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Roads to Change: Livelihoods, Land Disputes, and Anticipation of Future Developments in Rural Kenya

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Abstract

This article examines how rural roads relate to differences in livelihood patterns, attitudes toward social change, and land disputes in Baringo, Kenya. Although their direct use is limited for many residents, roads have a highly differentiating impact. While some households orientate themselves toward roads, those relying more on (agro-)pastoralist livelihoods avoid their proximity. Our findings suggest that better-off households are not the only ones that tend to live closer to roads, but that poorer households do as well. Rather than by socio-economic status, households living closer to roads can be characterized by higher degrees of formal education and also appear to be more open to economic and social change. Our data also highlight dynamics of land disputes in the face of ongoing large-scale infrastructural investments in Kenya's previously marginal northern drylands.

Keywords Roads · Infrastructure · Geothermal energy · Pastoralism · Quantitative analysis · East Pokot · Baringo · Kenya

Resume

Cet article étudie la relation entre les routes rurales et les différences en termes de modes de subsistance, d'attitude face au changement social ainsi que les conflits fonciers à Baringo, au Kenya. Bien que leur utilisation directe soit limitée pour de nombreux résidents, les routes ont un impact à l'origine de certaines différences. Alors que certains ménages se rapprochent des routes, ceux qui dépendent davantage des moyens de subsistance (agro-) pastoraux évitent leur proximité. Nos résultats sug-

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gèrent que les ménages plus aisés ne sont pas les seuls à avoir tendance à vivre plus près des routes, et que les ménages plus pauvres le font également. Les ménages vivant plus près des routes peuvent être caractérisés par un niveau de scolarité plus élevé, plutôt que par leur statut socio-économique, et semblent également être plus ouverts au changement économique et social. Nos données mettent également en évidence la dynamique des conflits fonciers face aux investissements d'infrastructure de grande envergure en cours dans les zones arides du nord du Kenya, qui étaient auparavant marginales

Introduction

Investments in rural roads are frequently thought of as contributing to reducing poverty, which in turn is associated with spatial isolation, remoteness, and inaccessibility (Bryceson et al. 2008). The idea, as many have observed, is at least as old as modernization theory. These claims have currently resurfaced in Kenya, and in many other parts of Africa, especially with the development of growth corridors, which have gained increasing attention in the past decade (Dannenberg et al. 2018). Literature on the impacts and benefits of rural roads, however, provides evidence for a mixed bag of outcomes. Despite widespread acknowledgement that improved transport is critical to economic development, it has also been pointed out that roads are, in themselves, insufficient as preconditions for economic growth (Leinbach 1995). One key critical point is that poor rural populations typically gain little from enhanced access to rural roads, as they lack capital to invest in automobile transportation. If enhanced physical mobility is not a key feature, then what is specific to rural roads?

In our contribution, we deal with the question of what influence roads have beside the fact that they improve mobility and transportation for some. In what ways are rural roads related to social change and differences in livelihood patterns? Roads are focal points for (economic) developments, such as shops and businesses. They are also, as we will show, hotspots for conflict, particularly with regard to the distribution and governance of land, which emerges as a critical resource. Furthermore, we inquire into how knowledge, attitudes, and worries are distributed according to households' socio-economic status as well as their distance from roads.

Our findings are based on household survey data and long-term ethnographic research in Baringo, Kenya, a region that has been marginalized from and bypassed by infrastructural developments for many decades. Previously existing (nearly dysfunctional) roads were recently improved and new roads were constructed. Most of these infrastructural investments are directly related to the construction of large-scale geothermal energy facilities in the so-called Baringo-Silali block (Klagge et al. 2020; Greiner 2020). Therefore, the analysis of knowledge of and attitudes towards this and associated infrastructure projects is another focus of this paper.

In our empirical analysis, we focus on two existing main roads in Baringo, which are also the only through roads, one recently paved, the other gravelled and in rather poor condition. We explore how these roads are associated with people's livelihoods, attitudes, knowledge, and assessments of geothermal development as well as



their anticipations about the future and disputes over land. Due to major recent infrastructural investments in the area, our findings are highly relevant to development practitioners and planners and contribute to literature on investments in and impacts of rural road infrastructures across the Global South.

Literature Review and Research Questions

For decades, academic engagement with rural roads has primarily been the domain of engineers, economists, and development planners. Despite prominent scepticism regarding the economic growth potential of rural roads, roads were major areas of investment in the mid-twentieth century: ‘World Bank lending in the 1950s and 1960s was heavily biased toward infrastructural investment, with road projects being exceptionally prominent’ (Bryceson et al. 2008, p. 460). With the turn to rural development in the 1970s, an increasing number of field studies documented the realities of rural roads, generally suggesting that the complexity of transportation development in rural areas prohibits simple causal linkages (Leinbach 1995; Wilson 2004).

Despite the recent boom in rural road construction, particularly in sub-Saharan Africa, little is known about their actual impacts (van de Walle 2009; Rammelt et al. 2017; DeGrassi 2005; Beuran et al. 2015). One critical view is that “[r]oads on the fringes of the state are themselves war-zones” and “known places of ambush and assault” as Fiona Wilson has noted (Wilson 2004, p. 544). Some even argue that rural roads contribute to the impoverishment and exploitation of newly connected areas (Fairhead 1992) and may lead to other potentially adverse effects, such as rising land values and worsening access to land for disadvantaged groups (DeGrassi 2005). Rural roads can also pose significant risks of social, economic, and ecological damage, especially if poorly planned or implemented (Alamgir et al. 2017; Ibisch et al. 2016). Others, however, point out the socio-economic burdens of isolation in roadless areas (Brottem and Coulibaly 2019; Porter 2002), and the benefits of enhanced access to basic services such as education and healthcare (Sewell et al. 2019). Rural roads, it has also been pointed out, may imply various other benefits for local populations and agricultural developments (Berg et al. 2018).

The ambivalence of roads, and related knowledge gaps concerning their socio-economic impacts, were confirmed, for example, in a three-country study by Bryceson et al. (2008). The authors conclude that roads mainly enhance the mobility of the wealthy. Whether their socio-economic status is cause or effect of this mobility, however, remains unclear. The authors also find that the poor often lack affordable access to transport so as to benefit from roads. Yet, the impact of roads is not reducible to questions of enhanced transport and mobility alone.

Following the recent turn toward infrastructures in anthropology and related fields, multiple other dimensions of roads have come into focus. Beck et al. (2017, p. 6) note that roads in Africa are ‘unique spaces of encounter, practices and sociality,’ whose impact is highly differentiated. The movement of people toward newly built roads is ‘universal’ they argue (ibid. 10), which brings about winners and losers, as whole regions are re-shaped and old residential areas become deserted. In a similar vein, Harvey and Knox (2015, p. 7) suggest that



‘roads deliver the basic conditions of modern living’, but that these benefits are ‘uneven and unpredictable.’ Like many modern infrastructures, roads come with promises of development, modernity, and social change (Larkin 2013).

The link to social change implicit to roads has already been pointed out by Wilson (1973), who in his ‘Theory of Transport and Development’ identifies two main functions (or consequences) of roads that potentially effect development. Besides, first, the creation of economic opportunities, he points to a second social function, which he describes as response to economic opportunities (ibid.: 208). The first function is defined by narrower economic factors and depends heavily on the region’s resource base, market conditions, and available transport. The latter function, however, points to the social impacts and consequences of roads, since it is related to ‘awareness of opportunity and what may be broadly defined as attitudes toward economic change’ (ibid.: 208). This awareness relates to ‘receptivity of and responses to new economic opportunities’ (ibid.: 220). In a similar vein, many analysts suggest that rural road infrastructure enables people to diversify their livelihoods (Gachassin et al. 2010; Bryceson et al. 2008). In a study of rural roads in Papua New Guinea, for example, Gibson and Rozelle (2003, p. 170) note a direct relation between the travelling time to the nearest road and the number of different income earning activities per household.

The recognition that roads should not be built exclusively according to narrow economic criteria resonates with the notion of ‘social roads’ i.e. roads ‘whose construction could be expected to have consequences that were primarily social and political rather than economic’ (Howe 1984a, p. 31). Although the social effects of roads are widely acknowledged (Sewell et al. 2019), Leinbach (1995) observes that these non-economic benefits are often overlooked. ‘Just as commodities flow over the linkages of a road network,’ he notes, ‘so too do ideas and news about innovations and new techniques’ (Leinbach 1995, p. 340). Data from Indonesia, for example, show that rural road upgrading led to increased visits by official visitors, who acted as important sources of information (ibid.).

This observation resonates what Chambers (1983) describes as the ‘tarmac and roadside bias,’ indicating that ‘visible development follows main roads’ (ibid. 13) and development work tends to focus on those portions of the population that are accessible via roads. Rural development projects, as well as shops, health services, educational facilities, and government offices, therefore, tend to cluster along roads (see also Porter 2002). Road construction, Chambers claims, contributes to inflated land prices and it is often the wealthier sectors of the population who are able to invest in roadside plots. Ssenyonga (1976, p. 8) has described this phenomenon in western Kenya as an ‘elite roadside ecology.’ By this, he means that new roads, and particularly the anticipated infrastructural developments that follow them, such as electricity and water, are pull factors to which the better-off respond (ibid. 7). This is in line with findings that rural roads bring about rising land prices (Chambers 1983; DeGrassi 2005; Howe 1984b), and can turn into focal points for ‘speculative accumulation’ in the context of infrastructural developments (Upadhy 2020).

A range of important questions emerge from this brief review of literature on rural roads, which we will address through our empirical data from Baringo:



- Do roadside locations serve as residential sites for the relatively affluent (see Sect. 5.1)?
- Do livelihood strategies vary according to distance from roads (5.2)?
- Are those who live closer to roads more open to social change and economic opportunities? Do they differ in their attitudes and worries from those who live farther away (5.3)?
- Are those who live closer to roads better informed about recent developments, especially geothermal development (5.4)?
- And last but not least: Is there a ‘universal’ movement to roads in our study area (cp. Beck et al. 2017)? If so, does this increase conflicts over access to and ownership of land (5.5)?

Background to Roads and Mobility in Tiaty East

Our research area is Tiaty East subcounty in Baringo County, the eastern part of the former East Pokot District. The area is located in the Lake Baringo basin and the adjacent eastern highlands near the Laikipia plateau in Kenya’s Central Rift Valley (Fig. 1). Tiaty East comprises about 2163 km² and has a population of more than 73,400, according to recent census data (KNBS 2010). The study region is dominated by semi-arid acacia bush savanna and a rugged topography of lowland plains, rolling hills, and mountain ranges. Rainfall follows a bi-modal pattern and is characterized by high inter-annual variation. The area is classified by the Kenyan government as Arid- and Semi-Arid Lands (ASAL). Tiaty East is almost exclusively inhabited by Nilotic-speaking Pokot people, whose specialized form of pastoralism has been the dominant form of land use in almost the entire area over the past 200 years (Anderson and Bollig 2016). Overall, our research area is typical for the northern Kenyan drylands, which have since the early days of colonialism never been in the focus of national development.

Since about the early 2000s, like many other parts of northern Kenya (Lind et al. 2020; Mosley and Watson 2016), the area has been undergoing rapid changes, which have been documented extensively by ethnographic data, some smaller-scale household surveys, interdisciplinary field campaigns and remote sensing (Basukala et al. 2019; Bollig 2016; Bollig et al. 2014; Greiner et al. 2013; Vehrs 2016). Sedentarization and rain-fed agriculture are increasing, as is school enrolment and the influence of Christian Churches. In short, Pokot society in the Baringo Basin is gradually transforming from an egalitarian toward a more stratified society. Livelihoods have become partly de-pastoralized and diversified, and land, which until recently was used as communal rangeland, is increasingly fragmented and the target of aspirations to secure private land titles (Greiner 2017). Land has thus become a contested resource among individual households. The rush on land privatization is amplified by recent investments in large-scale geothermal and other projects (Klagge and Nweke-Eze 2020), as well as promises of changing land legislation in the context of political devolution (Alden Wily 2018; Greiner 2016).

In this context, many historical conflicts with neighbouring groups such as the IlChamus and the Tugen, but particularly with the Turkana, have flared up again



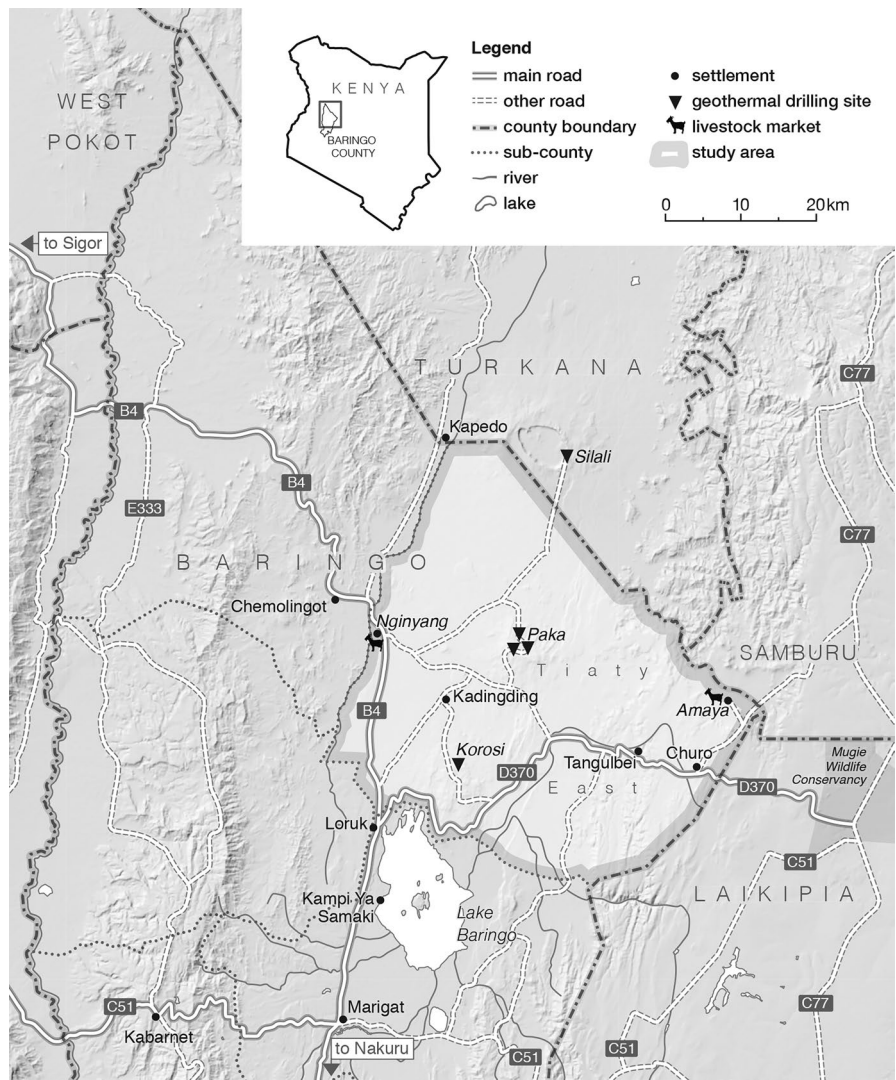


Fig. 1 Map of Tiaty East and its surroundings: Roads, geothermal drilling sites, and major livestock markets (own design)

and intensified in recent years. These conflicts, which often revolve around territorial boundaries and (grazing) lands, involve mutual livestock raiding and armed assaults (Bollig and Österle 2007; Greiner 2013; McCabe 2004; Mkutu 2008). Attacks and counter-attacks in these often-deadly clashes also involve large-scale police and army operations, as well as the ambushing and killing of state security personnel. State forces have not been squeamish about holding the entire population responsible for insurgent activities through collective punishments, such as



random destruction of houses, beatings, and livestock confiscation (Österle 2007). As a result, many households, particularly those with more livestock, chose to settle hidden in the bush and at a distance from roads.

The fact that creating roadblocks emerged as a central strategy in conflicts among neighbouring groups and state security forces underlines the strategic importance of roads in this infrastructure-poor region. Similar to the experience of other remote populations in Africa, roads for residents of Tiaty East have always been related to state authority and critical security issues, and particularly punitive actions by police or army forces (Gewald et al. 2009). However, most of the old colonial roads are no longer traversable by car and are only used by pedestrians (Vehrs 2017). Additionally, in the absence of official roads, ‘traders have cut roads through the bush to deliver consumables even to areas far from government-maintained roads’ (Bollig et al. 2014, p. 69).

The road network in Tiaty East consists of two main roads (see Fig. 1) as well as some old and some new gravel and dirt roads that act as feeder roads.¹ The main north–south road (B4) that connects Tiaty East with the city of Nakuru, the former provincial headquarter, was only tarmacked in the early 1980s. Until 2015, however, the tarmac ended behind the centre of Loruk, a few hundred meters within the border of Tiaty East, and turned into a badly maintained gravel road leading up to Turkana. For many Pokot people, this road literally marked the boundary between the nation of Kenya with its modern infrastructure and their impoverished and marginalised pastoral area (Österle 2007, p. 129). The main east–west road (D370) connects Loruk (on the B4) with Laikipia, where it joins the north–south oriented C77. In colonial times, the D370 was a livestock route, which was only gradually graded and eventually improved in the late 1970s into a ‘tourist class all weather road’ (Catholic Diocese of Nakuru, n.d.: 4).

The recent gradual improvement of neglected road infrastructures in Tiaty East is mainly due to the successful explorations of regional geothermal sources, which included the tarmacking of the B4 north of Loruk. Investments into (ancillary) infrastructure necessary for the exploitation of geothermal energy must be understood against the backdrop of growing interest in mineral and other natural resources of Kenya’s formerly marginalized northern drylands (Lind et al. 2020). To improve accessibility, the ageing bitumen road surface of the B4 from Nakuru was renewed since 2015 and extended into Tiaty East and farther north. An additional network of over 100 km of new gravel roads was constructed to access remote sites for geothermal development (see Fig. 1). Still, these enhanced road capacities do not necessarily reflect higher mobility of the local population.

In Baringo, people hardly own means of transport, and similar to large parts of sub-Saharan Africa, people in Tiaty East are ‘living in a walking world’ (Porter 2002). Livestock, the main export from the area, is often driven through the bush to

¹ The development report for East Pokot District (2008–2012), including both Tiaty East and Tiaty West, mentions 0.5 km of roads with bitumen surface, 123 km with gravel surface, and 456 km with dirt surface in a district area of 4524.8 km² (DDP 2008, p. 21). The poor road infrastructure is paralleled by lacking access to electricity and other infrastructures and services (Ogola et al. 2011).



one of the main markets in Nginyang or Amaya, some of which is then transported with trucks out of the region (see Fig. 1). Public transport is limited to infrequent bus connections to and from Marigat, which serves as transportation hub to other parts of the region; out-migration for labour or education is of minor importance for most households (Bollig et al. 2014). Though people may occasionally use main roads for walking, or sometimes for driving their livestock to the market, many of the key activities that require mobility, such as herding or collecting water or firewood, mainly take place on off-road foot paths. Roads are thus mainly used by NGO vehicles, politicians, the police, traders, researchers, the occasional tourists, and professionals, i.e. locals who live and work away from the region and return for visits. For many Pokot, the road is, therefore, associated with police, army, or other government activities.

Despite relatively limited direct use by many residents of Tiaty East, roads and especially main roads have a highly differentiating impact that goes beyond physical mobility, as we show in what follows. Following a brief description of our methods and data, we introduce household stratification and residential patterns in relation to main roads in Tiaty East. We then show how distance from these roads is associated with assets and livelihoods, attitudes and worries, knowledge and assessment of geothermal development, as well as land-related conflicts and anticipations. We conclude by highlighting our key findings.

Methods and Data

Data used in this contribution are based on a household survey as well as on long-term ethnographic research. The survey was carried out between July and August 2019 as part of a multi-country survey on rural livelihoods, aspirations, and land-use change. The survey is a key methodological instrument developed through the collaborative research centre ‘Future Rural Africa’ (CRC228), which explores dynamics related to land-use intensification and conservation in rural Africa (<https://www.crc228.de>). As such, the survey was administered in all of the project’s research sites, including Kenya, Tanzania, Namibia, and Zambia. The survey is designed to address comparative as well as project-specific topics.

The questionnaire consists of a general section applicable to all research sites, covering basic household characteristics, including demographics, livelihoods, and income source; future-related behaviours and aspirations; as well as issues related to land-use. In Kenya, the survey was mainly conducted in Tiaty East and in Baringo South. This contribution is exclusively based on data from Tiaty East and its immediate surroundings ($N=361$ households). To conduct the survey, a team of local research assistants was trained and supervised by the core survey team throughout the data collection period.

The survey was based on a stratified random sampling strategy. For sampling, the area was categorized into three spatial clusters (strata) that either contained conservation projects, intensification dynamics (either infrastructural or agricultural), or neither of these. Out of these clusters, a total of 24 were randomly selected. The household was chosen as the principal residential unit (Randall et al. 2011), and its



members were defined as those residing in the household for at least three months in the last year. Units of polygynous households were counted and enumerated as separate entities. Primary survey respondents were those that self-defined as head of the respective household. If the head was not available for interview, another member of the household—usually the spouse—was interviewed. Data regarding age, sex, education, and the like used in our analysis, however, always refer to the person identified as head of household. In this contribution, we offer original comprehensive data from the larger data set for Tiaty East and its immediate environs.

The analysis of the survey data was carried out against the backdrop of long-term ethnographic and interdisciplinary research in northern Baringo (former East Pokot district). Members of the CRC228 have done extensive fieldwork in the region since the 1980s. This includes long-term ethnographic fieldwork as well as shorter visits to the area, including interdisciplinary field campaigns with specialists in remote sensing and agronomy. In the context of CRC228, the authors of this contribution work on the implementation and governance of infrastructures for geothermal energy as well as related community investor relations in northern Baringo.

Empirical Analysis

Stratification of the Study Population and Residential Patterns

Since about the 1990s, the livelihoods of Northern Baringo's population have diversified from a predominantly cattle-based pastoralist economy to an increasingly stratified society, with increasing social differentiation according to livelihood strategies and livestock ownership. This trend, which has been previously described ethnographically (Bollig 2016; Bollig and Österle 2013; Österle 2008), is confirmed by our cluster analysis in which we used three variables on education, landholdings, and livestock ownership to distinguish six socio-economic groups, each including between 50 and 77 households (Table 1).² The focus on education, livestock, and land reflects important and measurable sorts of capital or assets, whereby 'ownership in land' refers to customary use rights rather than to formal, tenured ownership.³

The cluster analysis generates a clear-cut division between households without formal education (NFE) on the one hand (groups A1 to A4), and households with some formal education on the other hand (groups B1 and B2). Additionally, we find pronounced differences regarding ownership in livestock and land between the groups. With respect to these assets, A1 (NFE-very poor) is the poorest group with

² The clustering was performed by applying the hierarchical agglomerative method of Ward's minimum-variance. The cluster analysis was based on three variables – education, land, and livestock ownership –, each of which was classified into 5 ascending grades. Correlations between the resulting variables were little ($r_1 = 0.143$; $r_2 = -0.130$; $r_3 = 0.267$) and are therefore not prone to skew the cluster analysis.

³ Although livestock ownership continues to be more culturally correlated with social status, access to land is increasingly important. As early as the beginning of the 1980s, therefore, Rada Dyson-Hudson (1980) suggested the inclusion of arable land ownership as a key variable for measuring socio-economic stratification in East African pastoralism.



Table 1 Socio-economic groups of households: result of cluster analysis based on land, livestock, and education variables (survey data, own calculations)

Cluster analysis data	All Households	A1	A2	A3	A4	B1	B2
		NFE (no formal education)				Educated poor	Educated rich
		Very poor	Poor	Pastoralist	Agro-pastoralist		
Number of households	361	77	50	63	54	58	59
Formal education (no/yes)		No	No	No	No	Yes	Yes
TLU (median)*	2.4	0.5	1.6	8.2	7.1	0.5	4.7
Land in acres (median)	1	0	2	0	3.5	0.5	2.5

*Calculations of tropical livestock units (TLU) are based on Njuki et al. (2011)



Table 2 Socio-economic groups and distance classes as the basis of our analysis (survey data, own calculations)

Socio-economic groups	Total (100%)	Distance classes		
		– 500 m	> 500–5000 m	> 5000 m
		I	II	III
A1: NFE-very poor	77	10 (13%)	28 (36%)	39 (51%)
A2: NFE-poor	50	6 (12%)	23 (46%)	21 (42%)
A3: NFE-pastoralist	63	2 (3%)	15 (24%)	46 (73%)
A4: NFE-agro-pastoralist	54	8 (15%)	14 (26%)	32 (59%)
B1: educated poor	58	20 (34%)	24 (41%)	14 (24%)
B2: educated rich	59	15 (25%)	24 (41%)	20 (34%)
Total	361	61 (17%)	128 (35%)	172 (48%)

very little livestock and negligible land, followed by A2 (NFE-poor) with little land and livestock. A3 and A4 own much livestock which indicates that pastoralism is an important part of their livelihood. Whereas A3 (NFE–pastoralist) is rich in livestock, but not in land, A4 (NFE-agro-pastoralist) is rich in both livestock and land, thereby pointing to the additional importance of agriculture for these households' livelihoods (also see Table 3 below).

This latter group (NFE-A4) resembles B2 (educated rich⁴), which is also rich in livestock and land, but has some formal education. Finally, B1 (educated poor), the group with the lowest average age, also has some degree of formal education but is mostly destitute, owns little livestock, and varying, but smaller amounts of land (see Table 1). In terms of livestock, which is still a local indicator of affluence—despite the increasing diversification of livelihood patterns—we can distinguish three relatively poor and three relatively rich groups of households (A1, A2 and B1 versus A3, A4 and B2).

When analysing households according to their home's distance from the two main roads in the study region (cp. Fig. 1), we distinguish between three distance classes: (I) Those that live close to a main road (up to 500 m); (II) those that live a bit farther away, but within about one-hour walking distance (> 500 m–5 km); and (III) those that live beyond 5 km from a main road. Table 2 shows how our six socio-economic household groups are spread among the three distance classes.

As Table 2 shows, our findings contradict Chambers' (1983) assessment of roadsides being primarily residence sites for the more affluent. The roadside in Tiaty East is by no means only the residential area of relatively rich households. Fairly rich households with more 'traditional' livelihoods, particularly those relying on pastoralism (A3) and agro-pastoralism (A4), tend to live far from the road (73% resp.

⁴ The term 'rich' in this article is used relatively to describes households that own much more assets than the majority of households in the study region. In an overall Kenyan context, however, these households would rarely be characterized as rich.



Table 3 Socio-economic groups of households: analysis of data on age, farming, and possession of household assets (survey data, own calculations)

	All Households	A1 NFE (no formal education)	A2 Poor			A3 Pastoralist			A4 Agro-pastoralist	B1 Educated poor	B2 Educated rich
			Very poor			Pastoralist					
Age (mean)	44	45		49	43				50	36	40
Farming (access to cropland and/or fallow land) (%)	67	32		100	44				98	60	86
Iron sheet roof (%)	22	5		12	3				28	45	46
Radio (%)	19	6		1	5				19	34	44
Mobile phones (1 or more) (%)	59	39		56	43				72	74	76
Mobile bank account (%)	14	10		2	8				9	21	36
Scooter (%)	7	0		2	10				9	7	17
Access to electricity or solar energy (%)	7	0		2	2				6	9	25



59% in distance class III). About half of the NFE-very poor (A1) and the majority of the NFE-poor (A2), as well as most households in the groups with formal education (B1 & B2), live relatively close to a main road (distance classes I and II). These findings have some similarities to the results of a study in rural Tigray, Ethiopia, by Rammelt et al. (2017). Their data, which measure household-to-road distance and income in four rural woredas (districts), also reveal a rather mixed picture. In this study, the correlation between households' distance from roads and income differs greatly between the four woredas, including one woreda where the income-rich tend to live far away from roads and one with the opposite situation. The authors point to the distribution of natural resources such as water and pastureland as a possible explanation for these inter-regional differences.

Our data also suggests that environmental factors, particularly the availability of pasture, plays a role in the residential choice of households (Greiner et al. 2013), particularly of those with greater livestock ownership. Similar to what is reported from Hade Alga in Tigray (Rammelt et al. 2017), households with significant livestock holdings tend to live in greater distance to the road than those with few animals. An important additional explanation for these patterns in our research area is the widespread fear of police and military intervention as a result of livestock raids on neighbouring groups, which in the past have often included the arbitrary confiscation of large quantities of livestock (see also “[Background to Roads and Mobility in Tiya East](#)” and “[Differentiating Impact of Roads on Attitudes and Worries](#)” sections).

We conclude that, in contrast to households that are relatively rich in livestock, poorer households are forced to adapt their income strategies and rely on income sources that require road access or even travel. It is notable that, in our sample, a higher percentage of female-headed households reside closer to the road (36% in distance class I; 27% and 26% in II and III). Concerning areas far away from the roadside, we can conclude that these are not deserted due to a ‘universal’ movement of populations toward new—or, in our case, rehabilitated—main roads (Beck et al. 2017). By contrast, from our data it appears that off-road locations serve as deliberate retreats for households depending on more traditional pastoral or agro-pastoral livelihoods. Our findings thus point to a clear relation between residential distance to roads and livelihood choices.

Livelihood Diversification and Distribution of Assets in Relation to Road Distance

Livelihood diversification from pastoralism to agriculture—predominantly rain-fed maize cultivation—is common across all socio-economic groups. There are, however, differences between groups, with the lowest incidences in the ‘NFE-very poor’ (A1) and the ‘NFE-pastoralist’ (A3) households (see Table 3), but variation also depends on the ecological suitability of the residential area (cf. Rammelt et al. 2017). Nonetheless, farming activities are less common in households far away from the road: 38% of households in distance class III are not involved in cultivation, as compared to 29% in distance classes I and II.



Income from formal employment is rare in the study area, and it is unsurprisingly highest and most common in the educated rich group (B2). More important is income from daily wage labour and own businesses; 13% of all households reported at least one of these two income sources. Daily wage labour, for example, includes seasonal clearing, ploughing, or weeding agricultural fields for other households. It also includes manual day labour in road construction and security services, both of which are related to the implementation of infrastructures for geothermal energy generation. Own business activities include food retail in small shops or kiosks, usually by more affluent households. It also includes sale of charcoal, illicit brews, honey, as well as petty trade, which are important income-generating activities found in many households, but most prominently among the poor (Bollig and Österle 2013). Whereas bags of charcoal are commonly displayed and sold along the main roads, the production of illicit goods, for example the poaching of sandalwood, is usually done covertly. One prominent example is illicit brewing, which was introduced by road and bridge workers in the 1990s. However, while drinking places tend to be well hidden, they are never located far from a road to ensure supply and customers.

Cash income from both daily wage labour and own businesses is highest, on average, in households close to the road (distance class I). Regarding socio-economic groups, income from daily wage labour is highest in group B2, followed by A1. Income from own business is highest in households of groups B2 and B1, followed by A3 and A4, thus indicating a need for investment of own resources and/or formal skills to be able to run a business. Overall, these findings indicate that households with some degree of education, but also households living close to a main road, earn higher incomes from such activities.

A look at the asset base among the different socio-economic groups further reveals striking differences between rich and poor households (see Table 3). Iron sheet roofs are often mentioned by local people as an indicator of the relative wealth of a household. Interestingly, they are most common among educated households, rich and poor. The distribution of radios, mobile phones, and mobile bank accounts (*Mpesa*) also reflects education and relative wealth. Finally, most households (93%) do not have access to electricity. Only in the educated rich group (B2), 25% of households have access to electricity from the grid or from solar power; geographically, the number of households with access to electricity is highest in the group closest to the road.

Since we focus on the impact of main roads, it is also interesting to see how automobile transport is distributed. In our survey of 361 households, we counted a total of only 26 scooters (or small motorcycles) distributed amongst 25 households (most of which were in educated rich households, B2, see Table 3). There was a total of only five private cars in the sample of 361 households. They belonged to four households in the educated rich group. Bicycles are not very popular with only 14 bicycles in 13 households.



Differentiating Impact of Roads on Attitudes and Worries

Despite large differences in asset ownership and livelihood conditions, the interviewed household heads share many worries and attitudes. However, there are also stark differences that are also reflected in households' distance to road. Questions regarding worries, attitudes and specifically trust in institutions were posed in the survey using Likert scales, with answers ranging from (1) 'extremely worried', (2) 'very worried', (3) 'worried', (4) 'slightly worried' to (5) 'not worried at all' and (1) 'strongly trust', (2) 'trust', (3) 'indifferent', (4) 'distrust', and (5) 'strongly distrust' (in institutions).

Regarding worries about climate change, associated livelihood conditions, and political issues, we find a rather homogeneous picture: Throughout all groups, respondents are worried, very worried, or even extremely worried about food insecurity (98%), about effects of climate change, especially floods and long droughts (94%), about depletion of natural resources (94%), and about clan or tribal violence (94%). Of those households interviewed, far fewer are (-/very/extremely) worried about political upheavals (53%) or about exclusion from political decision-making (32%). With respect to these worries, there are only relatively small or inconclusive variations among different socio-economic groups and distance classes.

By contrast, a clearly differentiated pattern emerges from question about whether the household head is worried about the loss of cultural traditions (Fig. 2). Households living closer to the road are less worried about this issue. Moreover, household heads with some degree of formal education have relatively few concerns in this respect. At the same time, the proportion of those who worry about loss of cultural traditions strongly increases with growing distance from the main road(s): from 39% in distance class I to 83% in class III.⁵

Those who worry most about the loss of cultural traditions are thus household heads with larger livestock herds who predominantly live from pastoralism, or—to put it differently—whose livelihoods have changed least (i.e. specifically A3). These are also the households living at greatest distances from the main roads. This not only recalls Scott's argument of self-chosen marginalization to escape the potentially adverse effects that go along with integration into the nation state (Scott 2009). It also recalls Wilson's claim that a road's function might also be related to attitudes toward economic change (Wilson 1973). If we take lower fear of 'loss of cultural traditions' as a proxy for openness to change, we can conclude that exposure and interactions resulting from residence closer to main roads enhances economic change. This is also reflected in diversified livelihoods (see 5.2).

When asked about trust in institutions, our respondents report a very high level of trust in the traditional leadership system: 88% of all household trust or even strongly trust traditional leadership, and only 5% distrust or strongly distrust this institution. The level of trust in local and national government is much lower, but there is still a majority (56%) that trusts state institutions, with 26% reporting distrust. The police and judicial systems enjoy the lowest level of trust (33%) and an even higher level

⁵ This is also the case within each of the six socio-economic groups, albeit at different levels.



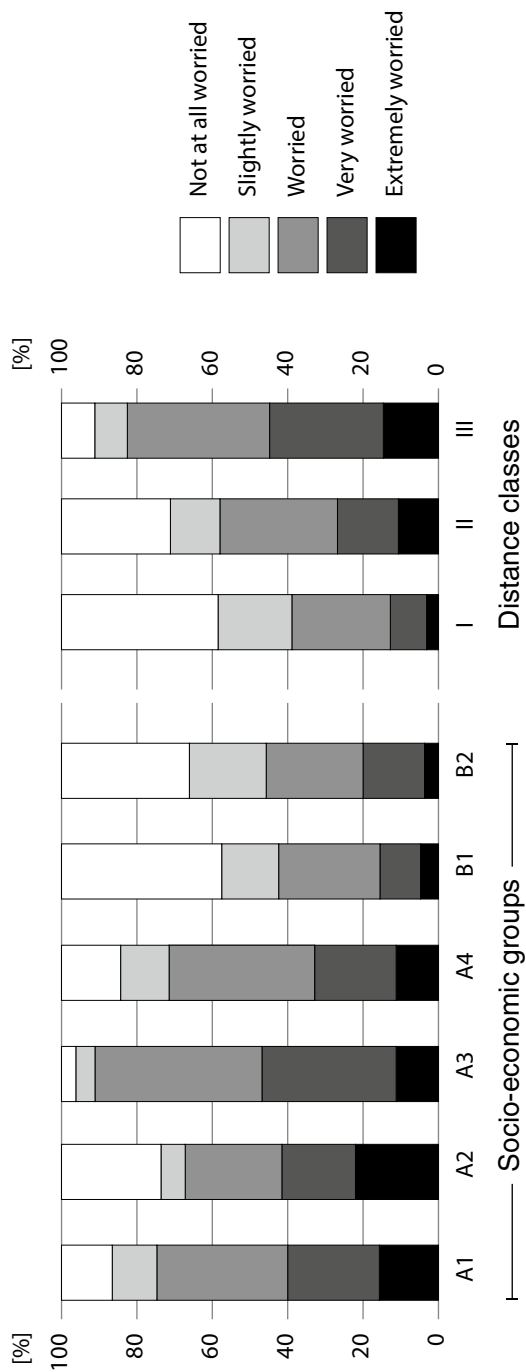


Fig. 2 Worry about the loss of cultural traditions (survey data, own calculations)



of distrust (40%). There are only slight differences between the groups, but notably the educated rich (B2) show somewhat divergent attitudes: respondents from this group have a relatively high level of trust in the police and judicial system (42%), and a slightly lower level of trust in the traditional leadership system (81%) than the other groups. This disparity is confirmed by ethnographic evidence showing that households with some degree of formal education often call the police in the event of disputes, very much to the dismay of rural elders who often belong to groups A3 or A4 (Greiner 2017).

Despite relatively small variations across household groups regarding trust in institutions, the respective data show an interesting variation according to road distance (Fig. 3). While there are only slight differences regarding the level of trust in central and local governments, strong trust in the traditional leadership system clearly increases with distance from road.⁶ The level of trust in the police and the judicial system also shows a clear, but reverse road-related pattern.⁷ Trust in state institutions clearly decreases with growing distance from a main road. This is an interesting finding given the situation of conflict in Tiaty East, and widespread fears of army or police interventions (see “Literature Review and Research Questions” and “Stratification of the Study Population and Residential Patterns” sections).

Our findings could indicate that either those with greater trust in the police and judicial system moved closer to the road, or that increased interaction with security forces due to proximity to roads leads to a reduction of reservations against them. In summary, however, these results show that traditional attitudes are very prominent among the study population, particularly those living far from the main roads, whereas local and central government and especially the police and judicial system are much less trusted.

Knowledge About and Expectations from Geothermal Development

Given the prominence of recent infrastructural developments in the study area, one would assume that large parts of the population are at least informed about the most prominent one, namely the development of infrastructures for geothermal energy production. This is indicated on huge billboards, visible in new roads and water infrastructures, and communicated in meetings with the local population. Interestingly, almost half of all households interviewed (47%) claimed not to know about this project. There is a clear pattern that relates to road distance: 79% of those residing close to the road (distance class I) knew of geothermal development, whereas among those households living far from the road (distance class III), only 34% claimed to be informed (Fig. 4). Furthermore, in each of the six socio-economic groups, a much higher proportion of households in distance class I claim to know

⁶ This is also the case within most of the six socio-economic groups (A1, A4, B1, B2), whereas the results for A2 and A3 are inconclusive, probably also due to the small numbers of households in distance class I (cp. Table 2).

⁷ This is also the overall trend within the six socio-economic groups except for A3, where the small household number for distance class I (only 2 households) does not permit any generalizing statements.



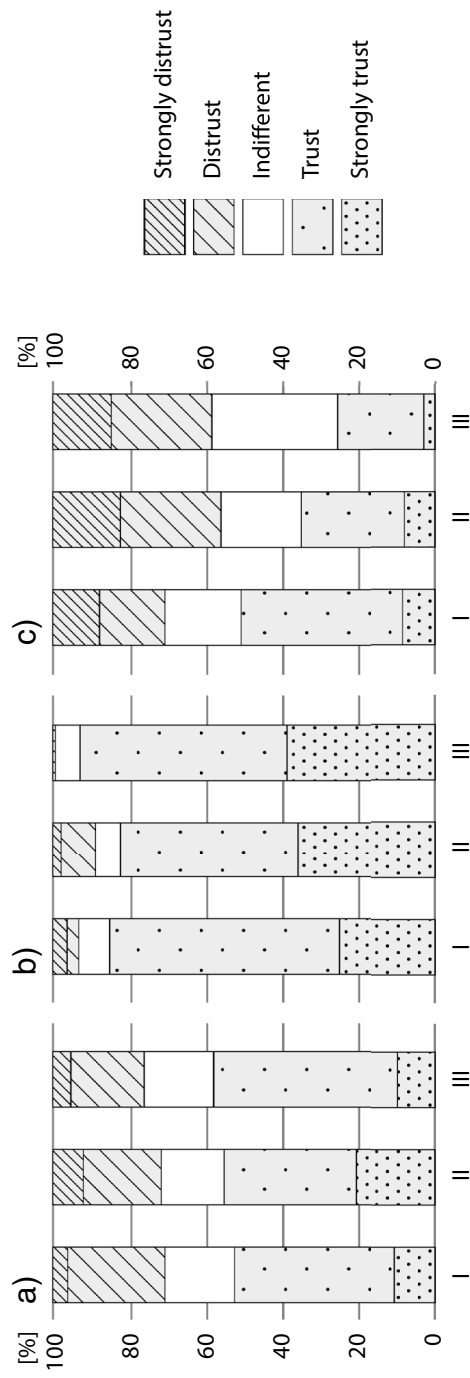


Fig. 3 Levels of trust in (a) central and local government, (b) the traditional leadership system, and (c) the police and judicial system by distance classes (survey data, own calculations)



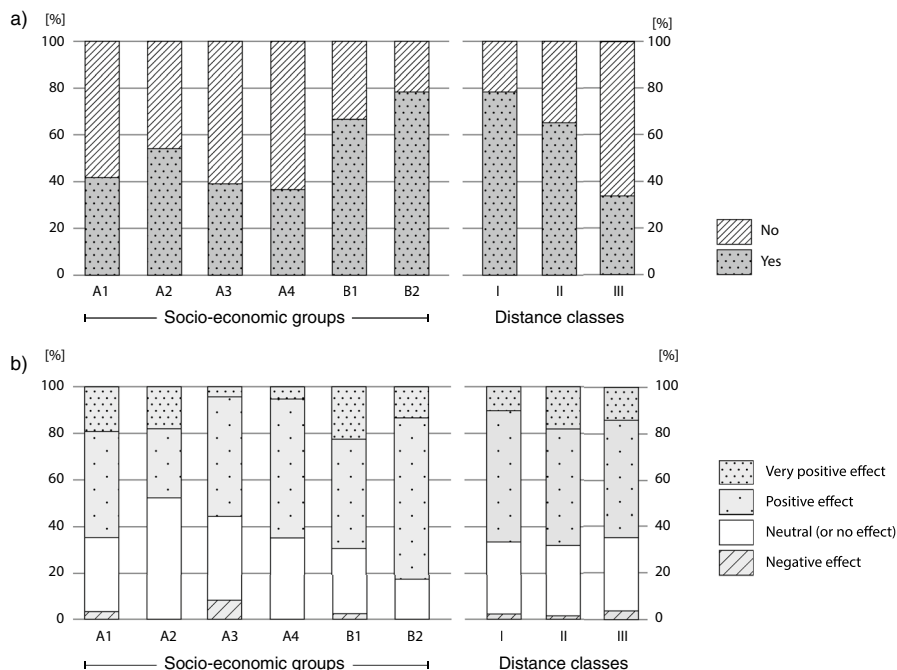


Fig. 4 (a) Knowledge of geothermal development project in the region, and (b) expectations regarding its effect on the next generation by those who know about it (survey data, own calculations)

about geothermal development than in distance class III. Regarding awareness of geothermal projects in the area, households with some degree of formal education claim to know of geothermal development much more often than households in other socio-economic groups.

Interestingly, of those households that know about geothermal development, the large majority expects a positive (52%) or even a very positive (15%) effect on the next generation, whereas about a third (31%) is neutral and only 2% expect negative effects. There are variations among the six socio-economic groups: positive or very positive expectation is highest among the educated rich (B2, 83%), and the highest negative expectation is 8% in group A3 ('NFE-pastoralists'). Overall, our survey results exhibit a positive outlook on the future impact of geothermal development.

Among the benefits expected for the next generation, employment (jobs) is mentioned most frequently (86 mentions), followed by water (31 mentions), and roads (12 mentions). Electricity is only mentioned five times as an expected future benefit. This indicates that electricity is not an urgent desire for many respondents, most of whom (93%) do not have electricity access, solar or otherwise, so far (see Table 3). Especially among households whose livelihoods are mainly based on mobile livestock husbandry, electricity is of little importance. This is confirmed by interviews with residents of the area. A member of the community liaison-team of the GDC told us that elderly Pokot people, in particular, have no interest in electricity but insist on improved access to water.



Our findings thus suggest that households with some degree of formal education, as well as households that live closer to the road, are better informed about recent developments in the study area. These results support Leinbach's (1995) claim that roads are carriers of information, news, and innovations. Traders, NGO workers, travellers and even the odd researcher, but also politicians on the campaign trail and security forces, they all use the road. People wait along the road for the occasional car to come by and offer a lift, drivers meet relatives or friends and stop for a chat, and longer involuntary stops due to punctures or other technical breakdowns are also common.

The relatively widespread availability of mobile phones (59% of all households claim to be in possession of at least one device) could disrupt the privilege of higher information density along the roads, since mobile phones allow for 'non-localized' flows of information. However, network access is not widely available, as are airtime and power for charging. Furthermore, there is a considerable increase in availability of mobile phones and radios the closer a household is to the road: 66% of households in distance class I own one or more cell phones, and 39% are in possession of a radio. By contrast, 52% of households in distance class III have one or more cell phones, and only 12% are in possession of a radio. In summary, it can therefore be concluded that in Tiaty East and its environs, households residing closer to the road have better access to information.

Land Disputes and Anticipations Toward Land

Conflicts around land ownership in what today is Tiaty East mostly started in the mid-2000s. The ongoing trend toward livelihood diversification and sedentarization has increased pressure on land with arable soil and plots close to the main roads and to settlements. The rush for land is particularly pronounced in the cooler highlands around Churo, where electricity has been available for a few years and where conditions for cultivation are favourable. Although land has officially been communal throughout Tiaty East, and private ownership was not legally recognized, many plots along main roads are fenced in and claimed as private property. Our qualitative research showed that disputes are often conducted by people seeking to challenge a current user's right of use based on past claims, typically with the aim of securing land for members of their own family. Members of local elite families are frequently involved, as they have the knowledge as well as the financial means to involve traditional courts (Greiner 2017).

These ethnographic findings are confirmed by the results of our survey (Table 4). While about 17% of all interviewed households have already been involved in a dispute over their land, this figure is twice as high in the group of the 'educated rich' (B2). Moreover, the observation that landed property close to rural roads has turned out to be a major point of contention is confirmed by the data. In particular, households living close to a main road have been more often involved in such conflicts (21% in distance class I) than households living more distant to the roads (15% in distance class III).



More recently, the ongoing rush on land in Tiaty East was driven by what can be described as ‘economies of anticipation’ (Cross, 2015; Greiner 2016). Anticipation, according to Bryant and Knight (2019, p. 22) refers to the “imagining of the future in the present,” and to consequently “drawing them into the same activity timespace” (ibid.). As such, the anticipation of future developments in the area—geothermal energy exploration, but also the Lamu Port-South Sudan-Ethiopia Transport Corridor (LAPSSET) and Chinese investments into diatomite mines—has massive impacts on the ‘production of locality’ (Appadurai 2013, p. 298). While some of these developments, such as the anticipated passage of the LAPSSET corridor through Tiaty East, might not materialize, it still contributes to imagined new topographies of economic value and—more generally—to the local land rush and to rising values of land.

Past observations and future expectations of land availability reported in our survey confirm the dynamics of land-related issues. The two questions, how the availability of land has changed in the past, and how it will change in the future (each with a 5-year horizon), has yielded clear results. The majority of households observed decreasing land availability in the past (56%) and anticipate a similar trend in the future (60%). These percentages, however, are significantly higher in households living close to the road (distance class I). With 79% and 82% respectively, the figures in that group are higher than in any of the socio-economic groups alone, hinting at a clear rush for land close to the roads.

The anticipation of decreasing land availability is also underlined by concerns about future conflicts over land ownership. 23% of all respondents think that it is likely or very likely that there will be a dispute over their land in the future. Again, this is especially the case for households who live close to a main road (34% in distance class I) and in households with some degree of formal education (B1: 38%, B2: 34%), but also in the group of relatively land-rich agro-pastoralist households (A4: 30%).

Discussion and Conclusion

Roads have a differentiating impact on households in rural Kenya. In particular, residential patterns of certain socio-economic groups exhibit clear orientations toward main roads—and are associated with different attitudes toward traditional authorities, the state, and their respective institutions. Households with some degree of formal education and more diversified livelihoods tend to live closer to roads, whereas households that have the resources to rely on pastoralist or agro-pastoralist strategies tend to live farther away from the main roads. This finding resonates Scott’s (2009) idea of an “Art of Not Being Governed.” At the same time, it contradicts Beck et al. (2017) who claim that there is a ‘universal’ movement towards newly built roads. Our findings also contradict, or at least relativize, Ssenyonga’s notion of an ‘elite roadside ecology,’ since many poorer households also tend to be oriented toward (main) roads. The schism, therefore, is not so much between rich or poor; it is more about education and between ‘modern’ and ‘traditional’ lifestyles and attitudes. This



is particularly important for development-related work: to reach the traditional ‘pastoral’ elite, one needs to go off-road.

Regarding economic opportunities through roads, our results confirm Wilson’s (1973) ‘Theory of Transport and Development,’ which identifies two main functions of roads. First, they create economic opportunity, in our case especially in the form of income from daily wage labour and own business activities, i.e. beyond traditional pastoral economies. Second, according to Wilson, roads are important for ‘awareness of opportunity and what may be broadly defined as attitudes toward economic change’ (ibid. 208), and—based on our study results—also social change. People living along or near roads, in our study, are better informed, for example, about geothermal developments; they are less worried about the loss of cultural traditions and have more trust in the police and judicial system. Our results show that these attitudes—broadly defined here as a general openness to social and economic change—occur in both rich and poor households, but vary with distance to main roads, although this also depends on a household’s livelihood choices, assets, and education. Overall, households that are situated close to roads, formally educated or not, rich or poor, tend to be more open to change, by contrast with pastoral elites living ‘traditional’ lifestyles far away from main roads.

Enhanced opportunities for cash income, better service provision (e.g. electricity or water), as well as rising land prices in connection with recent prospects of infrastructural developments lead to increasing pressure on land along the main roads. The presumed shortage of land is reflected in observations and anticipations of households living close to main roads. They are the ones most often involved in land disputes, they more often anticipate future conflicts, and the vast majority of these households—poor and rich alike—anticipate that the land will become scarcer in the coming years. Past and anticipated land disputes point to the relevance of ongoing conflict dynamics about land ownership and availability, particularly along main roads. Development policies in rural Baringo have to take this into account, so as to ensure that ‘economies of anticipation’ do not only work for local elites, and that poor families in rural Baringo are able or being enabled to tap into new opportunities that emerge with roads.

Our findings provide a good reason to revisit Chambers’ famous notion of a ‘roadside or tarmac bias’ in development work (Chambers 1983, p. 13). Chambers suggested that (a) the rural roadside is the residential area of the better-off, and that (b) developmental activities usually concentrate along roadsides, and therefore, tend to miss the poor. Our case, however, suggests that the rural roadside is not exclusively the residential site for the more affluent. Rather, it is also the place where many paupers try to eke out a living, and where the educated poor, largely destitute households try their luck. Considering that they are—or have to be—open to economic and social change, this means that there may be opportunities for road-related development policies for the poor. At the same time, however, our findings also suggest—and this reinforces Chambers’ argument—that those who claim to want to address, involve and inform all sections of the population must literally go the extra mile (or more) to reach those who live off the road.



Conflict of interests

The authors declare no conflict of interests.

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