

The Dynamics of Collective Action and Political Agency in the Leeward Kohala Hinterlands, Hawai‘i Island

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ABSTRACT:

The *kua‘āina*, or backcountry, in the Hawaiian Islands was the setting for a dynamic back-and-forth between the collective action of commoner class farmers and political elites. We examine how the long-term history of that dynamic left behind spatial patterns in the form and distribution of domestic, agricultural, and ritual architecture across the Leeward Kohala Field System. We find a contrast between places that were the best and most reliable for farming and lands prone to shortfalls. Less ideal lands were less densely populated with fewer efforts to standardize plot sizes and a lower investment in temple architecture. We suggest that as leeward Kohala was drawn more and more into competition for power that involved local and non-local chiefs, the autonomy of residents diminished, and the ability of local inhabitants to negotiate the demands of elites after this shift was variable, with greater demands likely placed on residents living in optimal zones.

Keywords: political economy; agriculture; Leeward Kohala Field System; Hawai‘i

INTRODUCTION

The ancient Hawaiian hinterlands or *kua‘āina* (backcountry; Malo 1951) were diverse and varied natural and cultural landscapes (Kahn *et al.* 2016). *Kua‘āina* were not absolute, but rather existed in relation to other spaces created as places. Investigating the hinterlands is to some extent dependent on the articulation of core zones yet the definition of either is far from intrinsic. In one dimension, cores can be conceived of as places where leaders (*ali‘i*) exercised centralised political, ritual, and economic power, with varying relationships with their peripheries. As Greig and Walter (2020) note ‘(t)he core implies centrality and richness, in contrast with the periphery (or hinterland) which encompasses ideas of distance, disconnection, marginality, and challenge.’ Cores also suggest directionality – resources flow to them, as well as places of density or intensity – they are locations where larger numbers of people engaged in more intense activities.

Conceptualizing *kua‘āina* as marginal, however, is not the only way to approach the back country. Heinz (2019) notes that when regarded from a Hawaiian cultural perspective, it is possible to flip the narrative. Invoking the concept of a *kīpuka* – an older volcanic area that preserves native or Polynesian introduced plants surrounded by a younger volcanic flow – she suggests that following European contact, some *kua‘āina*, hinterlands, became cultural *kīpuka*. These hinterlands became centres into which Hawaiian cultural knowledge flowed and was maintained, not backwards areas that lacked Western technologies. By focusing on these cultural *kīpuka*, these hinterlands, Heinz advises we can understand how Hawaiian communities remained resilient after European contact. This conceptualization of *kua‘āina* as potential *kīpuka*, of hinterlands as areas for resistance and knowledge, is not limited to the colonial era.

Ancient Hawaiian *kua‘āina* could also be *kīpuka*, lands where people had lived for centuries before being engulfed by the political aspirations of *kanaka maoli* outsiders from other Hawaiian districts or islands. Some *kua‘āina* fell under the hegemonic control of outside political elites invested in directing and manipulating the political economy and ritual activities of these areas, while communities associated with other *kua‘āina* remained relatively autonomous throughout their history. Yet, we suspect that control by centre elites was rarely absolute and could change, with enclaves within hinterlands providing spaces and places for collective action and resistance.

In the following, we investigate spatial patterns in the distribution of archaeological features that reflect dialectic-

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cal processes of elite control and commoner action in the *kuaʻāina* of the Leeward Kohala Field System (LKFS) on the Big Island of Hawaiʻi. We consider the spatially and temporally contingent nature of the centre-hinterland continuum, examining variation within the LKFS and the dynamic relationships with outside areas. We specifically focus on three architectural metrics: (1) residential features (*hale*), (2) ritual structures including temples (*heiau*) and men's houses (*hale mua*), and (3) agricultural alignments and associated trails that created plots for permanent cultivation. We consider variability in form, density, and distribution of these features in relation to potential agricultural productivity, territorial boundaries, and the presence and influence of elites.

Our findings show contrasting and changing lifeways within the LKFS. Throughout the area there was a shift away from a domestic mode of production toward a surplus generating economy after AD 1650. This shift was more extreme, or more complete, in the more optimal environmental zones of the field system, where investment in community and extended family temples was high, agricultural plots were formalized, and residential populations were substantial. In what we define as the more marginal hinterlands of the field system, establishment of fixed fields was likely later, and there was less emphasis on increasing production for surplus extraction. Gardening plots were less uniformly developed or clearly defined, population density was lower, temples were less frequent, and there are some indications that ritual activity included men's houses in addition to temples. We suggest that this pattern is due to the influence of elites, which was greater in the more optimal production zones, with the more marginal hinterlands of the field system providing opportunities for farmers to exert more relative autonomy.

THE CONTINUUM OF CENTRE-HINTERLAND RELATIONS

Examining the relationships between centres and hinterlands is fundamental to understanding the evolution of a political economy. DeMarrais and Earle (2017:189–190) note the importance of nested scales of social interaction, from the activities of households, to dealings within neighbourhoods and communities, to relations within state-controlled regions. While the spatial hierarchy of these is clear it is the heterarchical (Brumfiel 1995) relationships between them that are key. People created contemporaneous institutions and coalitions at different social and spatial scales and the impact of these on peoples' lives were variable and non-linear. Historical and geographic contingency influenced the extent to which the local domestic domain could outweigh the impact of the polity, and vice-versa. At multiple spatial scales there was recurrent renegotiation and consideration of alternative behavioural strategies and their associated culturally defined costs and benefits. In interpreting the archaeological record and

understanding the nested scales of social interaction some of the behaviours of elites are often understood in terms of their desires to control and manipulate the political economy (for Hawaiian examples see Earle 1997; Kirch 2010; Hommon 2013; Earle and Spriggs 2015), while those of commoners are conceptualized in terms of collective action and processes of cooperation, compromise and resistance (Furholt *et al.* 2019; DeMarrais and Earle 2017; Kahn *et al.* 2016). In Hawaiʻi, studying these processes is best done in the hinterlands or *kuaʻāina* as the complex archaeological records of centres of power are often difficult to untangle (Kirch 2014).

Analytically defining the continuum between centres and hinterlands, and variation within hinterlands, requires explicit criteria. The attributes of archaeological remains such as the size and composition of communities or the size and form of residential features, are often used as proxies for defining relationships between areas (e.g., Cordy 1981; Kahn *et al.* 2016). On the Big Island, the size and composition of 'royal centres' identify coastal Kona as the foci of the island wide polity at certain times in contrast to the outlying hinterlands such as leeward North Kohala (Cordy 2000; McCoy 2018). Relationships can also be defined by geographic locations in terms of either straight-line (e.g., Kikiloi 2012) or least-cost distance (e.g., McCoy *et al.* 2011b), ease of access (e.g., Kahn *et al.* 2016), or measures of centrality (e.g., Cordy 2002). Alternatively, environmental conditions or the degree of resource variation in a landscape can affect the locations of centres and hinterlands, with hinterlands characterized by low population density, and marginal or unpredictable resources (e.g., Hommon 1986, 2014; Graves *et al.* 2011).

In contrast to the notion that hinterlands were productively marginal, Hommon (2020) notes that some Hawaiian hinterlands, like Kohala, were resource rich in relation to the core or centre. In these cases, hinterland field systems served as supply zones for political activities. Hommon suggests that it is social distance, or the degree to which areas were integrated into regional economies and hierarchies, not inherent resource disparities, that define Hawaiian hinterlands. For Hommon, centres are not necessarily permanent, fixed physical locations, but rather can be the locations where groups of people can be found. Centres in Hawaiʻi were the mobile royal courts that consisted of advisors, priests, genealogists, chiefs at various levels of the bureaucracy, messengers, and warriors, as well as craftworkers. Hommon notes that the hinterlands, or *kuaʻāina*, could be defined by the degree and frequency of influence the government (the king and chiefs) was likely to exert. Earle's (1980) analysis of irrigation systems in the windward valleys of the Hawaiian Islands supports this notion, there being a continuum of production management with the extensive lo'i pondfields of the large valleys grading into the smaller more dispersed irrigation systems of localized valleys, such as those found in windward Kohala (also see McCoy and Graves 2010). In the core irrigated production

zones elite presence and management and surplus production would have been high, with the smaller backcountry systems escaping the oversight of the elite and their *kono-hiki*, with a corresponding decrease in surplus demands.

Using a range of criteria to define and understand centre-hinterland relationships as a continuum of diversity demarked by relative relations enables researchers to forgo binary characterizations. Viewing locations in a binary manner, as either a core or periphery, oversimplifies social interactions and ignores how varying degrees of marginality differentially impacted communities. Centres and hinterlands were not only spatially contingent, but also temporally contingent, constantly transforming and emerging. This was done in response to socio-cultural, economic, and environmental processes (Greig and Walters 2020). As a result, people's strategies and actions transitioned over time. In Hawaiian *kua'aina* the autonomy of local farmers likely waxed and waned in relation to outside forces, and indeed the roles and actions of farmers undoubtedly changed as some were recruited into managerial positions. It is within the ecological and socially marginal zones of hinterlands that resistance and the collective action of non-elites could flourish.

LEeward KOHALA FIELD SYSTEM (LKFS)

The Leeward Kohala Field System (LKFS) was an agricultural hinterland that was drawn into the political world of district, island-wide, and inter-island polities during the latter stages of the pre-colonial period and into the historic period. Traditionally, the Kohala peninsula was divided into *ahupua'a* or community-based territorial units that extended from the coast inland to the mountain range separating leeward and windward areas. Kohala itself was one of the six named moku, political districts, on the island. Within the LKFS there were no royal centres, with the large coastal *heiau* (temples) of Pu'ukoholā to the south and Mo'okini to the north being foci of political activity (Cordy 2000:383). Located increasingly inland as one moves southward, the rain-fed field system was to become one of the most productive hinterlands in the Hawaiian archipelago. Extending some 20 km north to south along the leeward flanks of Kohala mountain it spread approximately 2–3 km wide in a *mauka* (inland; upslope) – *makai* (coastal; downslope) axis and covered an area of ca. 60 km² (Figure 1). Intensively developed and occupied, the field system contains high densities of agricultural alignments,

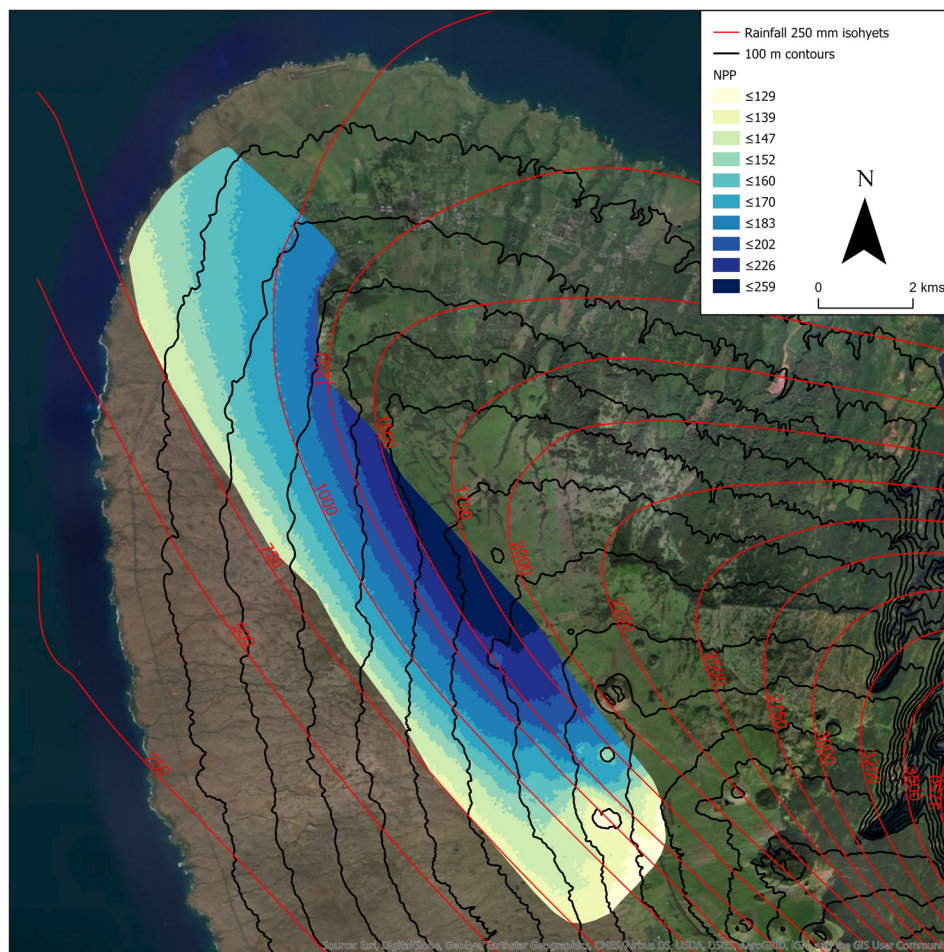


Figure 1. Net primary productivity (NPP) in the LKFS in relation to annual rainfall and elevation.

trail networks, and both residential and religious features (Ladefoged and Graves 2000, 2008, 2011).

At its maximum, the LKFS produced huge quantities of food with the focus on *ʻuala* (sweet potato; *Ipomea batatas*), dryland *kalo* (taro; *Colocasia esculenta*), and *ʻuhi* (greater yam, *Dioscorea alata*), and a range of other useful cultigens such as *kō* (sugarcane, *Saccharum officinarum*), *maiʻa* (plantain/banana, *Musa* spp.), and *kī* (ti, *Cordyline fruticosa*) (Lincoln and Vitousek 2018: 4). Gardening plots can be defined in the LKFS by the intersection of agricultural alignments and trails (Ladefoged *et al.* 1996, 2003). During its latter phases of development, the field system not only met the subsistence needs of local farmers, but production generated large quantities of surpluses. These sustained local managerial *konohiki* and a series of higher ranked chiefs and their entourages, some from outside the area. In addition, these surpluses were mobilized for the sustenance of warriors and craft specialists, including those involved in the construction of *heaiu*. Based on historical accounts (Mears 1791) and geochemistry (Lockwood 2009), the field system also supported large numbers of pigs, an important prestige food and a means of converting surplus produce into storable and moveable protein. The development of this relatively dry area over the span of some four or more centuries (*ca.* 14th to early 19th centuries) witnessed the shift from a household domestic mode of production (Sahlins 1972) to a more intensified and highly managed surplus production. At the same time, seasonal and inter-annual differences in rain combined with geographically variable soil nutrients created a continuum of outputs across the area of the field system.

The ecologically defined boundaries of the LKFS are sharp (see Ladefoged *et al.* 2009; Vitousek *et al.* 2014). The *makai* edge of the system corresponds to the 750 mm (Giambelluca *et al.* 1986) rainfall isohyet, and less closely with isohyets of newer rainfall data (Giambelluca *et al.* 2013). The *mauka* edge of the system is defined by a sharp soil nutrient transition from relatively rich to depleted soils (Vitousek *et al.* 2004) across the two substrates that comprise the local geology. This boundary reflects a threshold in nutrient leaching as a nonlinear function of annual rainfall, the age of geologic substrate, and ambient temperature (which is itself a function of elevation) (see Chadwick *et al.* 2003; Vitousek 2004; Vitousek *et al.* 2004, 2014). The southern edge of the system is more diffuse with fields dispersed across a landscape of more dissected lands and lower temperatures as the field system tracks upslope along the rainfall isohyet. To the north and east, the LKFS is constrained by the coastline, and higher rainfall of the windward side of the peninsula that reduced soil nutrient values.

While the ecological boundaries of the LKFS are sharp, productivity within the system is a continuum with high levels of spatial variability. Several studies have modelled spatial and temporal agricultural productivity within the field system (Lee *et al.* 2006, 2009; Lee and Tuljapurkar 2008, 2010; Puleston (n.d.); Ladefoged *et al.* 2008, 2011;

Kagawa-Vivani *et al.* 2018). Puleston (n.d.) developed a model published in Ladefoged *et al.* (2011) based on the earlier work of Lee *et al.* (2006) and Ladefoged *et al.* (2008). That model estimated potential net primary productivity and the coefficient of variation in net primary productivity and suggests that within the LKFS a central zone was the most productive with decreasing productivity downslope as rainfall decreased and to the south as elevation rose and temperatures declined (see Figure 1). Temporal variability in productivity correlates with rainfall and DiNapoli and Morrison (2017) note that the southern zones of the field system were prone to severe and frequent droughts.

Within the field system steep gradients in rainfall and soil nutrient levels characterize the *mauka* – *makai* axis of *ahupuaʻa*. Research on soil nutrients (see Vitousek *et al.* 2014 and Ladefoged *et al.* 2018 for summaries and references) and experimental gardens in the field system (Kagawa and Vitousek 2012; Marshall *et al.* 2017; Lincoln *et al.* 2018) show substantial variation in sweet potato productivity along transects that extend from the lower to higher elevations within the field system. Kagawa and Vitousek (2012) report on production values in three experimental gardens spaced along the *mauka* – *makai* axis of Puanui Ahupuaʻa. They recorded production of 1.8–4.0 kg/m² during the spring and summer in the upper garden; 0.8–2.2 kg/m² production in the middle garden during the fall and winter, and only 0.6 kg/m² during the winter in the lower garden. At the upper elevation winter growth is inhibited by lower temperatures; at the lower elevations crops fail during the summer due to the lack of rain. In drought years production at any level in the lower elevation *makai* fields would have been impossible, with agricultural activities focused upslope in the wetter more productive lands.

Temporal trends in the settlement history of leeward Kohala correspond to environmental parameters and we divide the process into four stages (Ladefoged and Graves 2008; Field *et al.* 2010, 2011a, 2011b; McCoy *et al.* 2011a; and see Dye 2014), primarily on the basis of data from two zones within the LKFS (the *ahupuaʻa* of Kehena 1, Kehena 2, Makeanehu, Kaupalaoa, Kaiholena and Lamaloloa in the centre; and the *ahupuaʻa* of Kahua 1, Kahua 2, Makiloa, Pahinahina, and Waika to the south). First, as early as AD 1300 and certainly by AD 1400, people were practicing slash-and-burn horticulture in the uplands. Second, the cultivators established the earliest residential features by AD 1400 in both the optimal and more marginal southern zones of the field system. Third, in the optimal central zone, construction of residential features increased between AD 1500 to AD 1650, and then levelled off after AD 1650. Fourth, in the marginal southern *ahupuaʻa*, the greatest increase in households dates to between AD 1650–1800. In addition to the chronological trend of more reliably productive central portions of the field system being intensively developed before the more marginal southern *ahupuaʻa*, there is spatial patterning within *ahupuaʻa* that suggests that optimal zones were occupied earlier than marginal areas (Field *et*

al. 2011a). The pattern of early occupation of optimal zones, both across the field system and within specific *ahupua'a*, with later expansion into more marginal zones highlights the response of people to the variable ecological conditions of the field system.

THE POLITICAL ECONOMY OF THE LKFS

Anthropologists, particularly those working in Oceania, have long discussed the relationship among chiefly mobilisation of labour, household agricultural economies, and the creation of surplus production (Earle 2011; Earle and Spriggs 2015; Sahlins 1972). When population size is small relative to land available for cultivation, when demand for labour needed for building infrastructure and cultivation is limited, and when chiefly demands for surplus production are kept in check, household economies tend to meet the immediate demands for feeding their families over the course of a year or so. Intensive dryland farming systems can destabilize these relations when chiefs can and do seek out additional productivity from subordinate households to create surpluses well beyond domestic needs.

The development of the LKFS from the 14th to late 18th centuries corresponds with shifts in production strategies. Focusing on a series of coastal residential features in Makiloa Ahupua'a, Field *et al.* (2010; 2011a) identify a shift around AD 1650 marked by an increase in the size of primary residences and an increase in number of associated smaller secondary residences. They distinguished primary from secondary features on the basis of size and morphology, and the amount and type of associated midden. The combination of primary and secondary features were interpreted as the elements of Hawaiian households or *kauhale*. The labour from these more numerous, larger households would have been capable of generating greater surpluses in relation to earlier households which were smaller in number and with fewer household members on average. Within the LKFS some 3 to 6 km inland from coastal settlements in this portion of leeward Kohala, a corresponding shift in agricultural intensification took place around the same time. The subdivision of garden plots in the centrally located *ahupua'a* of Kaiholena and Makeanehu occurred between *ca.* AD 1600 and 1800 and likely marked the increased management of household production by *konohiki* with a commensurate ability to monitor surpluses (Field *et al.* 2011a). Farther south in the uplands of Makiloa, Pahinahina and Kahua 1, Ladefoged and Graves (2007) proposed that increases in agricultural production after AD 1650 occurred in a linear fashion while population growth levelled off. This would have resulted in an increase of agricultural surplus relative to household needs in line with a shift from a household-level of production to one in which surplus would have been available for chiefly demands in the late pre-colonial period.

At that same time that agricultural production increased, there was a concomitant process of subdividing

most *ahupua'a* into ever smaller sized territories (Ladefoged and Graves 2006), with implications for both communities' farmers and elites living in and outside of Kohala (Ladefoged *et al.* 2008). Modelling of this process showed that as leeward Kohala territorial units were increasingly divided into more numerous but smaller communities, average life expectancy at birth of individuals decreased (Ladefoged *et al.* 2008). However, according to the model, by dividing the field system into smaller agricultural plots, overall surplus production increased. This increase in overall production came at a cost of increased spatial variability in surplus production and increased temporal variation in achieving surpluses. Territorial subdivision resulted in areas of higher and reliable productivity distinguishable from marginal zones and this made it easier to monitor production in both.

Heiau were constructed throughout the LKFS during the shift from a domestic economy to one focused on surplus production, but this chronology is best known for the less productive, southern portion of the field system. Mulrooney and Ladefoged (2005) derived the temporal associations of *heiau* based on a seriation of construction traits and noted the association of *heiau* with the sub-division of territories. McCoy *et al.* (2011a) refined this seriation and grounded it in an absolute chronology based on 15 radiocarbon dates from under *heiau* foundations. The LiDAR analysis by Phillips *et al.* (2015) extended the territorial focus to show how *heiau* changed over time with respect to differences in viewsheds visible from new construction locations.

These studies found that there was a general trend for late 15th and early 16th century *heiau* to be relatively small and located in the centre of broad territorial units (McCoy *et al.* 2011a). The viewsheds of these structures were minimal and this suggested (Phillips *et al.* 2015:36) the organization of production at a local, perhaps extended household scale. From the late 16th to the mid 17th century additional small *heiau* were constructed (McCoy *et al.* 2011a) and the viewshed of these created a superimposed and interlinked network of ritual organization (Phillips *et al.* 2015:36). These small *heiau* manifested inherent property rights for kin groups, rights that were supplanted with the construction of subsequent larger *heiau* and the imposition of elite demands (c.f. Artursson *et al.* 2016). In the early 17th century, construction of *heiau* employed a new style – enclosure structures with an inverted corner that produced a notch in planview. This is a morphological trait associated with *heiau* on the islands of Maui, Moloka'i and O'ahu. The new *heiau* form indicates that religious authority in the LKFS now included influence from members forming a cross-polity sect of priests. This shift in *heiau* morphology and the presence of a new priestly class coincides with changes in land management and the alienation of commoners from land holding (McCoy *et al.* 2011a). The placement on territorial boundaries and viewsheds of the larger, but simpler, late 17th century *heiau* reflect the

importance of local *ahupua'a* communities in production in conjunction with cross-*ahupua'a* administrative units (McCoy *et al.* 2011a; Phillips *et al.* 2015:38).

MITIGATING CHIEFLY DEMANDS IN THE HINTERLANDS

The shift in the LKFS after AD 1650 from a domestic mode of production to a more surplus-producing economy came with increased managerial surveillance and control. However, the heterogeneous environmental conditions of the LKFS provided opportunities for farmers to exercise their autonomy and resist the demands of elites. Analytically, these zones of the LKFS are characterized by inherent environmental limitations and socially constructed places where elites did not live. The relative autonomy of occupants in those areas is evidenced by the morphology, function and spatial distribution of agricultural, residential and religious features.

Agricultural plots in the margins

The hinterlands of the LKFS are found in the very south of the field system and along the *makai* zone of field system in many *ahupua'a*. It is within these areas that productivity was low, and the frequency of drought was high. Ladefoged *et al.* (2011) note that these marginal zones were areas where agricultural intensification and segmentation were limited, with development taking the form of expansion into previously uncultivated lands. They also note that these more peripheral areas contained lower densities of agricultural alignments.

Additional analysis of that LiDAR data indicates that the spacing between alignments was larger and gardening plots less formal in marginal areas. We measured the width of more than 24,000 field plots across eight *ahupua'a* in the LKFS. Width is defined as the distance (*mauka-makai*) between adjacent field alignments. We did not include distances greater than 100 meters since these are likely disturbed zones. Here we illustrate the differences in garden plot configurations in the central portion (Kaiholena Ahupua'a) and the southern region (Kahua 1 and Kahua 2 Ahupua'a) (Figures 2 and 3). In the central area, we find smaller average plot size, with about half between 10 m, the lower limit of width in these fields, and 25 m wide (Kaiholena: 59%). The larger field widths are more common in Kahua 1 and Kahua 2, and only a third are in the 10–25 m range (Kahua 1: 32%; Kahua 2: 27%). The kurtosis values for all three *ahupua'a* are greater than 3, a reflection of their departure from a normal distribution, with the largest kurtosis value found in Kaiholena. While such high values are a function of the long extent of the left portion of the distribution, they are associated with a more pronounced peak (or maximum) in Kaiholena. In general, both skew and kurtosis are correlated with average plot width. These results suggest that in the central and more optimal zones, fields were intensified and subdivided to create more uniformly small units increasing the ease of management. The more variable and less bounded nature of southern less optimal area gardens limited the ability of others to monitor production. This in turn would have facilitated efforts by local farmers to reduce surplus production, divert surplus to their own needs, or lower marginal return on labour to a level just above the requirements of households.

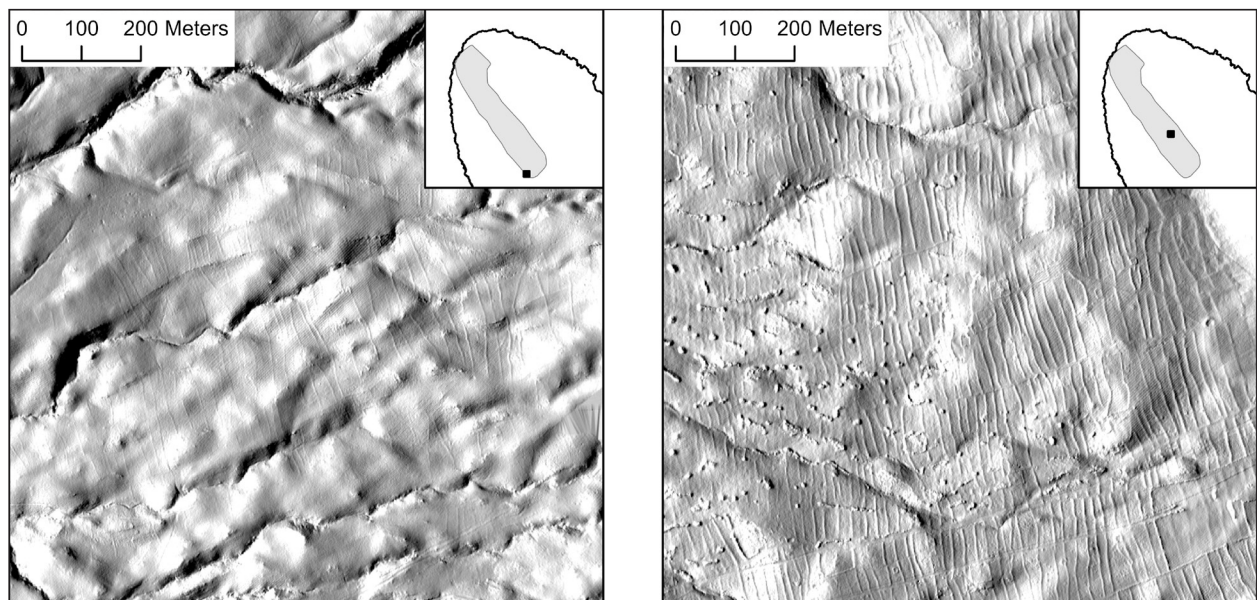


Figure 2. Hillshading of LiDAR data showing garden plot configurations in the southern region (Kahua 2 Ahupua'a) on the left, and in the central portion of the field system (Kaiholena Ahupua'a) on the right.

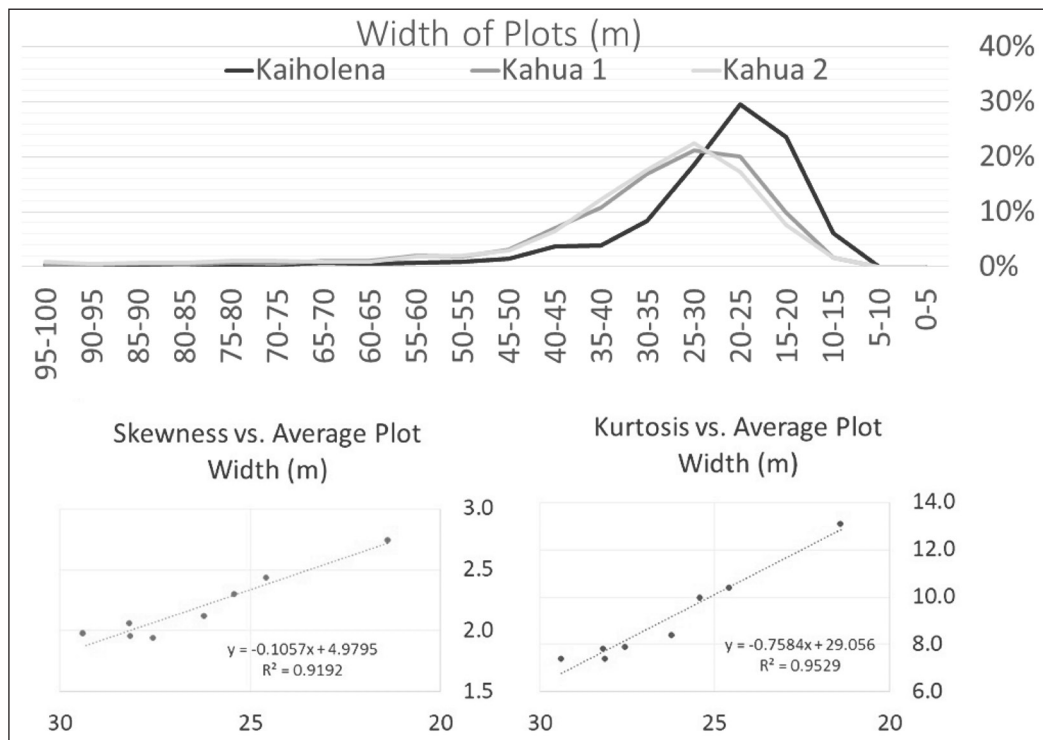


Figure 3. The distribution of plot widths in the southern (Kahua 1 and Kahua 2) and central *ahupua'a* (Kaiholena), and the relation of these to skewness and kurtosis across eight *ahupua'a*.

Hinterland households

The density of residential features in the less optimal southern part of the field system is quite low (Figure 4). The residential features in this area tend to be smaller than those found in the optimal zone of the field system, suggesting they were occupied by farmers and families of smaller size, and not *konohiki* or local community managers. Indeed, these marginal areas of the LKFS are hotter and drier, with significantly cooler and more comfortable living conditions located to the north and upslope. It is in these more optimal locations that primary residential features are larger and secondary features occur in greater frequency, indicators of elite presence and influence.

Unlike the low density of residential features in the extreme south of the LKFS, the density of residential features in the most marginal *makai* zone of some *ahupua'a* is very high (see Figure 4). As shown by Kagawa and Vitousek (2012) these areas were drought prone and only productive after winter rains. The high density of residential features in these zones is not the result of more people living in these areas, rather it can be attributed to the process of periodic abandonment of *makai* zones during multi-year droughts, with reoccupation once conditions improved. During reoccupation a proportion of older abandoned features would have been reused but additional features would have been constructed anew. Over many years the cycles of abandonment and reoccupation, with associated

reuse and construction of new features, created a palimpsest landscape with high densities of features. This process does not appear to have occurred in the most southern marginal areas of the LKFS.

Rituals in the margins

Community-level *heiau* in the southern LKFS *ahupua'a* are found in higher productivity zones. The association of these temples with *ahupua'a* boundaries and centres, often with commanding views of fields, facilitated oversight by managerial *konohiki* and associated ritual specialists (McCoy et al. 2011a; Phillips et al. 2015). These temples functioned in part as community-scale ritual locations for the management and collection of agricultural surpluses as the economy shifted from one focused on domestic needs to one in which elites extracted a portion of the surplus to fund projects at a larger scale. In the more marginal hinterlands of these *ahupua'a* community-scale temples are lacking, but smaller ritual features outside of the viewshed of those temples are sometimes found. For example, in the *makai* zone of Makiloa we recorded a structure (MKI-130; see McCoy et al. 2011a) we now interpret as a *hale mua*, what Kamakau (1991: 27) defines as 'the men's eating house or family chapel.' The structure is a 10.5 by 7.6 m multicomponent feature with well-constructed walls more than one meter high and unusually high concentrations of surface midden and lithic material.

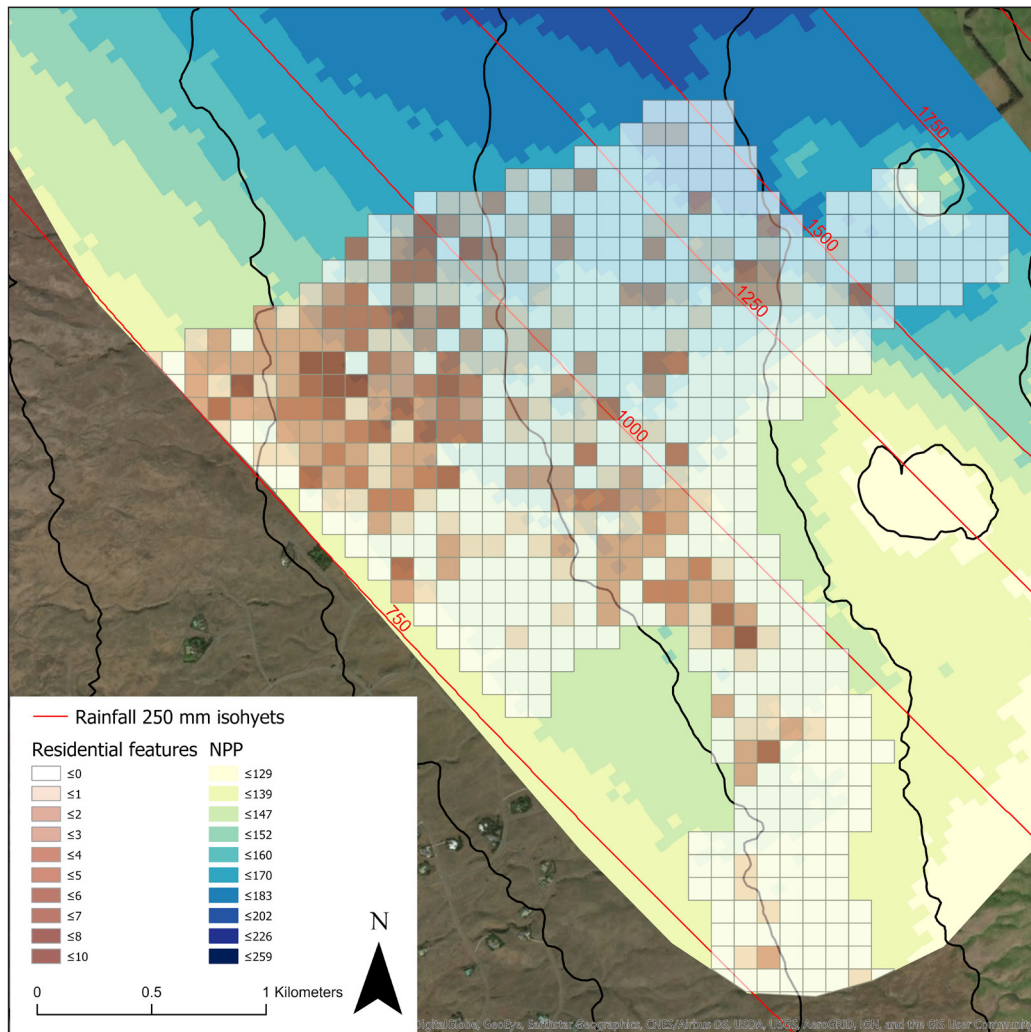


Figure 4. The frequency of residential features in the southern portion of the surveyed area in relation to net primary productivity (NPP).

Based on their study of *hale mua* in Lualualei on O‘ahu, Dixon *et al.* (2008) proposed that the influence of *hale mua* was local. They suggest that members of the *hale mua* were not directly involved in the unification of regional polities, something achieved at larger community-level *heiau*, but rather ‘symbolized the male role in his extended family’ and functioned as places for communal redistribution within local residential groups. In the marginal *makai* section of Makiloa the presence of a *hale mua* hints at the importance of the local extended household, where agricultural production was focused on meeting the subsistence needs of themselves and nearby relatives. While farmers in the area were integrated into both the *ahupua‘a* community and the larger polity with associated chiefly demands for surplus production, such demands, and the payoffs for such demands, were certainly much higher in the optimal *mauka* zones where community-level *heiau* are found. For Makiloa, in its marginal *makai* zone of the field system the presence and influence of chiefs and associated ritual

specialists were limited by riskier and less productive agricultural fields.

DISCUSSION

The earliest Polynesian settlers of Hawai‘i made their homes in the most optimal areas of the archipelago. It was not until several centuries later that permanent settlements occupied leeward Kohala. With the introduction of sweet potato to the archipelago in the 14th century (Ladefoged *et al.* 2005), it became possible to garden the wetter areas of the nutrient rich soils of the uplands of leeward Kohala. These gardens were initially small horticultural plots with corresponding coastal settlements, and the local farmers and fishers of this hinterland were far from the centres of power in windward valleys, where productive coastal and farming locations occurred in close proximity to each other. As leeward Kohala was drawn more and more into competition for power that involved local and non-local

chiefs the autonomy of leeward Kohala residents diminished. For outsiders pondering their intentions for the area, leeward Kohala could no longer be dismissed as a marginal backcountry, rather the potential for generating huge agricultural surpluses would have been recognized. The integration of leeward Kohala with other Hawai'i Island polities stimulated the economic shift to one focused on surplus generation. The ability of local inhabitants to negotiate the demands of elites after this shift was variable, with greater demands likely placed on residents living in optimal zones.

A primary concern of outside elites and the leeward Kohala managerial *konohiki* was the control of the political economy and the maximization of surplus production. Farmers in the LKFS had immediate needs to consider as well as preserving the long-term well-being of themselves and extended families. This included considerations of personal labour and effort within cultural defined norms and expectations. The marginal zones of the LKFS produced less surplus and produced it with less predictability and hence chiefly expectations and control were correspondingly lowered. It was here that homes, as represented by archaeological residential features, were humbler and ritual activities probably focused more on the extended family through the use of *hale mua* as opposed to community level *heiau*. Farmers grew their crops in less formally and uniformly structured garden plots.

The actions of farmers and the politically motivated strategies of elites had implications for the long-term survival of both groups. For farmers it might have been preferable to live in the hinterlands of the LKFS as it would have been easier to manage the demands for surplus production. However, life in these drought-prone areas came with the risk of subsistence shortfalls. These could have been ameliorated by access to food from other areas, either within or outside the *ahupua'a*. Alternatively, farmers could have engaged in the short-term abandonment and movement out of drought effected areas, something that would have only been possible with the auspices of local chiefs and *konohiki*.

CONCLUSION

We have examined the evolution of the LKFS as a *kua'aina*, a vast and rural backcountry. The original occupants would have recognized the rich marine resources adjacent to the barren coastline, but it was not until sweet potatoes were introduced that the uplands flourished. The rich agricultural lands formed a cultural *kipuka* (c.f. Heinz 2019), a land where people had lived for decades before being drawn more and more into the world of outsiders. What became a highly productive field system that generated huge amounts of surpluses was not, however, uniform. The sharp ecological boundaries of the LKFS surrounded a diverse landscape where differential rainfall, elevation and geologic regimes created productivity disparities. We

suggest the lower and less reliable productivity margins of the fields were places where people were less closely monitored and had relatively more autonomy. Being physically and emotionally connected to these marginal areas, however, made farmers vulnerable to the frequent and severe droughts that plagued the margins of the field system. In such times, the relative autonomy of farmers in marginal zones could be a liability and weakness capitalized on by local managerial elite and outside chiefs. Relief by way of resource distribution or access to other lands could be granted in return for continued support of surplus production and the political economy so vital to the new emergent religious centre in the uplands of Kohala and its political counterparts elsewhere in Hawai'i.

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