

Chapter 5

Cycads, Sustenance and Cultural Landscapes in the Amami Islands

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1. Introduction

The cycad (Cycadophyta) is a genus of gymnosperm that can be traced back to the Permian era. The genus flourished in the Jurassic period and is now present in a range of tropical and sub-tropical regions, including Micronesia, Melanesia and Australia (see WHITELOCK 2002). The species *Cycas revoluta* is native to southern Japan, where it is known as the *sotetsu* (the term by which we will subsequently refer to it), occurring in a range from the Yaeyama islands south of Okinawa up through the Ryukyu archipelago to Kyushu island.¹ The plant is hardy and well-suited to island environments, since it is salt-tolerant, and is also common further north as a result of its cultivation as an ornamental garden and landscape plant.² The *sotetsu* grows fairly rapidly (for a cycad) and progresses from a (single) crown of leaves and minimal trunk to a tree-like growth of up to 8 m in height, which

may include several metre-wide leaf crowns on a branching trunk structure whose base may measure up to 0.9 m in diameter (Fig. 1). In mature female specimens, the feathery, convex centre of the crown is the location for up to several dozen plum-sized red fruits whose flesh covers seeds up to 7.5 cm in length. The resemblance of the tree to species of palm has led it to be (incorrectly) referred to as a 'sago palm' or, less commonly, 'fern palm'

There is considerable literature on the *sotetsu*, and related cycad species, that describes the toxicity of its various components in its unprocessed state (see WHITING [1989] for a compendium of these). The principal cause of this toxicity is the presence of the glucoside cycasin, which causes a range of symptoms from severe gastric reactions through to liver failure (and is also carcinogenic). Beta-methylamino-L-alanine, a form of amino acid with various toxic effects, is also present.³ Despite these aspects of its bio-chemical make-up, the pulpy interior stem of the plant and its seeds have been widely used in Australia, Melanesia, Micronesia and South East Asia as a food source for indigenous peoples - a usage that continues to the present, albeit in a more limited form (given the increased availability of other, less preparation-intensive, food materials).



Fig. 1. *Sotetsu* crown with fruit, Tokunoshima Is, 2009. Photo: Philip HAYWARD.

2. *Sotetsu* and Amami history

For much of its early history, Amami was an autonomous collection of island communities with varying degrees of connection with each

1. See KYODA (2010) for a discussion of its distribution and low genetic diversity.

2. See OSBORNE and TOMIYAMA (1995) for a discussion of its cultivars.

3. While there is not extensive evidence of its harmful impact on humans in Ryukyu, this amino acid has been extensively documented for its impact on residents of Guam who consume the local cycad variety *cycas circinalis* (see SPENCER *et al.* 1987). Also see SACHS (1997) for a discussion of its relationship to various health conditions on Pingelap island.

other. In the 14th and 15th centuries the area came within the sphere of influence of the expanding Ryukyu kingdom, based in Okinawa before being seized by the Satsuma clan from Kyushu in 1609, who dominated the region until the Meiji Restoration of 1868 that incorporated Amami into the modern Japanese state. Despite this, the region remained a largely overlooked regional ‘backwater’ with many islanders continuing to live in thatched huts with no access to mains water until well into the 20th century and with modernisation (including the construction of paved roads, brick and concrete buildings and electrification) not occurring on a large scale until after the withdrawal of occupying American forces in 1953⁴ and the islands’ incorporation into Kagoshima Prefecture.

The Satsuma clan utilised their domination of the Amami Islands to force islanders to abandon their subsistence lifestyle, based on agriculture and fishing, in order to cultivate sugarcane for export to Kyushu, requiring them to labour in harsh conditions for little local profit and to the detriment of cultivating food resources for local consumption. This created a vulnerability that became all-too apparent when a series of severe cyclonic events in the mid-late 1700s deposited substantial amounts of sea salt on fields, causing a series of famines that resulted in a significant number of deaths from starvation and migration away from the islands. James LEWIS’s theorisation of island vulnerability and resilience to indigenous and exogenous hazards (2009) offers a number of significant insights into island resilience and vulnerability. Drawing on analyses of catastrophes arising from European colonial intervention into islands such as Tonga (where “the otherwise descriptively rich... folklore and legend” of the pre-colonial era “seemed unconcerned with environmental hazard,” [*ibid*: 4]); LEWIS has identified a system of “disaster imperialism” at work. In this colonial mechanism

the vulnerabilities created by imperial disruption served to reinforce imperial control by weakening local societies and undermining the senses of resilience and self-sufficiency that characterised their pre-imperial operation. But whatever lowering of morale may have occurred in Amami as a result of the community’s newly-developed susceptibility to a range of environmental pressures, local response to the events of the mid-late 1700s was both proactive and significantly effective. Local concern to protect the population against subsequent crises resulted in the decision to plant *sotetsu* throughout the islands, on account of its salt-resistant properties, its value as an emergency food resource, its ability to provide effective wind/sea spray breaks for fields cultivating other plants in coastal areas and the usefulness of its leaves as restorative, a nitrogen-rich fertilizer for other crops (such as sugarcane and rice).⁵

The *sotetsu* proved a particularly useful resource during a series of adverse climate events in the early 1800s. Regional prosperity increased in the late 1800s, during the Meiji restoration, aided by a global rise in sugar prices and an unforeseen advantage to *sotetsu* cultivation, in the form of the export of its leaves to South East Asia and North America for use in floral displays. A slump in the sugar market in the early 1920s, and the global economic depression that followed at the end of the decade caused severe hardship and famine to return to the Ryukyus and the *sotetsu* was once again accessed as a key foodstuff. Similar conditions recurred in Amami in the late 1940s and early 1950s during the US occupation. One term that came into broad circulation in Japan to describe the harsh conditions of these periods and, indeed, in some contexts, the Amami islands (and Ryukyus in general), was *sotetsu jigoku* (usually translated into English as ‘*sotetsu* hell’). Perceptions of the ‘hellish’ conditions of the time were strongly as-

4. US forces occupied Amami in between 1946 and 1953, effectively cutting it (together with Okinawa and Ogasawara) off from main island Japan.

5. See, for instance, NAGOYA, 1984: 141, for historical reference. In addition to these intended uses, the plant later became a valuable export commodity, with dried leaves being exported to South East Asia, Europe and North America for use in funerary rites from the late 1800s on (see THIERRET 1958: 28); seeds were also processed for laundry starch from the 1930s on and the plant was used for various medicinal purposes (K. NISHIA, cited in WHITELOCK 2002: 139).

sociated with the *sotetsu* itself on account of its predominance in diet, its intensive preparation requirements, the possibility of poisoning if not adequately prepared, and the bland, starchy nature of its stem pulp.

A. KOBAYASHI, who visited Amami in the early 1950s, described the lengthy preparation methods for the stem pulp in the following terms:

After removal of the outer scaly skin, the stem was cut into small pieces, 7-15 cm., and then left for some time under a straw mat so that it might become covered with fungi. The stem pieces fermented by the effect of the black fungi and others. Isolation of the starch was now easier and the toxic elements were removed. They were washed in water and then the starch was extracted. (cited in WHITING 1989: 228)

A series of photographs of this process taken by Hideo HAKARI in the 1950s (reproduced in THIÉRRÉ 1958: 21) detail the chopping, drying and rinsing methods involved and indicate the lengthy processing involved. Douglas HARING, a US scientific investigator who visited Amami in the immediate post-War period noted that there was a “huge reliance” on *sotetsu* pulp, used as an ‘extender’ (to bulk out limited contents of other dishes) and that the *sotetsu* nut meal was the base ingredient in a local miso.⁶ He also noted that the *sotetsu* was “universally loathed” and that its consumers risked poisoning “every now and then a batch of especial potency kills those who eat or drink the product” (1954: 227). HARING described a process of embarrassment and denial at work, with many locals identifying that while the poor might consume *sotetsu* products they were not themselves reliant on it (*ibid*).

Such local and external perceptions have established the *sotetsu jigoku* as a central element of much of Amami’s recent history; a history that has, in turn, served to define Amami identity. Community identity is not “given,” essential or static, it is *performed* in different ways in differ-

ent places with different materials, different affective engagements and different outcomes. As Max WEBER expressed, in a seminal attempt to define ethnicity, the “subjective belief” of a group “in their common descent because of similarities of physical type or of customs or both, or because of memories of colonization and migration” is fundamental to “the propagation of group formation” (WEBER 1978: 39). The performance of identity occurs in a number of contexts, in socio-cultural terms these can include language, music, dance, cuisine, agriculture, traditional medicinal practice etc. These reinforce senses of shared customs and memories and produce tangible and intangible heritages. Individual acts of identity performance that define community identity are a product of locale, circumstance and of custom, reaction and/or innovation. In these senses, the *sotetsu*’s own growth from individual low crowned stubs to high, multi-branched field breaks is a performance of identity that produces a distinct cultural landscape through the plants’ growth, its interruption of wind force and saline dispersal, its creation of sheltered spaces for agriculture and its general construction of a ‘parcelled’ field scape and the network of lane-ways that humans have used to access and exploit its resources (Fig. 2).

While the cultivation of *sotetsu* and its preparation and consumption as an emergency food has been common to Amami over the last three hundred years (at least), the ubiquity of the designation of *sotetsu jigoku* for Amami history, has tended to obscure the fact of the *sotetsu*’s demonstrable success and sustained resilience as an emergency food product and of the wisdom of the local enterprise to cultivate it widely across the region from the early 1800s on (at a time when global economic slumps, let alone American occupation were unimaginable future contingencies). In this regard we might just as accurately identify Amami and the wider Ryukyu Islands as being characterised as *sotetsu kyuusai* (*sotetsu* rescue/salvation).⁷

6. Both of which are products resulting from fermentation affected by the *aspergillus oryzae* fungal mold.

7. Aside from food resource properties, *sotetsu* leaves also formed a useful cash product for the islands in the early 20th Century, when its leaves were exported to Java for use in funeral rituals (HARING 1952, cited in WHITING 1989: 226).

3. *Sotetsu* cuisine and culture

One of the most common characterisations of the deprivations of the *sotetsu jigoku* periods concerns the unpalatability of *sotetsu* dishes. This has led to routine repetition of this characterisation by many writers referring to Amami history, few (if any) of whom appear to have verified their contention with any direct experience of consuming *sotetsu* dishes. This is, in many ways, unsurprising since few writers and scholars working outside the area of Food Studies seem aware of the potential of taste and digestion as essential elements of research in food history. Indeed an indignant historian might well point to the difficulty of accessing *sotetsu* products when writing about the *sotetsu* as a symbol of Amami history primarily explored through broader socio-cultural analysis. Yet there is a problem here in the intensification of (ill-understood) secondary source characterisations combined with a peculiar under-estimation of human culinary skills and practices. It is a common human impulse to prepare food dishes that are palatable. Repeated experiences of food preparation and consumption - and experiment and communication with other producers and consumers - can identify techniques and recipes that produce food that is acceptable and, often, pleasant for consumers. There is no reason to assume that such practices did not influence patterns of *sotetsu* preparation and consumption over the last three hundred years and, indeed, significant evidence to the contrary. Such is the predominance of negative perceptions

that the evidence is often in plain sight. Take, for example, the previously noted observations by the American scientific officer in Amami in the early 1950s who noted the “universally loathed” and frequently poisonous nature of the *sotetsu* as a food stuff, without noting the contradictory aspects of its widespread consumption, at a time of improving socio-economic conditions, and, most pointedly, of its packaging and export to markets in main island Japan (HARING 1952, cited in WHITING 1989: 227). While HARING did not identify the off-island consumers who were purchasing and consuming the product, and while these may have been Amami islanders who had relocated to Kansai and Tokyo; the simple fact of their purchase of *sotetsu* products suggest that “universal loathing” may have been something of an exaggeration. This is not to deny that the starchy trunk pulp, in particular, was commonly regarded as poor substitute for a range of other foods but rather that alternate perceptions were also present.

In terms of memories and cultural inscriptions of the taste of the *sotetsu*, the observations of external researchers are notable. Writing in 1880s, J. E. SMITH described the taste of roasted *sotetsu* nuts as possessing “the flavour of chestnuts, with less sweetness and a more watery consistence” (cited in THIERRET 1958: 1) while W. HOOKER observed in 1830 that the flavour was “sweet but insipid” (*ibid*). While these are hardly ringing culinary endorsements, they at least offer an alternative perspective to the hegemonic negativity of most Japanese



Fig. 2. *Sotetsu* hedged field, near Kanamizaki village, Tokunoshima Is, 2009. Photo: Suelo KUWAHARA.

characterisations. Local research has also begun to acknowledge the role of *sotetsu* in Amami cuisine. Tsuyu FUJII's *Shima No Juri* ('Foods and Recipes of Amami') (1999) includes details of preparation of 'flour' from the *sotetsu* trunk and 'meal' from the nuts (Fig. 3). While the author accompanies her recipes for *narigai* (nut meal porridge) and *shingai* (stem flour porridge) with cautions about the palatability of the porridges to contemporary tastes, she also identifies the "strong leavening power" of the nuts as making a "tasty *nari miso*" (FUJII 1999: 153), a product made by combining boiled soy beans and chopped prepared *sotetsu* nut in a preparation traditionally stored in large jars. The authors of this article also found confirmation of local perceptions of the palatability of *nari miso* while researching in southern Tokunoshima Is. in 2009. During one interview, for instance, Suma YAMAMOTO, a 93 year old woman from Kanamizaki village, who grew up during the economic depression of the 1920s, recalled her childhood memories of her family harvesting *sotetsu* fruit in the fields adjacent to the village and processing the seeds to make a year's supply of miso. She recalled the miso as a "delicious" element of her childhood cuisine and also remembered the attractive nature of the fruit when it was ripe and ready to be harvested.

While YAMAMOTO's recollections might (all-too-easily) be dismissed as the result of nostalgia for a long-lost youth, her account has a major advantage over broader historical characterisations in that it reflects sustained knowledge and consumption of *sotetsu*. In this regard it is also relevant that she did not present her perceptions as contradictory to local perceptions but rather complemented them with reference to cultural inscriptions of the *sotetsu* in song. Referring to the attractive *sotetsu* fruit, she recalled a line from a mid-20th Century Amami song which proclaims that "The redness of the *sotetsu* fruit is beautiful." In itself the line is significant, at least within the general derogatory discourse concerning the plant detailed above, but its production context is also significant. The line



Fig. 3. Splitting the *sotetsu* nut to extract 'meal' for miso preparation, Toguchi village, Amam-Oshima, 1998. Photo: Teruko NISHIDA (NISHIDA 1998: 112).

derives from a song entitled '*Sotetsu no Nari*' ('*Sotetsu* Fruit'), a prize-winning poem by author Tadahige SHIGEYAMA set to music by Hozo MATUSDA and popularised by singer/sanshin⁸ player Miyoko NAKAI on a 7 inch vinyl recording issued by an Amami recording company in 1956. The song was released at an important time in Amami: American forces had recently withdrawn, the deprivations of the immediate post-War period were softening and the island was reasserting itself at the same time as it was engaging with reconstruction-era main island Japan. Tokunoshima-born entrepreneur Yoshihiko IBUSUKI opened Central Gakki music store in 1949 in the Amami capital of Naze and began recording and releasing local music, mainly in the traditional local shima uta (island folk song) style, in 1956. IBUSUKI's initiative aimed to retain and revive traditional Amami music at a time of cultural trauma and transition. The writer's choice to build a tender poem around the imagery of *sotetsu*

8. The sanshin, a three string fretless banjo-like instrument, is an icon of Ryukyu culture.

fruit (and the label's subsequent choice to release a musical adaptation as one of its first singles) suggests a readiness to (re-)embrace an iconic local plant in a more celebratory context than common characterisation of periods of *sotetsu jigoku* suggest. The song's opening lyrical couplet produces a striking image of passion: "The redness of the *sotetsu* fruit is beautiful/ [It is] just like the colour of my lover's heart" (authors' translation);⁹ and the song goes on to conjure images of moonlit beaches and birds song as conducive to love making. Suma YAMAMOTO's reference to the song to reinforce her youthful memory can thereby be understood not so much with reference to a single snippet of verbal (and melodic) imagery but rather in terms of the song's broader affective dimensions and the context of an earlier era of local cultural reassertion.

4. Modern context

Since the reversion to Japan in 1953 the Amami Islands have experienced a steady increase in prosperity and amenities, together with a rural-urban drift from outlying islands and villages to the Amami capital, Naze, and to major Japanese cities such as Osaka, Tokyo and Kagoshima. While far from prosperous (in comparison to either main island Japan or Okinawa) in the last half-century the islands have not experienced any of the environmental or socio-economic pressures that caused them to rely on *sotetsu* as an essential foodstuff

as in previous periods and, with little immediate prospect of such hardships returning to the region, the *sotetsu* has faded from consciousness as an essential and/or emergency food source. In this new context, the cultural landscape created by *sotetsu* hedged fields and laneways, such as that around Kanamizaki, has been 'lapsed' as a resilience resource and now serves other functions. One of these is relatively contiguous with its historical use, providing small cultivation patches for local residents to grow vegetables to supplement their purchased groceries (or, in some instances, to neglect as weed choked enclaves within a more actively cultivated area). Another is a product of both the lapsing of resilience function and the arrival of tourism in the islands. The latter has been a somewhat volatile phenomenon. Following the reversion to Japan in 1953, and particularly during the economic boom years of the 1960s-early 1970s, the Amami Islands experienced a surge in tourism as Japan's most southerly islands, with Yoron Is., in the far south of the group, being a particular beneficiary of holidaymakers' impulses to head as far south as possible. This situation persisted as long as the US administration in Okinawa retained barriers against movement between "its" islands and main island Japan, which finally dissolved in 1972 when the administration returned control of Okinawa to Japan. With their most southerly status lost, tourism declined in Amami. A partial revival in the 1990s proved short-lived. Evidence of this is clearly apparent close to Kanamizaki village in the form of the foundations and access roads of the now-demolished Hotel New Otani at the end of an overgrown track on a nearby bay. During the latest peak in tourism, the laneways of the *sotetsu* fields were resignified as a botanical attraction through their laneways' designation as *sotetsu tonneru* ('*sotetsu* tunnel'), and the overall aggregation of mature plants as a "jungle" (Fig. 4). Accompanying this (attempted) resignification of the area was the erection of a gift shop adjacent to the fields, which still operates, although with a low volume of trade, selling seashells, trinkets and clothing. As an aggregation of individually-owned small field



Fig. 4. View of *sotetsu* 'tunnel' laneway outside Kanamizaki village, Tokunoshima, 2009. Photo: Suelo KUWAHARA.

9. See IBUSUKI, IBUSUKI and OGAWA (2011: 678) for a full Japanese translation of the original Amami language lyrics.

parcels with no coherent identity or management, the owners *sotetsu* field area have significantly not yet identified or explored the option of securing a heritage status for the area.

One heritage status directly relevant to the Kanamizaki *sotetsu* fields is that of ‘Globally Important Agricultural Heritage Systems’ (GIAHS), a category identified, advocated and administered by the United Nations’ Food and Agriculture Organization (FAO). The Kanamizaki *sotetsu* fields exemplify many of the characteristics of GIAHS identified by the FAO, in that they are “ingenious agri-‘cultural’ systems” based on “complex and innovative land-use/management practices” that have evolved “due to geographic isolation, fragile ecosystems, political marginalisation, limited natural resources, and/or extreme climatic conditions” and exhibit “ecosystem resilience and robustness” premised on “generations of accumulated dynamic knowledge and experience” that constitute a “valuable cultural inheritance” (KOOHAFKAN and CRUZ 2011: 22-23) (Fig. 5).

The lack of quest for heritage status for Kanamizaki fields reflects a number of factors. The principal ones concern both the functionality of the area as a used agricultural space and the lack of pressure for clearance and/or redevelopment of the fields, given the low density of population in the area. This has failed to create the kind of pressures on the Kanamizaki *sotetsu* fields that the FAO has identified as key to its strategic designation of particular traditional agricultural systems as GIAHS and the various ‘Pilot’ and ‘Candidate’ systems identified to date. Another factor that might be identified is a sense of cultural ambivalence towards a plant and agricultural system inextricably associated with times of oppression and famine.

Similarly to the physical space of the fields and the botanical resource, *sotetsu* products are no longer produced as emergency foodstuffs but now occupy one of two positions in a small but significant contemporary local practice. The first is a locally-produced and privately consumed product and the second is as a specialist food, packaged



Fig. 5. View of *sotetsu* hedged field outside Kanamizaki village, Tokunoshima, 2009.
Photo: Sueo KUWAHARA.

and marketed for both local consumers and, increasingly for tourists. Contemporary production of *sotetsu* products has arisen in both Tokunoshima and Amami-Oshima Is. In the former instance, a popular ryokan (traditional inn) in Kanamizaki village, stocks locally-made *nari miso* alongside a range of other local products in its restaurant. In Amami-Oshima Is. the miso is more widely available, selling in a supermarket in Naze, at a gift kiosk at Amami airport and at a shop in northern Amami-Oshima Is. named Aji-no Sato Kasari. The latter is particularly significant. Founded in 2002 by a group of eleven women from northern Amami-Oshima Is., it represents a local heritage enterprise designed to preserve, produce and promote traditional recipes and foodstuffs to the local community and tourists (Figs 6-7). The operation makes approximately 200 kg of *sotetsu* miso per month¹⁰ and produces additional miso for special events promoted by the organisation. Amami communities around Osaka and Tokyo also provide a limited but steady export market and the company has recently acquired additional main island customers following the broadcast of a television item that commented on *sotetsu*’s high mineral content and (alleged) ability to prevent the onset of dementia.¹¹

As will be apparent, the production, market-

10. Figures provided by Shigeko YOSHIDA of Aji-no Sato Kasari to the authors (interview May 2011).

11. *Ibid.*

ing, purchase and consumption of *sotetsu* food products in the contemporary period reflects a significantly different perception of the product than the reviled plant conjured by the expression *sotetsu jigoku*. With regard to its highly specific connection to locality and processed *sotetsu*'s status as a heritage product, its marketing has similarities to the revival of local product in areas such as Iwate (at least prior to the 2011 tsunami disaster) discussed in LOVE (2010) in the context of the attempted *kasseika* (vitalization) of regions experiencing economic contractions following the economic downturn of the 1990s. As LOVE details, this process involved accessing the memories of senior community members as to traditional food sources, cultivation, preparation and culinary techniques. But while LOVE notes that producing Iwate heritage vegetables as a premium product involved an acknowledgement that local vegetables “are no longer dietary necessities borne of deprivation but a reflection of refined food sensibilities” (2010: 228); Iwate food producers were not faced with the significant stigma that is still attached to the *sotetsu* product. In this regard, the marketing and packaging of Amami *sotetsu* products is signifi-

cant. There is no attempt to erase the image of the *sotetsu* plant but rather a foregrounding of it; a resilience of commodity and imagery that is finding a new - albeit niche - market.

5. Conclusion

Well after its period of frequent reliance on the *sotetsu* as emergency food source, the Amami islands continue to benefit from its durable and versatile indigenous cycad. Along with the continuing export of dried leaves for funerary displays, the plant is now a profitable export product, with seeds and potted plants being dispatched to a variety of international locations, where it is marketed and promoted by international aficionado networks¹² and local retailers free of any of the stigma of its homelands. As the distance from the *sotetsu jigoku* years increases, the product has been increasingly (re-)considered as a viable crop. As a survey of uses of *sotetsu* in Amami in the late 1990s conducted by agricultural researchers from Kagoshima University identified, *nari-miso* had gained positive responses in consumer tests on account of “its unique taste and low salt content” (KIRA and MIYOSHI 2000: 31) and tests were under-



Fig. 6. Shigeko YOSHIDA of Aji-no Sato Kasari showing *sotetsu* products on sale in the shop, 2011. Photo: Suelo KUWAHARA.



Fig. 7. *Sotetsu* products on sale in Aji-no Sato Kasari, 2011. Photo: Suelo KUWAHARA.

12. See, for instance, The Cycad Society, <http://www.cycad.org/>.

way to evaluate *sotetsu*'s potential as an ingredient in noodles and confectionary. While the latter have not developed into significant products, the recent sales of *nari miso* in main island Japan identified above suggest that *nari miso* has the potential to succeed in a context that KIRA and MIYOSHI identified as important for a region with population decline and an ageing demographic (*ibid*). As the base for regional specialty products, *sotetsu* has the capacity to combine with other local elements to influence regional branding. In this context the development of products that actively utilise the *sotetsu* as an asset in packaging and marketing has the opportunity to dovetail with the promotion of areas such as the Kanamizaki *sotetsu* fields as important heritage assets, worthy of tourist visitation (both in themselves and within the framework of GIAHS identified by the FAO). A successful integration of these initiatives would thereby allow the much-maligned, versatile and dependable *sotetsu* to enter a new stage of usefulness for Amami, free from the elaborated stigma of regional deprivation triggered by the Satsuma clan's introduction of sugar plantations and the "derivative vulnerabilities" that subsequently became entrenched in the islands and from which they are only now beginning to emerge as they seek a new position in the Japanese economy.

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