosystem services in an equitable way. Answering this question requires integrating ideas from political ecology, where conflicts over resources and claims to place are recognized as ubiquitous, and ecosystem change routinely generates 'winners and losers' (O'Brien and Leichenko 2003). Or, as Martinez-Alier (2004) argues, rather than 'victory' or 'defeat' we might think of ecosystem changes as involving theft and restitution.

In the following section we look at transitions in the Lower Omo before the Gibe III dam was built, to frame the enquiry in historical conjuncture and identify three major regime shifts separating four SES regimes (Figure 3). By understanding how the system responded to change in the past, we may better understand current capacity to respond to change and what future trajectories towards both resilient and desirable states might look like.

Figure 3. There have been three major regime shifts in the Lower Omo in recent history.



Regime 1: Pre-colonial eastern Africa

Evidence for pre-colonial society and environments in the Lower Omo come from oral history and environmental archaeology. Pollen assays from hyrax middens in the Lower Omo attest to a largely homogenous woodland and grassland plant assemblage over the past two millennia, with evidence of sorghum and maize cultivation since 1750 (Graciela-Romera et al. 2010), consistent with ethnohistorical evidence for the continuity of agropastoral systems over the past two centuries. The earliest written reports of the region, from 19th century travelers, mention several ethnonyms that correspond with those used by the current inhabitants of the region, e.g., the Kara and Daasanech (also known as Reshiat), both recorded by Donaldson Smith in 1895 (Bassi 2011). The livelihood systems practiced in the period before historical records begin are likely to have been broadly similar to those attested by 20th century ethnographers. As in much of pre-colonial Africa, political order was maintained through plural governance structures developed over generations of cultural and economic exchange. These governance structures, predicated on ideals of egalitarianism and autonomy, may themselves be interpreted as adaptations to predation by more powerful outside groups. Rather than being people who never knew any other masters than themselves, the peoples of the Lower Omo deliberately cultivated a political ethos, and habits of mobility, that helped them resist incorporation by the state or by neighboring powers (González-Ruibal 2014). Their success in this regard is attested by the absence of any historical record of the integration of this region by a state until the campaigns of Ethiopian Emperor Menelik II in 1898.

Regime Shift 1: Colonialism and state-making in eastern Africa in the late 1800s

The military campaigns that established the current boundaries in the Horn of Africa had profound effects on access to resources for agro-pastoralist communities, especially water bodies and grazing lands. The shock of colonial incursions came quickly after a rinderpest epizoonotic disease that severely reduced livestock populations (Phoofolo 1993). While indigenous governance structures did not cease to function, the combination of disease and the arrival of colonial powers placed significant constraints on local actors. Much of the Lower Omo was formally incorporated in the Ethiopian state, while the Turkana, the Toposa, and other clusters of the Karamojong came under the British colony and protectorate (Markakis 2011). In Kenya, the period during which the Turkana were incorporated in the colonial state were recalled as times of hunger and flight, referred to in oral history as ‘the scattering time’ (Lamphear 1992). For the Nyangatom in Ethiopia, the period is similarly referred to as *lopetar*, literally ‘dispersion’ (Bassi 2011). The arrival of outsiders in possession of superior weaponry and bent on extracting wealth made the late 19th and early 20th centuries one of the key hinge-points in the region’s history (Chew 2012; Jenkins 1998).

Regime 2: Marginalization and exploitation, late 1800s-mid 1900s

The establishment of the Ethiopian empire under Menelik and British colonial outposts in Kenya created structures through which the resources of the Lower Omo were extracted, for exchange on domestic and international markets. This process constituted in one sense a broadening of social networks, albeit networks established by force and built largely on one-way flows of resources out of the region. The Ethiopian provincial town of Maji, on the western side of the Omo, emerged as a major node in the East African ivory trade at the turn of the twentieth century, attractive as Sudan, Uganda, and British East Africa banned the export of ivory from immature or female elephants, whereas no such restriction was in place in Ethiopia (Garretson 1986). Hunters operating out of

Maji ranged as far as the southern tip of Lake Turkana, and as far north as Bor in Sudan (ibid.). Military incursions and the use of firearms in hunting also catalyzed an increasing spread of arms across the region. Ethiopian hunters and soldiers introduced small arms to local communities through exchanges for ivory, lion skins, and manes; in some cases, taking cattle and people hostage to compel locals to cooperate in trade (Sobania 1994).

While Emperor Menelik justified acquiring firearms from foreign powers for the abolition of slavery (Dilebo 1974), the same arms were used both to incorporate formerly independent territories in his empire and the slave trade. The slave trade continued throughout his reign and well beyond the first quarter of the 20th century (Ferryhough 1994) as “south-western Ethiopia became a hunting ground for humans as well as animals” (Bahru 2001:94). In a single slaving expedition in 1912 led by Lij Iyasu (successor to Menelik), 40,000 Dizi were captured and half reported to have died on the way to Addis Ababa (Bahru 2001). While trade in ivory declined after 1914, the trade in slaves actually increased (Garretson 1986).

In summary, during the period of colonization the function of the Lower Omo ecosystem remained largely consistent with the precolonial period – the common actions and ecosystem services continued, such as provisioning ES related to agriculture and pastoralism. This allowed a continuation of agro-pastoralist livelihoods for those communities whose labor reserves had not been critically depleted. However, the ES were accessed by a broader range of actors, both inside and outside of the Lower Omo, with impacts on the ecosystem (e.g., reduced biodiversity given an increase of ivory exports). The interaction with external actors, declining only after the end of the slave trade in the 1940s, had profound social impacts. Subsequently the Lower Omo resumed a marginal position within the Ethiopian political economy, and the arid climate was represented as making “the cost of integrating the lowlands prohibitive, because it could not be recovered by taxation or profits from trade” (Markakis 2011: 10). The framing of the Lower Omo as a frontier region and a site of extraction would, however, set precedents for future interventions by the state.

Regime Shift 2: Federal governments’ first land use policies, 1965-79

The mid-1960s to mid-1970s ushered in socialist governments in eastern Africa – in Ethiopia through a revolution that overthrew Emperor Haile-Selassie – and there were attempts to establish a professional civil service and structures of local government. Government-led economic reforms and state-building approaches introduced new initiatives in the Lower Omo, most notably, the development of the Omo and Mago National Parks (NPs), inaugurated in 1966 and 1979 respectively (Turton 1987). The parks operated as “fortress conservation” zones, from which humans should be largely excluded (Adams 2004). As Turton (2011) has argued, the NPs promoted the fiction that the land was unoccupied wilderness and failed to recognize the anthropogenic nature of the SES. Those who entered the park were treated as intruders or poachers, which constrained the ability of local communities and their cattle to move freely and access traditional grazing and hunting sites (Demeke 2003).

The beginning of the 1970s also saw widespread cholera outbreaks in the Lower Omo (Mugoya et al. 2008). Although the region’s governments provided only a limited medical response, the Derg administration, for the first time, provided food aid to local communities through new systems of local governance (Mercy 2016).

Regime 3: Changing relationships with the state, 1980 – 2005

The 1970s and 1980s saw the first distribution of seeds by government agents, as part of a new policy of encouraging sedentary farming. Provision of food aid and agricultural outreach marked a change from an exploitative relationship between the Ethiopian government and local peoples, to one of solidarity. The 1980s and 1990s saw some construction of basic health facilities and schools and provision of veterinary services, led by local government and missions such as the Swedish Church Mission in Nyangatom (Mercy 2016). At the same time, however, the Derg regime and its successor (the Ethiopian People’s Revolutionary Democratic Front) pursued a pastoral sedentarization policy, effectively discouraging and delegitimizing an important livelihood for the peoples of the Lower Omo (Fratkin 2014). Simultaneously, as different groups successively gained access to automatic rifles via trade connections in Sudan, conflicts escalated between neighboring groups, challenging pastoralists. In one of the better reported episodes, in 1987 a Nyangatom war party attacked the Mursi, leaving between 500 and 1,000 dead (Turton 1991). While the last years of the twentieth century saw substantial new involvement by the Ethiopian state in the affairs of the Lower Omo, this was limited to areas where government projects or NGOs were active, and the state did not play a major role in arbitration between communities over conflicts. Nor (despite its declared policies of sedentarization) did it interfere significantly with the local agro-pastoralist economy.

Regime Shift 3: Introduction of mega projects, 2005-2010

In the beginning of the twenty-first century, the Lower Omo experienced fundamental and rapid changes in resource use, population dynamics, and the political and economic ties of local communities to the state (Hodbod et al. 2019a). These changes stem from mega projects – large-scale interventions that have intentionally, rapidly, and profoundly transformed the landscape in very visible ways, through coordinated applications of capital and state power (Gellert & Lynch 2003). The most conspicuous of these is the Gibe III dam, which began construction in 2006 and filling its reservoir in 2015. The Gibe III has the potential to increase the total installed electricity generating capacity in Ethiopia by 85% while allowing Ethiopia to export electricity to its neighbors, including Kenya, Sudan, and Djibouti (Stevenson 2018). A transnational venture – commissioned by the Ethiopian government, designed by Italian engineers, and funded in part by a Chinese bank – the Gibe III expanded the activities of external actors to boost hydroelectric capacity in line with national policy (Growth and Transformation Plan (MOFED 2010)).

The Gibe III dam has also made possible a further mega project in the Lower Omo—the Kuraz Sugar Development Project (KSDP), a state-led, large-scale sugarcane cultivation and processing scheme initially allocated 175,000 hectares (Kamski 2016). The Ethiopian government aimed for sugar and sugar-related industries to increase sugar production from 17.7 million to 42.5 million tons and “substantially contribute to export diversification and foreign exchange earnings” (MOFED 2010:28). These projects, while moving more slowly than anticipated and now covering only 100,000 hectares² (Kamski 2019), have been accompanied by infrastructure and livelihood initiatives that are significantly changing the structure of the human subsystem. Road construction and transport links increase flows of resources in and out of the region. Irrigation canals were constructed to supply water to sugarcane estates, changing the flow of the river. Resettlement

² Kuraz IV (Figure 1) will no longer be cultivated.

schemes have led unprecedented numbers of outsiders to settle in the Lower Omo (notably from Konso, resettled in Salamago), at the same time as labor shortages in the southern highlands have attracted migrants from Wolaita to seek work on the plantations and infrastructure projects (Kamski 2016).

In summary, the introduction of mega projects led to SES-wide functional and structural changes, effectively redrawing the boundaries of the Lower Omo ecosystem. This precipitated a regime shift marked by a change in the balance of ES availability and access across the Lower Omo, which brings into sharp focus the different groups whose interests we need to consider in the new regime.

Regime 4: Adapting to a new function, 2010 – present

The Gibe III dam profoundly affected the function of the Lower Omo ecosystem and the livelihoods of communities reliant on the Omo River and Lake Turkana for provision of ES, but the new regime's identity is still in flux as communities adapt. The dam reduced peak flows and flooding and increased control of both water quality and quantity e.g., providing the capacity to avert floods (regulating ES). However, the hydrological variability that characterized the pre-dam regime was a positive feature of the ecosystem according to the indigenous inhabitants of the Lower Omo. Communities relied upon the annual flood to support recession agriculture on riverbanks and to replenish grasslands and riverine forest. As a result of the changing function in the ecosystem, communities in Nyangatom are reporting decreased quality of riverine forest and disappearance of shrubland, which in turn reduces the provision of wild foodstuffs (the collection of which is an important coping strategy in times of food insecurity) and reduces the availability of raw materials for fuel, fodder, and medicinal resources (Hodbod et al. 2019b). Similarly, changes in water availability and land access for dry season grazing due to the changing hydrological dynamics in the basin constrain the rearing of livestock in the Lower Omo, reducing the provisioning ES related to animal products (Hodbod et al. 2019a). Early results suggest that reductions in nutrient inflow are also negatively influencing productivity in Lake Turkana and yields in the productive indigenous fisheries are predicted to decline but estimates vary between 10% (Chapter 5) and by over two thirds (Gownaris et al. 2015, Gownaris et al. 2016). The regulation of the Omo jeopardizes these livelihood practices because of both the change in water availability and nutrient flows, reducing soil fertility along the river and the primary productivity of Lake Turkana (Hodbod et al. 2019a). These practices have been effectively traded for another provisioning ES, the production of electricity.

As with all mega-projects, these trade-offs are intentional. The Government of Ethiopia is directing a landscape-scale transformation in function in which electricity and commodities such as sugarcane and cotton become the main output of the region, rather than staple foods such as sorghum for local consumption. The mega projects are also intended to support infrastructure development (roads, telecoms, irrigation), new villages (with schools, clinics, veterinary centers, and mill houses) (Stevenson & Buffavand 2018). As outlined below, the policies of the Ethiopian government are directed towards the replacement of traditional livelihoods with wage labor:

“[A]t the end of the day we are not really appreciating pastoralists remaining as they are. We have to improve their livelihood by creating job opportunities. Pastoralism, as it is, is not sustainable. We want to change the environment.” Abera Deressa, former Minister of State in the Ministry of Agriculture and Rural Development (Butler 2010)

The transformation is intended to create a new, resilient landscape-scale regime in the Lower Omo, supported by reduced fluctuation in water availability, but it may simultaneously jeopardize the resilience of communities within the region. Climate projections for the region show that rainfall is likely to become more variable, and irrigation may be critical in supporting provision of water in the future (Jury and Funk 2013). While provisioning ES may increase overall if irrigation supports commodity crop production reaching its intended levels, thus far there has been a reduction in the provisioning ES that local communities are dependent on. The loss of flood recession crop production means communities without regular access to irrigation (the majority; Stevenson & Buffavand 2016) are dependent on rain-fed cultivation and alternate food sources from wild fruits, bushmeat, and fish (Hodbod et al. 2019b; Pertaub & Stevenson 2019). However, many of these are also becoming increasingly scarce due to degradation of and thus reduction in traditional land covers such as grassland, shrubland and wetland, and an increase in bare ground, likely due to unsustainable use of natural resources given increased population pressure on a shrinking resource base (Hodbod et al. 2019b). As a result, communities have reported losses in food security (Hodbod et al. 2019b; Stevenson & Buffavand 2018), livelihoods security (Getahun et al. 2020; Gownaris et al. 2015; Gownaris et al. 2016), and thus wealth (Fana 2019; Fana 2020). Promised benefits to resettled communities have been poorly distributed and are often insufficient (Stevenson & Buffavand 2018). As a result, food aid and relief has become more relied upon, commonly through the Productive Safety Net Program (Hodbod et al. 2019b). As the pace of extraction of resources from the region has increased, such flows of resources coming into the region have become more important for the survival of the region’s peoples. But increased connectivity also brings some risks at the basin scale, from vulnerability to price shocks in global markets for the goods produced (electricity, sugar) and for migration in and out of the region.

Overall, regime shifts in the Lower Omo were precipitated by external actors entering to govern resources rather than internal social or ecological dynamics. Table 1 outlines the resulting factors that influence resilience as per resilience principles (Biggs et al. 2015). The increased connectivity can bring positives (i.e., infrastructure development) but has also brought a decrease in autonomy for communities. Most recently, the new regime has decreased the diversity of food production strategies, limiting self-organization which previous supported resilience of communities through adaptation (Folke et al. 2010), leaving food aid as the primary coping strategy.

Table 1. Factors that enhance and erode resilience in the Lower Omo.

| Factors enhancing resilience | Factors eroding resilience |
|--|---|
| <ul style="list-style-type: none"> • Increased connectivity with external actors (regime 3 and 4 – infrastructure, access to aid) • Diversity of coping strategies for food security (regimes 1-3) | <ul style="list-style-type: none"> • Increased connectivity with external actors (regime 2 and 4 – governed by external actors) <ul style="list-style-type: none"> ○ External governance decisions without adequate consultation or compensation ○ Eroding autonomy and lack of participation in governance • Loss of diversity in food production strategies (regime 4) |

While social drivers emerged as key within this historical analysis, in addition to these rapid, external interventions from national and international actors, the SES now also must contend with slower, internal changes stemming from degrading land, increasing population, and climate change. Issues of weather and population existed in the previous regime, but communities had sufficient adaptive capacity to maintain their livelihoods and the regime's identity through such events; the recent regime shift has reduced the adaptive capacity of communities.

EQUITY DIMENSIONS IN DIFFERENT REGIMES

In the final part of this chapter, we consider three themes in relation to equity over our historical analysis of the Lower Omo: state-society relations, the distribution of impacts between groups, and the challenges of identifying winners and losers.

State-society relations

The first pattern that emerges relates to state-society relations, and more particularly to within-group versus between-group inequities. One constant over the past century is that each politico-territorial group in the Lower Omo has maintained a sense of its own identity and relationship to place. Part of this identity stems from indigenous systems of legal and political decision-making, which (like all legal and political systems) condone or naturalize some kinds of inequality within-politico-territorial-group. For example, political leadership among the Mursi is exercised by age groups and individual elders who have achieved a position of influence through their oratorical skills and knowledge of precedent and tradition (Turton 1975). Group decisions are made not by individual figures in authority, but through a process of persuasion in an open forum, akin to a parliament. While this governance system is egalitarian in principle, women are excluded from such public speaking. While women may exercise considerable influence behind the scenes (Lydall 2004; Pertaub & Stevenson 2019), there is nevertheless a within-group inequity built into the governance system.

In recent regimes the state has captured an increasing share of juridical and political power, increasing federal bureaucracy upon indigenous governance processes and between-politico-territorial-group inequity. NPs created a new structure for top-down governance, albeit in the case of the Mago and Omo Parks one enacted without due process, i.e., without official gazetting in accordance with national law (Mursi Online 2020). The presumed benefactor of the NPs and agriculture projects were state actors, with relative wins compared to the local communities given their total control of the decision-making process and resulting financial resources. However, the slow integration into the state in the later 20th century created some flows of resources into the Mursi in the form of tourist dollars and employment of park guards (as opposed to the more exploitative relationships that preceded this). Arguably more far-reaching than the actual constraint on access to cultivation, grazing and hunting, was the denial of local sovereignty over the land itself – the clear message it sent that the land belonged to the state rather than to locals (Turton 1987).

In places where missionaries have a long-established presence, the combination of schooling, literacy, and conversions to Christianity provided cultural bridges between lowland and highland groups, the latter who dominate Ethiopian politics. Groups such as the Nyangatom (missionized

since the 1970s) have thereby exerted greater influence within the political space afforded them – succeeding in securing a woreda in 2006, thus formalizing their claims to the western banks of the Omo formerly occupied by the Kara (Girke 2013).

The introduction of mega projects, however, constitutes a purposeful transformation by the state, over which local groups were unable to exercise meaningful influence, no matter what their local influence. While provisioning ES and economic value are generated by the Gibe III and large-scale cultivation, present operations appear to produce value for federal and international actors and migrant laborers at the expense of livelihoods for indigenous communities (Hodbod et al. 2019a). Federal and private actors were afforded recognition in the design of the mega projects, not local communities and administrators. Although they were welcomed by some local elites, consultation was inadequate and did not incorporate the diversity either within or between groups (Yidneckachew 2015; Mercy et al. 2019b). The lack of recognition and meaningful consultation limits the likelihood that this landscape-scale transformation will create a desirable *and* resilient regime for communities within the Lower Omo. Historical analogies from the Awash Basin in Ethiopia show that decades later indigenous groups, resettled for dams and large-scale cultivation, remain marginalized with less secure livelihoods compared to new migrant populations (Hodbod et al. 2015; Hailu et al. 2018).

Uneven distribution of impacts between groups

The second theme focuses on the impacts of the major shocks in the Lower Omo, which have been unevenly distributed between politico-territorial groups. The geographic focus of the ivory and slave trades in the early 20th century most affected those around Maji (the Suri and Dizi, see northwest corner of Figure 1), who suffered vast and absolute losses; the groups further from Maji suffered less. The annexation of land for the NPs deprived those resident in the annexed areas of access to land and resulting livelihoods. In the case of the Mago and Omo NPs, the Mursi and Kwegu were most impacted as the NPs included most of their best agricultural and grazing land. However, there were also relative losses for the Suri, Nyangatom, Dizi, Me'en, Bodi, Hamar, Banna, and Aari who utilized the parks for hunting, herding, bee keeping, and cultivation (Mursi Online 2020). With respect to the losses resulting from the Gibe III and KSDP, the Kwegu have been most affected as the most river-dependent and the first to have their land taken for the KSDP in 2012, followed by the Bodi who also lost substantial lands to KSDP, both with poorly managed resettlement and compensation (Stevenson & Buffavand 2018). Predictably, the experience of land alienation was resisted, with Bodi and Mursi attacking workers on sugar plantations and vehicles on the roads through their territory. The Bodi, Mursi, and Suri have since been targeted by the state for 'disarmament' during an unlawful intimidation campaign marked by indiscriminate abuse and the killing of over 30 adults and children (CSE 2019). While groups further downstream have thus far escaped direct violence and land alienation, they too have suffered from the cessation of the annual flood of the Omo, on which they depended for staple crops, as yields from rainfed cultivation are far lower than those from flood recession cultivation. The absolute loss and resulting impact on food security depends on the degree of reliance on flood recession e.g., while the great majority of Mursi, Bodi, and Daasanach, and the entirety of the Kwegu and Kara relied directly on flood recession, only the riverine communities of the Nyangatom did.

Challenges of identifying winners and losers

The case of NPs also illustrates our third theme, namely that one group's loss may not necessarily be another's gain. As in the case of the Aral Sea, with which the Lower Omo has been compared (Stevenson 2018), it is possible that no group really wins – or that early gains are not sustained. Individuals may gain – for example from participation in the slave trade, or from sugar or hydroelectricity revenues – but once a market or system collapses it may be difficult to label any given group as a winner.

The temporal nature of equity outcomes is also important to consider when evaluating gains and losses. While the governments of Ethiopia and Kenya stand to gain considerably from energy mega projects, they are also exposing themselves to significant risks, as exemplified by the KSDP, which has already been significantly reduced in capacity and privatized given early financial losses (Mercy et al. 2019a). In summary, the mega projects established during Regime Shift 3 created inequities in Regime 4 based on massive expropriation of land without adequate compensation and increasing difficulty in accessing vital resources, including water, forage, and wild foods. These losses are only partially offset by new wage labor opportunities and resettlement schemes, which effectively deepen the dependency of formerly autonomous peoples on the state and corporations and reduce their resilience.

RESILIENCE IMPLICATIONS - CONCLUSIONS

In this chapter we have addressed two conceptually simple but practically challenging questions: What contributed to resilience in the Lower Omo over the past 270 years? And what led to regime shifts? The analysis provided here suggests that significant shifts in structure or function have repeatedly stemmed from decisions by external actors, often relatively rapid and recently from those in formal governance. From the pre-colonial period through the early 21st century, communities demonstrated resilience by maintaining their traditional livelihood activities through regime shifts 1 and 2, supported by adaptation. The diversity of their livelihoods provided flexibility – it allowed them to prioritize different livelihood strategies at different times of year based on the availability of ecosystem services and thus to share the risk of failure.

In the post-Gibe III regime, however, communities may have reached the limits of their adaptive capacity, 'maxing out' the coping strategies from diverse livelihoods and social networks that have served them historically, as demonstrated by increased food insecurity and reliance on food aid. On top of the consequences of the rapid changes that communities have faced based on decisions from external actors, the current regime also brings slow dynamics (climate change and population growth leading to environmental degradation) that communities no longer have the adaptive capacity to respond to. The risk is that for all communities downstream of the Gibe III, further shocks will precipitate another regime shift with even more grave implications.

Looking forward, two options to ameliorate community resilience, neither of them straightforward or without risks, are that communities transform out of agro-pastoralism or migrate to other areas that can support agro-pastoralism. For policy, planning, and management to support their resilience, communities need recognition, autonomy, and sustainable access to natural resources that can support a diverse set of livelihoods and mobility. As Turton (2018: 61) has argued, "a

targeted, well-funded program of compensation, livelihood reconstruction and benefit sharing” is warranted. Tebbs et al. (2019) outline specific strategies co-developed with a range of community and government representatives that would support resilience for the Nyangatom and could be used in other communities with adaptation to the specific context. A common suggestion is to modify the dam operation to improve the balance of water resources – releasing controlled floods at the right time of year to simulate the annual flood pre-Gibe III. The critical issue is determining what volumes to release and when given the implications for hydropower generation and irrigation infrastructure (see Chapter 5). Some success has been found with this approach (Stähly et al. 2019) but there is limited data about its success for agricultural production (Acreman 2000) or discussion of it in Ethiopia.

A more feasible water resource management solution would be consistent and equitable access to sustainable small-scale irrigation. Communities prioritize secure reliable food production and see irrigation and pump access (along with training and extension support) as the primary solution. There is precedent in the region with irrigation schemes but with limited success with food production (Tebbs et al. 2019). Other major recommendations for policy and NGO support are providing support for pastoralists through ongoing delivery of veterinary services, provision of fodder in times of drought, support, and advice in grazing management, setting up a cooperative for marketing of livestock, and establishing physical marketplaces (Tebbs et al. 2019). Considerations of equity between households with large and smaller herds must be made. Communities acknowledge that resilient futures may involve their transitioning out of agropastoralism into employment on estates as a form of benefit-sharing. But this should be a process within which communities have autonomy and choice, supported by education and training (particularly for women and girls) so that management roles are open to them as well as field-based jobs. Other benefit-sharing programs could include access to by-products for animal feed, ensuring KSDP canals are accessible for animals to drink from, and making fodder production a pre-condition of private leases.

Within resilience theory, disturbance is a natural part of SES and triggers reorganization and renewal. However, for renewal to lead to more desirable *and* resilient futures requires diversity of resources, participation, and agency to support self-organization – currently, all are in short supply for the communities of the Lower Omo. It remains to be seen whether key decision-makers will work with communities to support their pathways to resilient futures.

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