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The Modern Origins of Traditional Agriculture

Colonial Policy, Swidden Development, and Environmental Degradation in Eastern Timor

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Abstract

The origin of swidden systems is typically portrayed as a pre-colonial, pre-nationalist, and pre-developmentalist tradition, subsequently interrupted and eroded by colonial exploitation and post-colonial technoscience in favour of market agriculture. A recent counter-position to this 'anteriority model' presents swidden systems as reactionary 'refuge agriculture' in search of remote locations to circumvent state accountability (Scott 2009). A third model traces swidden agricultural processes as a 'dual economy' of both subsistence and commodity production. This article examines these approaches through a study of maize and rice in eastern (Portuguese) Timor, where a particular type of environmentally damaging swidden system and colonialism have been shown to be co-emergent. Accommodating new archival data and adding detail to the established position on Timor's agricultural history, it is proposed that the early twentieth century was an important phase in the extension and dominance of maize in Portuguese Timor; and while far-reaching modification to rice cultivation is generally associated with the Green Revolution of the 1960s and 1970s, it is shown that the early twentieth century was also a major developmental period for this grain. It is further suggested that dynamics of agricultural change have differed across the colonial divide between Portuguese and Dutch Timor. The article calls for more comparative research on the divided island of Timor.

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Keywords

East Timor – agriculture – swidden – development – environment – colonialism

Introduction

Throughout the long history of colonial and post-colonial development regimes in the South, governments have intervened into rural agricultural processes and crop configurations to promote market-oriented production that serves the needs of states. There now exists a multitude of studies that have examined the relationship between different kinds of existing and imported crops as this kind of development has been pursued. The general picture to emerge is that peasantries have been forced or encouraged to modify their agriculture from subsistence crops to market ones, as city states, colonial powers, and independent nation-states have expanded their territorial reach, extended their control over land and labour, and sought to advance their national 'economies'. The story told of subsistence crops is often a fateful one: existing, diverse varieties are replaced with fewer improved varieties of the same crop, or existing subsistence crops are replaced with new plantation crops, with corresponding shifts in technology, land use, tenures, labour relations, and dependence on the cash economy. This agricultural drama is most frequently presented as a play-off between a pre-existing, traditional swidden system and a newly introduced, modern system of intensified production. Official neglect and ignorance of swidden systems, subsistence crops, local knowledge, and cultural institutions is part of this panorama (Aso 2009; Dove 1983, 2011; Elson 1997; McWilliam 2002; Moon 2007; Scott 2009).

From nineteenth-century Europe to the twentieth-century tropics of Asia, this division between the pre-existing and the introduced tells the tale of modernity, and it is integral to Julius Boeke's (1953) now classic notion of the 'dual economy'—the functional coexistence of a traditional and a modern sector. (For some, such as De Janvry (1981), there is the assumption that while each sector serves different ends, the traditional sector is destined to phase out under capitalist pressure.) Scholars have argued that this steady intrusion of the modern was no less the case for eastern Timor when under the rule of the Portuguese. Particularly for the period from the turn of the twentieth century, they have highlighted the prominent role attributed to plantation agriculture—especially coffee and coconut. At the same time, the swidden system is presented as a farming method that was squeezed out to more marginal terrain, and there abandoned to history (Clarence-Smith 1992; Gunn 1999; Schlicher

1996; McWilliam and Shepherd forthcoming; Shepherd and McWilliam 2013, 2014). Indeed, much of the historical record on this subject is given to this interpretation. Namely, in the nineteenth and twentieth centuries, a binary emerged in the colonial world between 'rich crops' and 'poor crops'. By definition, 'rich crops' were commodities with high export value, while 'poor crops' were subsistence foods with low market value.[1] In eastern or 'Portuguese' Timor, as in Mozambique, São Tomé, Príncipe, and other colonies, it appeared that there was a clear prioritization of the former amidst a devaluation of the latter, generating a dismissive disposition towards the subsistence vegetable garden—referred to as the *horta* in Portuguese or the swidden in English (we use the terms synonymously). A closer inspection of indigenous and colonial agriculture in Portuguese Timor, however, renders this view problematic. In this article we demonstrate that for the first half of the twentieth century, 'poor crop' development was as significant to the colonial development imaginary as that of the 'rich crops'. But we go a step further: we argue that a particular form of swiddening developed in parallel with the plantation system—it did not precede the plantation in any straightforward manner. This particular form of the swidden was one that was less diverse and more extensive, causing encroachment into and the burning of new forest with little regard for fallowing cycles.

We are not wishing to turn the tables on the swidden, as Scott (2009) has done by suggesting that shifting agriculture (and even ethnic identity) emerged as a posterior, unaccountable refuge agriculture in geographically isolate places as people sought 'not to be governed'. Although this argument does pertain to Portuguese Timor to some degree in the first decades of the twentieth century,[2] this would be to miss the historical co-constitution of the swidden system and colonial agriculture. In this relationship state expansionism did not so much invent the swidden as a defensive reaction as endow it with new possibilities when the indigenous people endeavoured to find ways to live with the Portuguese, particularly once peace had been imposed on them through a series of brutal 'pacification campaigns' (1894–1912). In fact, this is linked to a particular twist on the idea of the 'dual economy', namely, that subsistence and commodity streams have long coexisted within so-called 'traditional' or indigenous

1 We retain these terms throughout the article, rather than translate them into their equivalents, being 'market crops' and 'subsistence crops'.

2 It appears that tax evasion was more common than hiding out of reach of the authorities in the pre-war period. See Correia 1935; *Boletim de Comercio, Agricultura e Fomento da Provincia de Timor* 1917-4:401.

agricultural societies. For example, in the mid to late colonial period the Kantu Dayak in Borneo grew rubber and pepper as part of an ongoing, albeit often tense and interrupted, dynamic with different traders, polities, ecologies, and subsistence modalities (Dove 2011); in southwest Sumatra (Bengkulu Province) throughout the twentieth century farmers managed and balanced subsistence (including upland rice) and cash-crop production (lowland irrigated rice and rubber) in light of changing circumstances—migration, commodity price fluctuation and, eventually, New Order development policy (Schneider 1995); and in East Sumatra from the 1860s to the 1950s, unsustainable (and eventually ruinous) swidden-style tobacco cultivation headed by European planters on land leased from a sultanate existed alongside the integrated swiddens (which incorporated the cash-crop pepper, but not tobacco) of the Karo Batak people (Pelzer 1978).

In exploring the historical flow of the swidden in Timor, we revisit Fox's (1977, 1988) notion of agricultural transition, which is central to established views of swidden development and environmental change on Timor. Building on Ormeling's *The Timor problem* (1956) (which despite the title is focused on West Timor), Fox contends that over the course of colonial history, cereal cultivation, particularly maize, came to complement, prevail over, and displace other crops, wild food collection, hunting, and supplementary forms of meeting a livelihood; the outcome was a monolithic and maize-centred swidden system, which Fox, in his seminal work *Harvest of the palm* (1977), extended to the whole of Timor, with the intent of establishing a contrast with Roti and Savu islands. The latter islands, however, were the main focus of his study, and so Fox does not deal with the specifics and contingencies of Timor Island itself, except in a later book chapter (Fox 1988) on West Timor. Whether Fox generalized across the whole island (Fox 1977) or limited himself to a discussion of the western part (Fox 1988), his argument is the same: Timor's resource base on which this swidden system depended was steadily undermined by population growth and shorter fallow periods, and eventually generated an agro-environmental crisis that few would deny today (Metzner 1977; compare Pannell 2011). This begs a number of questions, such as: How monolithic was this system in particular times and in particular parts of the island? What was the impact of newly introduced crops on the overall configuration of crops over the centuries? In particular, what was, over time, the differential evolution of swidden systems across eastern (Portuguese) and western (Dutch) Timor, given the dominance of particular groups (for example, indigenous, colonial, mestizo, and Chinese), the processes of pacification, forced labour and tax, and the plantation economy, bearing in mind that none of the above was uniform across east and west? And what was the role of maize and rice in all of this?

It would be impossible to even begin to give a satisfactory answer to the above questions in one essay. Nevertheless, we continue in the spirit of the recent work of Hägerdal (2012) with a comparative historical focus on the whole island, and also draw some inspiration from Boomgaard (1999), who demonstrates the irregular nature of maize expansion across Indonesia, to argue that at least in some aspects the trajectory of agricultural change in eastern Timor has been different to western Timor. We point to the first three decades of twentieth-century Portuguese Timor as a period in which, on account of colonial policy, the swidden system became more dominated by cereals than ever before. It also became less diverse, its burning regimes saw an exponential expansion into primary forests, the system was less attentive to principles of regeneration, and other forms of survival (such as hunting and foraging) experienced a decline. We do not so much challenge the established position on the role of population growth as place it in the context of other factors, in particular the little-known Portuguese policy, introduced in 1912, to do everything possible to promote maize and rice as a 'dual economy', that is, towards both subsistence and market ends. In focusing on this period, we contribute to knowledge of agricultural transition (Fox 1977, 1988), underlining that the time frames and processes of crop diffusion and crop dominance cannot have been entirely symmetrical across the island.

We rely on the following sources, largely overlooked until now: a series of agricultural bulletins,[3] published in Dili from 1914 to 1921; a number of articles published in Lisbon between 1907 and 1937; and statistics produced in the early 1950s (see McWilliam and Shepherd forthcoming for a review of these materials). The colonial data set for East Timor is limited, not least for matters of local agricultural and environmental histories. If some of the statistics presented are arguably of uncertain accuracy in their particulars, we believe that they are indicative of broader trends. We acknowledge, however, that many questions remain to be answered regarding the minutiae of necessarily distinctive localized swidden practices, which varied substantially from place to place within eastern and western Timor as well as across both domains.

3 *Boletim de Comercio, Agricultura e Fomento da Provincia de Timor* (henceforth BCAeF or *Agricultural Bulletins*).

Timorese Agriculture in Historical Context

The island of Timor was first inhabited around 30,000 years ago (O'Conner, Spriggs and Veth 2002). Until relatively recently the Timorese subsisted as hunters, gatherers, and fishers in this diverse environment of mountainous uplands, karst plateaus, tropical forests, alluvial plains, swamps, and mangroves. Sago, palm juice, and various fruits were some of the main foods (Fox 1977). Around five thousand years ago agriculture developed to complement established subsistence modalities. Root crops predominated, and it appears that Job's Tears was the first grain to be grown. There was evidence of early use of fire in the planting of these crops in gardens or swiddens (Glover 1971; Fox 1988). Successive waves of migration from the east (Melanesia) and from the west ('Indonesia') as well as the development of trade networks encompassing Java, Celebes, and China saw the pre-European crop configuration expand to include rice, millet, and sorghum, just as metal tools and various animals (buffalo, pigs, goats, horses) were brought in. Early Chinese accounts suggest that grains had a patchy presence in Timor. In the fourteenth century, sago remained the main staple, underlining the continued importance of the collection economy (Eccles 2004; Fox 1988; Ormeling 1956).

From the sixteenth century, Europeans, drawn by the commercial prospects of sandalwood, came with watermelon, papaya, chilli, potato, tomato, eggplant, garlic, onions, and cabbage. They also brought maize, cassava, squash, sweet potato, and peanut. The latter crops were destined to become major staples. It would not be until the Japanese occupation of the mid twentieth century that cassava would rise to prominence when the Japanese forced the local population to intensify this crop (Shepherd 2014). In contrast, only half a century after maize made its first appearance in Kupang, around the mid 1600s,[4] the English voyager William Dampier (1939 [1703]:170) observed that 'Indian corn thrives very well [around Kupang], and is the common food of the Islanders'. Maize is known to have spread relatively quickly eastwards, displacing the established grains of sorghum and millet (Fox 1988) and complementing pigeon pea and mung bean, which would remain important, particularly along the central south coast (Fox 1988:267). Dampier himself only recognized maize: 'What other Grain they have, beside Indian Corn, I do not know'. In a comment that appears to refer to the area around Lifao, Dampier (1939:170) adds, 'they delight

4 Fox puts the date at 1672, while Hägerdal puts it back to at least 1658, adding that it 'must have been known for a long time before that since by [1658] it was already a main crop'. Hägerdal suggests that maize may have been brought to Timor by Ternate sailors from Maluku as early as 1540 (Hägerdal 2012:50, 50 n. 56, 125 n. 98).

most in hunting, and here are wild Buffaloes and Hogs enough, though very shy, because of their so frequent hunting'.

There was plenty of regional indigenous and non-indigenous traffic to drive the diffusion of maize and other plants across the island. Missionaries, wandering armies, Chinese and Topasse merchants and settlers, and the various Dutch and Portuguese activities all played a role (see Hägerdal 2012), as did marital exchange networks (Forman 1977). A produce tax (known as the *finta* in Tetum), first instituted by Dominicans in the 1600s and regulated from 1708 by the colonial government, certainly contributed to the expansion of maize. Maize, supplemented by squash, also enabled the very food surpluses that helped the mobilization of opposition to the Portuguese presence. Fox (1988, 2000) contends that the combination of the native appropriation of rifles and this agricultural transition (associated mainly with the spread of maize) fed the growing power and territorial expansion of the indigenous Atoni of Servião Province in the western part of the island.[5] An alliance of Atoni and Topasses (black Portuguese not loyal to the crown) eventually drove the Portuguese out of Lifao in 1769, eastwards to 'Porta Nova' or Dili. The Portuguese laid claim to the eastern side of the island, and the Dutch claimed the west side of Timor (Hägerdal 2012; Hicks 2004).

Is it possible, however, that maize in the east was not as widespread as it was in the west? After all, in the 'multi-ethnic east' there was no single ethnolinguistic group (not even the Portuguese themselves!) that was growing all-powerful and expanding into new lands to the extent that the Atoni had done as they advanced westwards, instituting plantation agriculture as they went.[6] In the east, the balance of power between the more numerous and fragmentary ethnolinguistic groups was relatively stable, as was their territorial reach (Hägerdal 2012: 73, 91 n. 15). In the half of the island that became Portuguese Timor, it is arguable that maize did not have the same pronounced geopolitical implications for the indigenous populations. As Metzner (1977) observes, more extensive cultivation was barely possible there given the prevailing confined-settlement patterns and endemic headhunting where permanent or semi-permanent food gardens hugged fortified villages (see also Forbes 1884; Roque 2010). There would have therefore been relatively little swidden (maize-centred or otherwise) expansion into outlying forests, much less onto

5 That the Vereenigde Oostindische Compagnie (Dutch East India Company or VOC) tried to stimulate maize in (West) Timor is apparently an erroneous interpretation of primary sources. In fact the VOC promoted rice; see Boomgaard 1999:68 6n.

6 The Atoni are the largest ethnolinguistic group in West Timor with around 850,000 members. They inhabit two thirds of the territory (see McWilliam 1988).

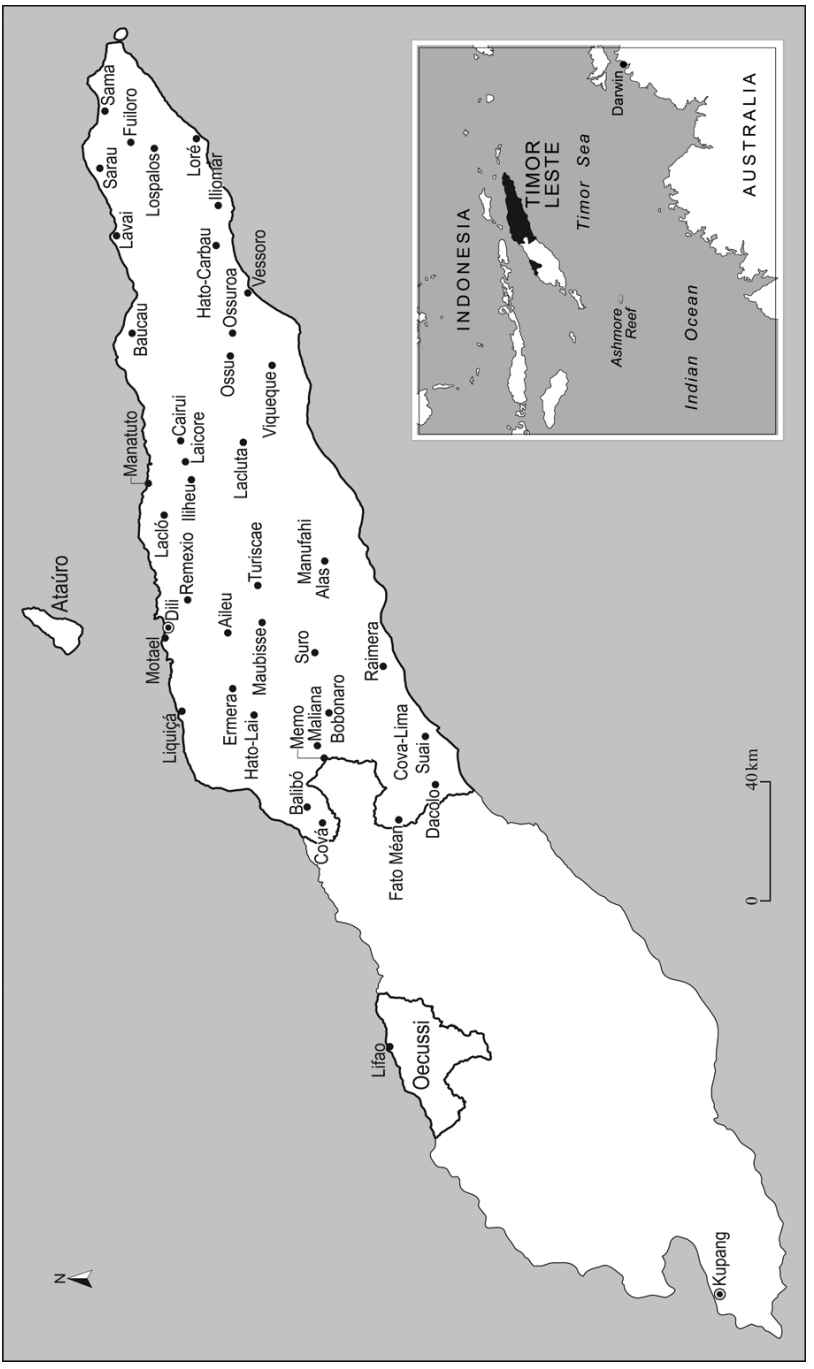

FIGURE 1 *Map of Timor with places appearing in text*

'wide, expansive lands' that characterized the steady westward push of the Atoni in West Timor (see McWilliam 1988:288). Indeed, it is arguable that the more rugged and higher terrain of Portuguese Timor made it more resilient to diminishment of the polymorphous economic base which included foraging, hunting, and fishing in coastal areas (compare Blust 1976:37; Hicks 2004; Pannell 2011). As we go on to demonstrate, there is persuasive evidence that maize was not monolithic at the time, and that rice was still a minor crop. Indeed, the future of these cereals was destined to be influenced by the particular nature of the pacification campaigns, development policies, property legislation, and tax regimes specific to Portuguese Timor.

Agricultural Trajectories of Portuguese Timor

From the moment the Portuguese came ashore in Dili, in 1769, they were highly dependent on the labour support and the *finta* food contributions of the *reino* (indigenous kingdoms) that surrounded them. Maize and rice, both readily transportable, were two common means for the indigenous rulers (*liurai*) of the *reino* to meet the tax amidst a range of other commodities including sandalwood, cloth, wax, leather, and gold (Castro 2010 [1867]:376). In the late 1850s, maize became an export crop for a few years (Magalhães 1909:2), but from one year to the next the export of maize was forgotten, since the colonial sights were set on the more profitable coffee under Governor Castro (1859–1863). 'In our opinion', said Castro, 'the future of the colony depends on coffee' (Castro 2010:321). With coffee, the role of maize and other taxable foods also declined when the colonial government exempted coffee-producing *reino* from *finta* dues. Maize would nevertheless remain an important supplementary subsistence crop, while one tenth of the rice harvest would suffice to meet tax obligations for those *reino* that did not produce coffee (Castro 2010:431).

Both Governor Castro and a contemporaneous visitor to the island, natural historian Alfred Wallace, noted the importance of maize to indigenous livelihoods (Castro 2010; Wallace 2010 [1869]). Yet how central were maize and rice to indigenous farming? The earliest figure for maize was provided at a conference presented at the Geographical Society in Lisbon in 1907. The agricultural expert, geographer, and ethnographer Alfredo da Costa e Andrade (1907:11) estimated the annual maize output in Portuguese Timor to be in the order of 60,000 *picos* (or 3,720,000 kilos).[7] Given a population of around 400,000, Andrade

7 *Pico* (in Portuguese) or *pikul* (in Javanese) was a traditional Asian measure of weight equal to between 60 and 62 kilos.

calculated that this was equal to an annual average of 9.2 kilos per capita, which, Andrade exclaimed, was 'barely significant!'. While this figure may have been conservative (see Magalhães 1909:29), further support for these baseline estimates can be gleaned from the *Agricultural Bulletins*, first published in 1914. In the western military district of Batugadé, the commander who was stationed there surveyed annual maize production in two *reinos*, Cová and Balibó, judging total output to be 99,200 kilos, or 5.5 kilos per capita. Rice output for the same *reinos* was even lower, with a total annual output of 6,200 kilos, equal to a per-capita output of under 400 grams. The commander noted that apart from these two cereals there was plenty of squash, beans, sweet potato, and pigeon pea.[8] The following year, the commander in Viqueque assessed maize production in its five *reinos*: Ossu, Ossuroa, Lacluta, Vessoro, and Viqueque itself. In two of these kingdoms, Viqueque and Lucluta, annual maize output per capita was 16.7 kilos and 11.8 kilos respectively.[9] These *reino*-specific figures, coupled with Andrade's 1907 report, suggest that maize and rice cannot have been more than supplementary foods, despite their historical role in the collection of the *finta*.

It is well known that during Governor Celestino da Silva's 14-year rule (1894–1908), the development and diversification of the plantation economy received enormous impetus. As he pacified the restless and rebellious *reino* through a protracted series of brutal campaigns, and established one European plantation after another, he widened the repertoire of 'rich products' from coffee to include coconut, rubber, cacao, tea, tobacco, and spices. It is less well known, however, that the food logistics of warfare, the advancement of European-owned plantation estates (on which thousands of indigenes laboured) and the introduction of compulsory labour for road-building and transport compelled Celestino to upscale maize and rice cultivation (Figueiredo 2004:454). This intervention into the subsistence economy was designed to ensure the stable and efficient supply of food to colonized subjects by way of grains that could be stored and transported with relative ease.

Without this intervention into maize and rice initiated by Governor Celestino da Silva, the defeat of the southern dissident *reinos* under Governor Filomeno de Câmara (1911–1917) would never have been possible; the War of Manufahi (1911–1912) required that some 12,000 indigenous troops be provided with food rations over the course of ten months. Colonial victory and

8 BCAeF 1914-3:143. Our population estimates are adjusted from the figures provided by Dores (1903:777, 785).

9 BCAeF 1915-3:338–9. As previously, we use Dores (1903) for population figures to derive per capita averages.

'pacification' completed, Câmara inaugurated Portuguese Timor's first Department of Agricultural Services (henceforth 'the Department'). Câmara gave the Department the task of promoting Timor's full range of agricultural products: coffee, cacao, copra, peanut, castor plant and tobacco, rubber, cotton, sugarcane, maize, rice, beans, sweet potato, potato, cassava, mango, pineapples, oranges, grapefruit, mandarins, banana, papaya, and custard-apple (Branco and Câmara 1915:197–8). But far from advancing a symmetrical investment in all of the above, Câmara extrapolated Celestino's initiative with a fanaticism he became famous for: he relentlessly promoted the rich products, and of all the poor products he focused almost exclusively on maize and rice (Branco and Câmara 1915:212). Thus a 'maize-rice fury' ensued in parallel with the extraordinary efforts to foist coffee and coconut upon the entire indigenous population. As one critic of the policy would later put it, they 'did for the *hortas* [maize and rice swiddens] what they did for the rich products' (Carvalho 1936:4). A transformation in subsistence livelihoods and farming practice was in the making.

The Promotion of Rice and Maize

After 1912, interventions into maize and rice took two forms: the areas under cultivation were expanded by an order of magnitude, and new technologies were introduced to increase productivity and systematize production. In his 1912 address to the military commanders, Governor Câmara proclaimed that 'in Timor there are vast expanses of land suitable for rice cultivation [...] for the most part they are naturally or easily irrigable, and amenable to two harvests per year'.[10] For its part, maize was known to grow almost anywhere (see Boomgaard 1999). The promotion of both crops entailed a great many activities and strategies, operationalized by military commanders who followed the orders of the Department. Many new varieties of wet and dry rice were introduced from abroad; they came from the Netherlands East Indies, the Philippines, and Siam.[11] They were tested in experimental stations linked to the state

10 See BCAeF 1914-7:426–7.

11 Various varieties of rice were procured from Java in 1914 (BCAeF 1915-5:546). Those varieties from Bangkok–Siam included Klao Bao, Klao Klanguti, and Klao Nok (BCAeF 1914-1:6–7). (Since 'Khao' means 'rice' in Thai, Klao may have been the Portuguese rendering.) The delivery of five varieties of wet rice and four of dry rice from the Philippines, first ordered in 1913, was delayed due to the outbreak of war in Europe (see BCAeF 1914-7:426–427). In the early 1930s, 15 new varieties were imported from Buitenzorg and tried in

farms (the Granja Eduardo Marquês in Liquiçá and the Granja Republica in the defeated *reino* of Manufahi), state plantations (including Remexio and Hato-Lia), and a handful of large, European-owned estates. In 1914, a package of seven select, newly introduced wet and dry varieties as well as a small selection of local varieties were distributed throughout the territory.[12] Some new varieties of maize were also imported, and comparisons with local varieties, following techniques copied from Belgian Congo,[13] saw a suite of maize varieties go into circulation: of these, two of the best known were *dente de cavalo*, which had been shipped in from Australia, and *batar-modoc*, a preferred Timorese variety.[14]

The varieties travelled everywhere. Maize went to Manatuto, Baucau, Lautém, Viqueque, Manufahi, Bobonaro, Cova-Lima, Liquiçá, and Remexio.[15] The dry rice went to Manatuto, Bobonaro, Liquiçá, and Motael, and the wet varieties went to Manatuto, Baucau, Lautém, Bobonaro, Aileu, and Suai.[16] Demanding that rulers and chiefs turn more of their lands over to maize and rice cultivation was of course not difficult. Issuing orders was what the Portuguese in Timor always did best. Wet rice in particular was extended under force: 'Sometimes coercion is warranted', insisted Câmara in October 1912, as he outlined a technical system for paddy whereby he allowed participants to keep 75% of the harvest.[17]

Maize and rice were extended to areas where they had never been cultivated or where they had evidently never been more than minor crops. Prior to 1912, for example, there was little in the way of wet-rice production in Manufahi, but now it was vigoroursly encouraged, particularly around Becó on the plains of Raimera.[18] After four years it was reported that 'the cultivation of wet rice [in Manufahi], which barely existed before, now satisfies the needs of the

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Hare-Balibar and Loré. They did not adapt but for two varieties, Skrivimankoti (SKK—introduced from Surinam via the Dutch East Indies) and Tjina; the latter was destined to become a key variety in the Philippines-based, post-war high-yielding rice breeding programme (Cardoso 1937).

12 These were the varieties procured from Java (see previous note). The three dry varieties were Tjempo, Sramboel, and Rengges; the four wet ones were Papabaren, Soekonandi, Balegading, and Nongkobosok (BCAeF 1914-7:482).

13 BCAeF 1915-3:327.

14 BCAeF 1915-3:317; BCAeF 1915-2:220, 232.

15 BCAeF 1915-2:255.

16 BCAeF 1914-7:483.

17 BCAeF 1915-6:652.

18 BCAeF 1915-3:317; BCAeF 1919-2:102.

region, which increase everyday'.[19] In Lautém, rice was cultivated in Iliomar, Loré, and Sama for the first time, and was introduced to Sarau after a twenty-year lapse in production.[20] The wet varieties were brought to the wide plains of Fuiloro, where previously there had been none.[21] Parts of Bobonaro, including the plains of Maliana and Memo, were set aside for paddy.[22] Between Manatuto, Lacló, Laleia, Cairui, Iliheu, and Laicore, 3,500 hectares were newly cultivated with rice, and yields approached forty times their previous levels.[23] In Viqueque, around Hato-Carbau, extensive rice cultivation commenced on the plains of Ira Bere and Uai Cai Dâva.[24] Extending the rice frontier sometimes entailed moving people to new lands, such as the uplanders of Fato Mean and Dacolo 'who [were] obliged to grow rice for the first time on the plains of Suai'.[25]

While wet rice was necessarily confined to a number of regions with appropriate agro-ecological conditions (Metzner 1977), maize was more widely cultivated but, as previously indicated, it was to date part of the polymorphous economy, mixed in with numerous other crops, while agriculture itself was mixed in with foraging, fishing, and collecting (Pannell 2011). In addition, the mixed economy was regionally specialized, and bartering and marital-exchange obligations ensured that products, including maize and rice, were in a constant state of flow from places of production to places of consumption (Forman 1977). These patterns were set to change. In Lavai in the Baucau region, for instance, the commander there said: 'The indigenes of this *posto* [military post] are preparing some lands for maize cultivation, despite the difficulty faced in making the mountain population here apply themselves to this crop.'[26] Further west, in the enclave of Oecusse, a commander admitted that among these peoples maize and rice were a low priority. In his attempt to make them grow these grains in 1915 'there has not been much progress'. 'These people are dawdlers', he said, adding that 'the advice given to them to help their agriculture goes in one ear and out the other, since they continue to go into the wilderness to look for sago and wild beans'.[27] A few years later, the same commander would resort

19 BCAeF 1919-1:93.
20 The lapse was reportedly due to rat infestation and an epidemic that killed all buffalo; see BCAeF 1915-1:203.
21 BCAeF 1914-3:143.
22 BCAeF 1914-7:457.
23 BCAeF 1914-3:142.
24 BCAeF 1919-1:300.
25 BCAeF 1919-2:109.
26 BCAeF 1918-3:233.
27 BCAeF 1915-6:724.

to 'the strategy of telling the chiefs to instruct the people that the cutting of sago is forbidden without a license'.[28]

A military official sent to the island of Ataúro (30 km offshore from Dili) was similarly intent on modifying the prevailing subsistence and exchange economy in an area where maize was absent and fish were plentiful:

> This military post has obliged the indigenes to open *hortas* for their subsistence, as when I first took up office most of the indigenes didn't have *hortas*. Those on the coast lived on fish, palm juice, and some maize; the maize they did not grow themselves but sailed to Dili to procure it in exchange for the fish that they caught. They told me that they didn't need to have *hortas* because the sea was their *horta*—it gave them fish to eat and to exchange for maize aplenty. But I made them open as many *hortas* as they could so that they have something to eat without having to go to other localities to acquire goods except in times of need.[29]

Clearly, in certain places, maize was thin on the ground, and the state proceeded to disrupt existing exchanges between peoples inhabiting different ecological zones in order to generate more uniform and increased outputs.

The Logic of Maize and Rice Extension

The need for maize and rice was articulated in a number of ways. Captain Armando Pinto Correia (1944:177), who served as the administrator of Baucau from 1928 to 1934, provides an example in his 'sermon to the chiefs', delivered from the patio of his residence:

> I spoke to them of the need to transform the district [Baucau] into Timor's granary [*celeiro*]. I exhorted them to intensify the production of rice and maize, and extend the area under cultivation [...] I said to them that they needed to work hard, not only to pay the tax, but also so they could dress more comfortably, improve their diet, live in better houses [...].[30]

It is uncertain how many Portuguese commanders or administrators had the wellbeing of the indigenous population at heart. Pinto Correia may well have

28 BCAeF 1918-2:275.

29 BCAeF 1915-6:738.

30 For a list of some 26 wet (white and red) and dry rice varieties in Timor, see BCAeF 1914-7.

been a rare specimen in this most distant and insulated of colonies. Outside the colony it was little known that indigenes laboured on prison plantations under the most heinous conditions, and that salaried but obligatory labour regimes were not far removed from slavery (Clarence-Smith 1992; Shepherd and McWilliam 2013, 2014; Gunn 1999). We may surmise that it was less indigenous welfare than it was tax that was foremost in every governor's mind; the colonial authorities were preoccupied with raising 'tributary capacity' by increasing productive output. Indeed, the whole *raison d'être* of the Department was premised on this principle. There was endless debate and considerable anxiety about how much tax the indigene could withstand: too little tax and the Portuguese felt they were selling themselves short; too much tax might bring on rebellions that the colony could ill afford.

In posing the fundamental question 'Can the indigene pay more?', the head of commerce, Albino Granado, argued for the inclusion of poor products into the tax equation:

> We know that the current economic circumstances of the indigene allow him to pay the current taxes without great effort [...] [but] if we want to raise his taxes we have to raise his tributary capacity [...] and while we incite him to increase his production of rich products, we should go to every effort, using all means, whether by forcing him or by teaching him, to produce many poor products, with the state making a commitment to buy all that he can produce. To make him cultivate more yet not compensate him duly, is an abuse that is not consistent with the colonizing mission that the Portuguese race is here to carry forth.[31]

Poor-product promotion was the very thing that allowed for this fine-tuning of tax, so that revenue would reach its maximum threshold. Ever since 1908, when the capital tax of one Mexican dollar (*pataca*) was first collected, commanders accepted maize and rice in lieu of hard cash. Tax rises—one *pataca* two *patacas* five *patacas* seven [...]—were as rhythmic as the drumming that accompanied their announcements (*bando*) to the indigenous population. By the mid 1930s, the capital tax would be equivalent to 200 kilos of first-quality rice, or 300 kilos of maize.[32] (The alternative was a couple of months of labour for the state.) To grow as much produce, they had to seek out new lands to grow it on.

31 BCAeF 1919-2:59–65.

32 These calculations are based on exchange rates and food prices provided by Figueiredo (2004:477).

Many villages, moreover, were now in a better position to cultivate new lands, as pacification and peaceful relationships between *reinos* now liberated from head-hunting raids had drawn them out of their defensive abodes of higher altitudes to settle in areas hitherto considered too dangerous (Metzner 1977).

Given both shifting settlement patterns and the moderately expanded and improved network of trails and 'roads', the population was as easily accessed for the import of new technologies as it was for exporting produce. Commanders everywhere sought labour-saving techniques for rich crops and poor crops alike. Irrigation was one thing that the Portuguese felt could be improved to augment both farm productivity and labour efficiency. The Timorese had long cultivated their wet rice under a system of gravity-fed irrigation. Water ran in open channels or it was fed along a series of spliced bamboos, slotted into each other to move water over many kilometres. Commanders and administrators improved these systems and amplified their use. They employed masons to line the channels with limestone. Baucau's channels soon came to stand as a model of what could be achieved in the other military districts (Correia 1935). In the rice-growing areas of Baucau, once the rice harvest had finished the commander had the water redirected to the maize fields.[33] In other areas, bamboo pipes were replaced by metal pipes. New irrigation systems accompanied the extension of the rice frontier on the southern plains of Viqueque around Hato-Carbau.[34] Maize and dry-rice fields were generally rain-fed, but in many parts, such as around Aileu, they were irrigated for the first time. On the immense state farms that employed as many of 5,000 men, women, and children, maize was intensively cultivated; state *hortas* were also established for maize and rice which were centrally located at every *posto*. Maize monoculture came into being for the first time ever on the eastern side of the island (compare Hägerdal 2012:73).

Pest treatment was also a feature of maize development. In 1915, in Liquiçá, rat infestation became so severe that indigenes were paid for every dead rat they offered to the commander.[35] Arsenic and strychnine, mixed with copra, were made available to combat various four- and six-legged creatures that attacked the crops.[36] Carbon sulphide, a highly flammable liquid that occasionally exploded in the faces of those using it, was rubbed on the maize cobs to deter insects. The biological control of bugs and beetles in the form of releasing chickens into the maize fields worked admirably. In state planta-

33 BCAeF 1918-4:456.

34 BCAeF 1919-1:300.

35 BCAeF 1915-2:220.

36 BCAeF 1914-1:54–5.

tions, guns proved to be the most effective treatment against bats, monkeys, and thieves.

Irrigation, pesticides, the distribution of crop varieties, and the expansion of the areas under cultivation were some of the changes and innovations that the Portuguese brought to maize and rice. But the main instrument that was supposed to precipitate a revolution in the cultivation and productivity of the cereals was the plough. In his *Memoria descriptiva*, Magalhães (1909:29) was among the first to herald what the plough, in combination with inputs, could do to modernize maize:

> The yield of maize in Timor is 50:1, its cultivation remains most primitive, and it is clear how productive this cereal could become if the lands were properly tilled with ploughs and supplied with fertilizers, replacing the dibble and the ashes of the trees, which are currently in use without exception.

Because the War of Manufahi had distracted the Portuguese from their agricultural mission, it was only after the authorities had put this group of some 40,000 rebels in their place that several hundred ploughs and accessories were shipped to Timor; the buffalo to pull them, of course, were already there, as were the indigenes who would be trained in their use.

The extension of ploughs took effect through a system of organizing groups of men known as *moradores da lavoura* or 'ploughing brigades'. Each brigade possessed four trained buffalo, one regular plough, one disc-plough (*grade*), a cultivator, and an array of hoes.[37] Maize now had to be sown in straight lines, and flatter terrain was preferred for its cultivation.[38] The maize fields were tilled twice, and prior to their second tilling the fields were fertilized (usually with excrement). In the case of rice, ploughs were intended to replace the buffalo puddling the fields. For both grains, the use of ploughs was made mandatory for all those who were within reach of one. For rice, transplanting rather than broadcasting was also enforced, and the varieties were not to be mixed. The extent to which ploughs, transplanting, and other crop management techniques increased productivity is uncertain. Most productive gains were achieved simply because the areas devoted to these crops were greatly expanded, oftentimes into primary forest. We discuss the fate of the plough in a later section.

37 BCAeF 1917-4:384.

38 BCAeF 1915-6:648.

Markets

For the government in Dili, the prospect of increasing rice production had implications beyond what the indigenous cultivators ate themselves, used in rituals, fed to their kin, or passed on to their family networks as part of the gift exchange that inhered in the system of marital unions (Forman 1977). Ever since the turn of the century, rice imports had been climbing steadily. In 1910 they stood at half a million kilos; in 1913 these figures doubled to attain almost one million kilos. Rice development was intended to offset the cost of imports for this colony that had always faced a fiscal struggle. Maize was a different story. Not since 1860 had it been exported. This did not prevent the authorities in both Lisbon and Dili from imagining that export potential existed. There were grave maize shortages in the metropolis—not even the pigs there had enough to eat. The English in South Africa and the French in Indochina had managed to make of maize a lucrative export crop.[39] Couldn't the Portuguese in Timor do likewise?

As it happened, they could not. Commanders had enough trouble getting the produce from the uplands to Dili, where it was needed for the urban supply and for redistribution to places where indigenous labourers were served their meagre rations under the forced-labour system. In many of the more distant areas, maize and rice were now cultivated in abundance, but the produce simply stayed put. Albino Granado of the Commerce Department complained:

> The military commanders and civil administrators are constantly coming to the central authorities urging the state to buy the produce of their subordinates, for without this their moral authority to incite the indigenes to work becomes farcical. The indigene finds himself fulfilling an order given to him from his superior [to plant] only to see that his produce lies around and rots.[40]

Proud commanders feared looking foolish in front of their Timorese subordinates when it was supposed to be the other way round. One official commented wryly that 'even the indigenes are beginning to believe that the Portuguese have a habit of starting everything but finishing nothing'.[41] Nor did the Portuguese

39 BCAeF 1915-1:52–3.

40 BCAeF 1921-1:18.

41 BCAeF 1920-1:14, 26.

commercial skills measure up too favourably against those of the Chinese: if the produce was not 'left to deteriorate in the local granaries', Granado confessed, 'it ended up in the hands of those most opportunistic and competitive of traders'.[42] (We may assume that the Chinese, not the Portuguese, had the more sophisticated grain storage facilities; the *Agricultural Bulletins* shed little light on this matter.)

Viqueque was one place where the production of maize now greatly exceeded local consumption by virtue of the input from the Department, the zealous commitment of the commanders, and the cooperation of local chiefs. But the produce went nowhere, while Dili and the concentrated plantation lands of Liquiçá and Ermera were scraping to meet their cereal needs. Part of the problem lay with the roads. The best of them ran to the coffee lands, but outside these privileged precincts the road quality was abysmal; roads were impassable in the wet season and not much better in the dry season. The demand for seasonal porters was high, but the colony was afflicted by a chronic dearth of workers. These conditions also affected the new rice cultivation zones in the south, such as in Suai and Suro (Ainaro). Often, the steamship *Dilly* failed to arrive as scheduled and local produce went to ruin (Cardoso 1937). Even when transportation functioned, the cost was prohibitive. 'It is cheaper', the new director of the Department calculated, 'to import rice from Lisbon than it is to bring it down from Suro on a man's back'.[43] It may seem ironic that these extraordinary efforts in agricultural development were not accompanied by a substantial expansion of the road network—in fact, road-building would not be pursued greatly until after 1922, when motorized transport first appeared.

But transport could not have been the issue for areas close to the colonial capital. The military district of Motael was on Dili's doorstep, and the northern reaches of Manufahi were not far beyond Motael in comparison to Viqueque, Lospalos, or Suai, all of which were six or seven days' travel away by steamship and/or on horseback. When the Department was first set up, nobody doubted that surplus maize and rice would be easily moved to Dili from these more proximate areas. In fact, many were confident that within a few short years maize and rice from these regions would not so much end up in Dili as they would file through it *en route* to Port Darwin, the Netherlands East Indies, and the very spot in the world most distant from Timor—Portugal itself (Magalhães 1909:29).

42 BCAeF 1921-1:17.

43 BCAeF 1921-1:18.

If rural commanders were doing everything they could to increase the cultivation of maize and rice, why was the produce not reaching Dili, not even from places just one or two days' travel from the capital, where many hectares of ploughed and irrigated fields had been opened across each of the *postos* of the area, including Turiscae, Mau-Lau, Maubisse, Laqueco, Aituto, Aileu, Saboria, Sarim, Dailor, and Lequidoi?[44] In 1916 and 1917, commanders were called upon to explain themselves amidst allegations that they had been inflating statistics. We translate one section of the intriguing defence of one commander, the infantry lieutenant Manuel Branco of Manufahi, who 'with the aim of disputing certain claims that are arising out of data taken at the marketplace in Dili [...] offer[s] some new information on the apparent shortage of maize and rice and the consequent price rises'.

Lieutenant Branco began by reproducing a conversation between himself and Chief Carlos of Alas who, the lieutenant added, 'is no ordinary creature in indigenous terms'. The lieutenant asked the chief whether the shortfall in maize was due to a reduction in the size of the mountain swiddens or *hortas*, particularly those that were outside the purview of the state? The chief then noted an exponential increase in maize production, but a decrease in saleable excess, and he explained why:

> The Timorese now work hard, so they need more food. The Timorese man keeps what he needs for himself, and as we proceed to discover new wealth [that is, plantation cultivation] we cannot sell what is indispensable for our own wellbeing. Every week the population is divided up to work, and you can see where the maize goes. What was previously consumed in one year is now consumed in one month.

The chief went on to note that in times gone by 'the great majority ate almost exclusively fruits and tubers, they hunted animals, and drank *tuaca* [palm juice]' while maize was 'a delicacy'. 'It's not with betel nut, fruits and palm juice that one gets the energy to sustain work [so] a complete change in their diet has been introduced', continued the chief.

Just after the maize harvest of 1917, the commander of Motael (the *reino* immediately south of Dili), Lieutenant António Terroso[45] similarly retorted:

44 BCAeF 1914-5:268–9.

45 The first use of the plough is credited to this commander; see BCAeF 1915-6:736.

> It should not be forgotten that even if no increase in cereal production has been noticed [in Dili], the indigenes currently consume 10 to 20 times that which they consumed prior to 'the agricultural revolution' [...]. In days gone by, when most of the people spent their days just chewing betel and wandering about, they ate very little. But today, with almost the entire population working hard from dawn until dusk, they eat very much indeed [...]. In 1913, around the headquarters [*sede*] of the military district [that is, Aileu] there were not enough rice lands to produce 200 *picos* of rice and today there are enough rice lands which in two annual plantings can yield several thousand *picos* [1 *pico* = 62 kilos] [...]; the same can be said for maize.[46]

While there was without question hyperbole in these statements, we take them as evidence that local diets were changing. When the commanders commented that the natives 'ate little' prior to the agricultural revolution, it is also likely that they were referring to cultivated staples—whose cultivation was highly visible to them—and not to forest foods—for which the hunting and collecting were less apparent. It would be difficult, however, to determine the exact degree to which maize cultivation inside Portuguese Timor had expanded since Andrade's conservative 1907 baseline estimate of just under 4,000 tonnes across the half-island. It is worth noting, however, that notwithstanding the increased indigenous consumption of maize and the phenomenon of 'overproduction', the total quantity of maize that reached the Department's warehouse in Dili increased by twenty-fold over the course of a decade (1911 to 1920).[47] In the case of rice, the fact that by the end of the 1910s imports had fallen to one twentieth of the 1913 levels while consumption had increased, is a sure sign of a major shift; similarly, the Department brought in 2,675 *picos* of rice in 1920 as against a figure of 98 *picos* for 1911.[48] Administrators were pleased to see how well 'the indigenous adaptation to the new commercial conditions of rice' was going.[49] While growth concentrated on wet rice in the lowlands, dry or 'mountain' rice had also played a role. The latter was intercropped with maize and beans, and it belonged of course to the very swidden system that was expanding exponentially on account of maize promotion.

46 BCAeF 1917-3:255.

47 Between 1911 and 1920 there was a steady increase. See BCAeF 1921-1:33.

48 BCAeF 1921-1:33.

49 BCAeF 1919-2:61.

The Environmental Crisis and the Plough

Those who are familiar with Timor Island would certainly question whether this maize and rice intensification was simply the result of indigenous obedience to orders from above. Significantly, maize was also being extended outside of the state-organized fields by slashing and burning swathes of hitherto uncultivated forests well beyond the gaze of colonial officials. There was now one new major incentive to do so. In the years immediately following the War of Manufahi, a new law was instituted to ensure that those who cultivated the land had their rights protected: in some cases, the law allowed land to be owned under title; in the majority of cases usufruct was guaranteed to the common cultivator under a system that aimed to break the dominance of property-rich big chiefs by establishing a form of communal title, so that Timorese commoners 'are now certain that they will not be fleeced [...] knowing that the fields they cultivate will be theirs and their children's'.[50] The disenfranchised and landless were quick to seize the opportunity, and it was reported that applicants were queuing up at the military commanders' offices to register properties (compare Sulistyawati 2011).[51]

In relation to maize cultivation in particular, what was in the process of becoming consolidated was the very thing referred to by Fox (1977:77) some half a century later as he sought to account for the similarities between Timor and Sumba and the notable exception of the palm-tapping economy of Roti Island: 'It is not swidden agriculture per se that accounts for the precarious subsistence base of the peoples of Timor [...] but the historical creation of a monolithic form of swidden overly dependent on maize'. Fox is right to stress historicity—this was nothing essentially Timorese or pre-colonial. The 'precarious', of course, refers to the intensifying pressure on land and the concomitant environmental stress. So it was that from the colonial perspective more swiddens meant more burning, and with more burning came fires that went out of control. Far from the state-managed intensive maize fields, these swiddens destroyed forests that the Portuguese anticipated exploiting for their valuable timbers. Deforestation degraded and eroded land that could potentially serve the cultivation of rich products—coffee, coconut, cocoa, rubber, sisal, and so on. When fires escaped their swiddens and entered plantations, the losses were enormous. The Portuguese viewed these changes with great consternation—the very agricultural wealth of Timor seemed to be slipping through their fin-

50 BCAeF 1915-5:544.

51 BCAeF 1915-5:544.

gers just at the point when they were about to exploit it for all it was worth. From 1912, new laws, orders, and decrees were pumped out of the governor's office and published in the 'official bulletin'; the gamut of laws to protect forests and prevent the burning on which swidden agriculture relied was conveyed across the land (Shepherd and McWilliam 2014).

In the absence of an effective capacity to police swiddening, the rapid expansion of maize cultivation was exactly that which brought on the crisis. Years later, it was admitted that

> [t]he commanders were ordered to pressure indigenes to increase poor crops by increasing the area under cultivation [...]. But they so much exaggerated the fulfilling of their instructions that, under this policy of maize expansion instituted in 1912, the destruction of the forests received its most severe assault.
>
> Agência Geral das Colónias 1931:158

At the time, however, civil administrators and military commanders alike refused to see the connection between policy and the obvious environmental outcomes. They insisted on pointing to the Timorese as 'the greatest enemy of the forest' (Agência Geral das Colónias 1931:157) and condemn the age-old 'agricultural traditions' as the unequivocal source of the problem; their environmental laxity was now added to a long list of other terms that had long been deployed to describe the failings of the Timorese—promiscuity, indolence, superstition, poor physical conformation, deceitfulness, jealousy, suspicion, distrust, and so on (see Magalhães 1909).

Just as they are today, the Timorese (and their habits) were always presented as the problem—how could it be otherwise?—and the Portuguese always believed they had the solution. This time, their solution was the plough. In replacing the dibble and the hoe, the plough would raise labour efficiency. 'What two men with hoes do in one month can now be done in one day with the plough', exclaimed one enthusiastic chief.[52] The plough would also give rise to *hortas* that produced greater yields. The overall surface area required for *hortas* would be reduced and precious forests would be spared. Properly tilled soils would eliminate the need for burning, and fertilizer would replace ashes. Maize cultivation would move off the steep slopes and onto flatter lands. The problem of the 'traditional' swidden would thus be resolved.

52 Again, these are the words of the chief of Alas, who was repeating what was said all over Portuguese Timor as part of the fanatical extension of this implement.

In reality, the plough would provide the technological fix for an environmental problem that was as much a Portuguese invention as it was a consequence of 'Timorese tradition'. The plough was the fetishized object that allowed the Portuguese to distort reason and avoid responsibility. The problem was recast as a techno-logistical one: there were simply not enough ploughs. More and more ploughs were unloaded at Dili harbour; motorized ploughs followed. But even as the indigenous population left the ploughs to rust in the fields, the Portuguese in Timor managed to perpetuate the fiction that 'the rapid extension of the plough in Timor, undertaken with far greater difficulty in Portugal, is nothing less than marvellous'.[53] Yet 'despite sustained efforts by the authorities', confessed Captain José Martinho a few years later, 'no one has yet managed to make the indigenes accept ploughs as necessary and useful for his crops' (Martinho 1943:140).

When in Portugal a new dictatorship (referred to as the Estado Novo after 1933) took over from the Republicans in 1926, the republican intervention was no longer immune to criticism:

> From 1912 until 1918, the Department of Agriculture intervened decisively to avoid the deforestation [by] initiating the indigenes in the use of the plough, to replace the primitive process of clearing forest and burning for the preparation of maize fields, and terminate once and for all the reliance on the dibble for turning the soil. Those who knew Timor [...] when this intense effort was undertaken will know that these actions were of no consequence.
>
> LENCASTRE 1931:77

New figures on maize and rice production specifically would have to await the post-war period.[54] In 1953, when a series of five-year Development Plans was first put into operation, the indigenous population of Portuguese Timor now stood at some 450,000—some 50,000 greater than at the turn of the century. Total maize and rice production was put at 22,798 tonnes and 7,860 tonnes respectively; these figures amounted to an annual per-capita maize production of just over 50 kilos and an annual per capita rice output of 17.5 kilos.[55]

53 BCAeF 1915-6:757.

54 As Metzner notes (1977:234), from 1920 all statistical data were recorded in district administrators' annual reports, which were destroyed during the Japanese occupation.

55 We use the figures offered by Reis (2000:75–82), who synthesized data from various sources.

Since Andrade (1907) and the commanders' survey of maize and rice four decades earlier, maize production had increased some fivefold, and rice some forty-fold.

Conclusion

Agricultural development of early-twentieth-century Portuguese Timor sought to rationalize the subsistence economy as much as it aimed to develop the plantation sector. We have shown that maize and rice cultivation were consolidated and accelerated by the Portuguese colonial interventions of the early twentieth century. We have suggested that prior to this period maize was not so widely cultivated although, alongside rice, it was clearly important and stood out in the indigenous and colonial systems of tribute, exchange, and power relations as a key component of the polymorphous subsistence base (see Blust 1976; Pannell 2011). We have also indicated that substantial rice development, as opposed to diffusion, was underway half a century earlier than what is generally considered to be the case (compare Metzner 1977). The expansion of both cereals across the landscape was aligned with a need to ensure the indigenous labour force had at its disposal a readily available food supply, replacing alternative food sources that were at once diminishing and incompatible with labouring livelihoods. Heads of family had to meet their capital tax, which between 1908 and 1936 increased tenfold. The sale of maize and rice was one of the main ways to do so. The evolution of this particular form of 'dual economy' created a suite of unintended environmental problems and an attempt at providing a technical solution in the form of the plough.

Our queries relate not to the outcome of mass swiddenization across the island (compare Pannell 2011), but rather to how eastern or Portuguese Timor in particular arrived at this point. Despite the many continuities across the island halves, including the general suite of crops and comparable population growth and densities (the details of which lie outside the scope of this article), we have ventured some comparative reflections on Portuguese Timor and Dutch Timor. A few things are worth reiterating: In Portuguese Timor there was no single maize-empowered ethnolinguistic group that prevailed and expanded anything like that of the Atoni in the west (Fox 1988; Hägerdal 2012; McWilliam 1988); there was no comparable state-driven development of rice and maize in Dutch Timor as there was in Portuguese Timor in the 1910s and 1920s; the plantation economy under Dutch control in western Timor was miniscule compared to that of Portuguese Timor (Ormeling 1956:131); the pace of livestock development (particularly the replacement of buffalo with Bali cattle), in con-

trast, was spectacular in Dutch Timor during the early twentieth century, while no comparable intervention existed in Portuguese Timor; and while ploughs under both the Portuguese and the Dutch failed, they did so at different times and under different conditions (Fox 1988:273; Metzner 1977:142; Ormeling 1956). In addition, there was no active agriculture department in Dutch Timor until the 1930s (the Dutch concentrated their development efforts in the central islands, in particular Java—see Maat 2001; Moon 2007) and only at this relatively late stage did the Dutch define swiddening as 'a problem' (Ormeling 1956:127).

Not until the 1930s, therefore, was there a confluence in the definition of problems inherent in 'tradition' and, in particular, 'the traditional swidden' across the island halves. Whilst dry (or upland) rice was subject to many of the same expansionary and developmental problems, wet-rice production could be tamed and contained. As the modern, intensive, state-managed maize fields languished as soon as colonial officials turned their backs, the emerging 'traditional swidden', meanwhile, 'got away', both untameable and uncontainable; the indigenes were blamed for its proliferation. So captivating was the ideological sway of this idea that in Timorese colonial and post-colonial discourse of the post-war period, wet-rice production came to be associated primarily with the modernist project, while the swidden was relegated to the field of unsustainable, even 'uncivilized', 'indigenous tradition'. New policy urged that the maize-dominated swiddens of post-war Timor now had to be eliminated, by the Portuguese in their eastern half of the island (until 1975) and by the Indonesians in their western half (as well as across the archipelago) and, after 1975, in their 'annexed' Timor Timur (McWilliam 2002; Silva 1964).

On both sides of the border, the historical emergence of the villainous swidden casts an ironic disquiet on the ways in which the people there continue to be blamed for this rampant slash-and-burn farming and the ways in which they are now, as they were then, counselled on how best to reverse it. In East Timor, swidden agriculture finds no apologists, not even among national NGOs which are vigorously promoting many other aspects of 'tradition' and 'culture' (Palmer and Carvalho 2008); the situation in West Timor is no different. Yet, as with swidden systems elsewhere, if read as a 'comprehensive landscape management system' (Fox et al. 2009:308), swidden-style practices in East Timor were, and are, always emergent, part of a diverse pattern of landscape use and exploitation as well as dynamic livelihood systems which are quick to embrace change, innovation, and transformation (Dove 2011; Dove, Percy and Doolittle 2011; Pelzer 1978; Schneider 1995). In East Timor, if less so in the neighbouring west, the continued reliance on wild foods in rural diets and the persistence of pre-colonial root crops and tubers attest to this dynamism.

Swiddens are equally quick to react to pressures coming from the political economy and broader markets. Indeed, the reactive transformation of the subsistence economy, whether by default or by design, was something that happened wherever colonization demanded market-oriented crop intensification (Aso 2009; Dove 2011; Dove, Percy and Doolittle 2011). In East Timor, colonial drivers—peace, plantations, tax, land regulation, forced labour, and a limited maize and rice market—propelled a particular style of swiddening into being, which we recognize now as traditional slash-and-burn. In West Timor, other factors were instrumental: Dutch colonial policy was hardly one of those factors, but, as Fox (1988) has demonstrated, indigenous territorial expansion was. Timor Island, therefore, extends a lesson to the broader understanding of the emergence of swidden agriculture by showing how the pre-colonial and early colonial 'agricultural system' was refashioned to become the characteristic maize-dominant swidden system of the late-colonial period (Fox 1977). The contrast between Portuguese and Dutch Timor offers a second lesson: a contemporary, island-wide agricultural panorama, across two nation-states (West Timor of Indonesia and independent East Timor) with many more similarities than differences in their respective agricultural systems, tempts one to assume that change followed similar historical pathways; closer analysis, however, reveals differences in diffusion, indigenous politics, and colonial ambitions that informed, but also destabilized, the very binaries of poor crops and rich crops, subsistence crops and market crops.

It would seem timely, therefore, for scholars to return attention to the offset and asymmetric emergence of, and transitions in, swidden systems, whose historical formation is necessarily as complex and multi-faceted as the current decline of those systems (Dove 2011; Fox et al. 2009). Following a revival of interest in the history of the swidden, we may ask to what extent swiddening, far from having 'an ill-defined anteriority' to colonial or state development, did not even arise as a decentralizing, outward-looking, liberating agent of ethnic affirmation (Scott 2009), but rather as a centralizing, inward-looking, and state-compliant agent of subordination—less at the margins of state power than right in the grip of it. This, ultimately, was a process that brought Timorese farmers and communities into greater contact with the cash economy and commodity production, yet, with great irony, forced environmental outcomes quite contrary to colonial interests.

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