

How to organise limited space: Micro-regionalisation of La Digue island (Seychelles)

Abstract

Islands, especially small ones, are commonly studied as microcosms of natural and social processes. In this article, La Digue island (10 km²) in the Seychelles archipelago was treated as such. An attempt was made to analyse the significance of the natural environment for the features of spatial development under conditions of intense globalisation. For this purpose, functional micro-regions were determined, along with their genesis and evolution. Spatial dynamics and individual features of space are presented as *chorème* (Brunet 1986). The analysis was based on data from a library query and field observation and field studies in July 2018. Twelve functional regions were determined. Analysis of the distribution and evolution of their functions reveals a high dependence on natural environmental features, especially topography, and thus confirms (at the scale in question) a geographical determinism.

Keywords

Seychelles • La Digue • insularity • tropical island • regionalisation

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Introduction

La Digue is the fourth largest island of the Seychelles (9.81 km²), at 5 km long and 3 km wide. It is located near the equator (4°S), in the east of the archipelago, in a group of granite islands, and neighbored by its “satellite” Felicité (2.7 km²) and other granite “crumbs” totalling 2.1 km² (Dupon 1977). It is thus very small in area and, because it is located very far from the continents, its insularity is very evident. This is not significantly alleviated by the proximity of several similarly small islands.

The settlement of La Digue began at the end of the 18th century. Situated far from the important trade routes and surrounded by sparsely populated islands, it developed in considerable isolation, resulting in particular spatial development features that are strongly associated with the relatively diverse natural landscape and that evolved under the influence of increasing contact with the outside world. These conditions led to the development of a particular spatial order. The main objectives of this article are to delimit the functional micro-regions, to present how they evolved and the determinants of their formation under conditions of intense globalisation, and to address the extent of the impact that the natural environment had on the features of their spatial development. Thus, the aims are to answer the questions:

1. Can La Digue be treated as an isolated island?
2. Does a deterministic direction of the island's development exist today and, if so, how to explain that phenomenon?
3. What features of La Digue are at risk?
4. How will changes in spatial development follow changes in function?

5. Will the boundaries of micro-regions change as functions change?
6. Is it possible to forecast the direction of the island's development in the future?

The analysis was based on data from a library query, field observation and field studies in July 2018. Interestingly, the geographical literature on La Digue is relatively scant, despite the fascination the island has held for geographers. In a small and limited area, not only on islands, it is relatively easy to detect the mutual relations between natural and social environmental features precisely (Jędrusik 1999, 2001, 2004, 2005).

Although it is difficult to clearly define the concept of an island (Jędrusik 2011), they are often spoken of as natural laboratories. They particularly intrigue naturalists who are fascinated by the endemism that results from their insularity and limited size (Kolodny 1977). Sociologists envied biologists: separation causes endemism, and sociologists are attracted to the prospect of extending this theory to human groups (Lasserre 1987, Bonniol 1987). Relict groups – *isolates* – are shaped by specific social and economic traits (see B. Malinowski in various works on Oceania, Firth 1965, Boissevain 1969, Ottino 1972). The island is only important as an isolate when one starts to study how the community functions (Benoist 1987). The importance of islands as laboratories has also drawn the attention of tourism geographers (Hall 2010).

Can La Digue be treated as an isolate? The origins of the population constitute a fundamental difference. For while the

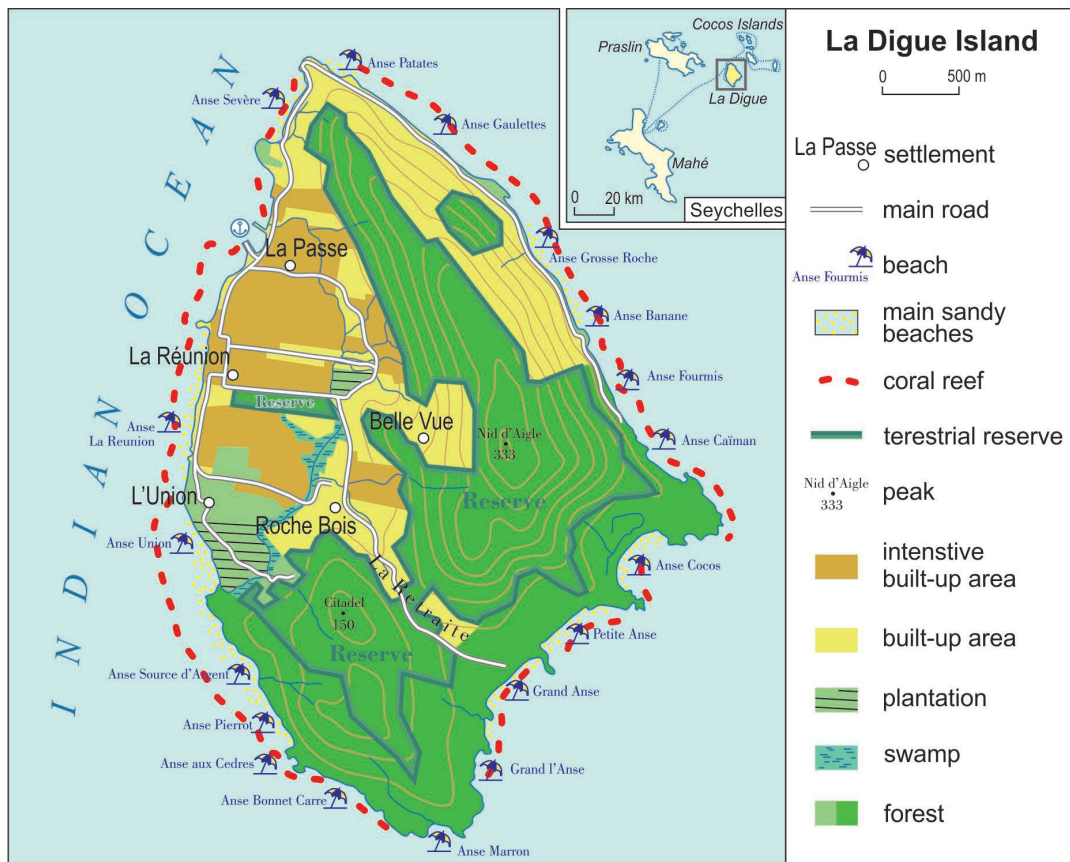


Figure 1. Main types of use and land cover of La Digue (Authors: M. Jędrusik, I. Gołębiowska)

classic isolate is a relict, La Digue's population is of immigrants who arrived with experiential baggage and cultural traces from the outside world, and who settled the island little over two centuries ago. Therefore, the La Digue community is not an isolate, but throughout history has operated in a diminishing isolation that can be considered an important development factor that demanded the use of non-standard solutions. Many great geographers, with P. Vidal de la Blache at the fore, have made this point. He wrote (1922): "Isolation, a lack of external pressure, seems to be the most important obstacle to [...] development. Indeed, human societies, which have, through geographical conditions, found themselves out of the way [...] seem to be affected by torpor and stagnation"

The characteristics of La Digue

Nature. The geological structure and landscape are dominated by geologically very old pink or red granites. To the east there is a longitudinal chain of hills (highest point *Nid d'Aigle* 333 m a.s.l.) which is covered with primeval rainforest (Fig. 1). The east and west slopes reach 30°; to the north-west, the slopes are gentler. The western part is made of a low-lying, flat, Holocene accumulation of sands of coral origin (up to 10 m a.s.l., incline of below 1%), which is probably a former lagoon bed. Similar plains have since 1785 been called "plateaux" in the Seychelles (Dupon 1977). The La Digue plateau is one of the largest in the archipelago and covers 164 ha – less than 15% of the island's surface, reaching a width of over 1 km. Most of the fertile plateau, even the slopes, is covered by very thick loamy soils, which formed on a mixture of granites and corals.

This relief created a large hydrographic basin fed by shallow-sloping streams (in turn, starting from the north, *J.B. Payet*, *Quinon*, *Macgaw*, *Maurice Payet*, and *L'Union*), which led to the creation of a small, 18-ha marsh (Günther 2004) called *La Mare Soupape*, which is a partially protected area due to the presence of *Pelusios* mud turtles (Gerlach 2008). The watercourses are connected by transverse drainage. Difficulties with the circulation of water hinder development on the plateau. The remaining hydrographic basins are smaller. The *Grand Anse* basin is fed by the rivers *Ange*, *Songe* and *Camille*; the *Petite Anse* basin by the *Rassoul No. 2*; and the *Anse Cocos* basin by the *Morel* (Robert 1999). Annual debits are small. Measurements on *Rivière Macgaw* in 1988–1994 showed average daily flows of 1.7–8.2 l/s. The plateau is constantly threatened by floods in the *norris* wet season (November–April), and attempts at drainage have failed. However, in the drier *suête* season (May–October), during the monsoon, the SE streams dry up and the limited groundwater and collected rainwater resources are used (ibid.).

The equatorial climate has low annual and daily temperature amplitudes. The water surrounding the island has a temperature of 26–28°C, which is conducive to bathing, especially in the west, where lagoons well insulated by coral reefs have developed. In the east, there are no lagoons, or they are very thin. The whole island's coast has beautiful, sandy beaches (Fig. 1). The total length of accessible beaches is estimated at 8,000 m (Duncombe 1996). There is no shortage of beaches, but the shallow lagoons make swimming difficult. Meanwhile, where there are no reefs, swimming is hindered by large waves and rip currents. Almost 26% of beaches are critically threatened by erosion (Cazes-Duvat

Table 1. Population changes on La Digue

Year	Population	Pop. density (pop. /km ²)	Plateau pop. density (pop. /km ²)
1804	52	5	32
1818	414	42	252
1825	350	35	213
1931	1,255	127	765
1960	1,842	187	1,123
1971	1,985	201	1,210
1977	1,911	194	1,165
1987	1,926	195	1,174
1997	1,998	202	1,218
2002	2,104	213	1,283
2010	2,269	230	1,384
2018	2,408	244	1,468

Sources: Dupon 1977, Eyméret 1984, *The population of the islands of the Seychelles 2018*

& Robert 2001). There is also the threat of freshwater flooding damaging the reefs and transporting terrestrial contaminants into the lagoon (Robert 1999). Coral reefs are severely bleached which, as elsewhere in the world's oceans, is to be blamed on the rise in sea temperatures.

Settlement. La Digue was discovered on June 17, 1744, by Lazare Picault, who named her "Ile Rouge", which was changed in 1768 by Duchemin to commemorate a ship. The expedition leader at the time, Marion Dufresne, declared the island to be unfavourable to settlement. The first settlers were a group of rebels deported from Réunion island (then Bourbon), who stumbled upon La Digue *en route* to East India. The first land concession was granted in 1794 (Dupon 1977) to Florant Payet. In 1804, the island was inhabited by 7 adult male colonists, 5 adult female colonists, 14 children of colonists, and 26 black slaves. The (free) colonists comprised 6 families. Two men were bachelors (Eyméret 1984). An excerpt from *Annales maritimes et coloniales* of 1821 shows that in 1818 on La Digue, there were 14 married persons, 2 widows, 1 divorcée, 7 bachelors, 13 boys and 10 girls (Touboul, 1979), i.e. 47 white colonists, plus two free blacks, as compared to the 26 colonists at the beginning of the century. The number of slaves grew just as fast. In 1818, there were 365 on La Digue. They worked on plantations, mainly of cotton, although since the colonisation of the Seychelles, spices, palm oil, cotton, aromatic plants, rubber and cola bushes were also grown. In 1818, 191 bales of cotton were produced on the island, or more than 12% of Seychelles' production.

The management conditions were difficult, especially communications with the rest of the archipelago. This is well documented in the administrator Bigaignon's description at the beginning of the 19th century (Eyméret 1984).

The large share of white population among residents meant that the birth rate was lower than in other similar areas. The population grew relatively slowly (Table 1), and the island's population density indicated neither under- nor over-population. However, this was only true when considering the entire surface of La Digue, a large part of which is, however, occupied by inaccessible elevations and areas that are difficult to develop.

Limiting analysis to the plateau only, the over-population of the island was evident.

The outstanding French investigator of tropical islands F. Doumenge (1983) considered an island to be under-populated if per usable square kilometre there were fewer than 20 people, over-populated at more than 300 people, and the minimum for development to be 50 people. In these terms, La Digue reached the over-population threshold as early as the beginning of the 20th century and even if demographic and economic pressure extended the usable area beyond the plateau – to the lower slopes and areas connecting the plateau with *Grand Anse* – the island continued to appear over-populated.

Spatial development and landscape management

The island has a clear functional dichotomy: the smaller, heavily populated, heavily developed west and the "wild" and almost unchanged east. These two areas correspond to the main topographical characteristics. This status was created with the island's colonisation and has generally continued into modern times. The changes resulting from demographic development and environmental pressure are taking place evolutionarily, with an obvious direction of eastwards expansion. The barrier of hills creates a strong refuge for nature, so the main invasive process is the gradual development of the western slopes above the plateau, and the building-up of the pass leading to *Grand Anse* and the north-east coast.

Development began on the plateau (Fig. 2). In 1834 only this part of the island was partially developed. The first concessions were granted there (Dupon 1971). The area was used for farming. In addition to cotton, coconut palms were grown. 1866 saw the beginning of vanilla cultivation (Tharreau et al. 2018), which has continued uninterrupted only on La Digue and Praslin. On Mahé, this crop was re-introduced in 1959 (Dupon 1971). After 1930, the global popularity of cinnamon oil grew, contributing to the cultivation of cinnamon on La Digue. In 1965, 98% of agricultural production was of coconut palm products, mainly copra and fresh coconuts (ibid.). The plateau is a valuable agricultural area to this day. In 1987, according to the *Land Use Plan of La Digue*,



Figure 2. Plateau La Passe and Praslin Island (photo by Maciej Henryk Jędrusik)

339 ha had high agricultural potential, of which 110 ha was being used.

In the middle of the plateau's west coast was the first settlement of *La Passe*, which quickly began to function as the island's administrative and economic heart. It centres on a small yacht harbour and a wharf, where small passenger ships from Praslin and Mahé land. The wharf has existed since the 1970s. Earlier, due to the lack of a proper harbour, the ability to land depended on sea conditions. The first ferry connection was launched in 1936 (a small schooner with a motor). After 1965, a slightly larger ferry arrived at La Digue three times a week (Dupon 1977). In 2018, up to 10 vessels were arriving daily (Tharreau et al. 2018), mainly from Praslin. In 1992, helicopter connections began (a landing site near *Anse La Réunion*), which is used by only about 1% of arrivals. In *La Passe* there are a gas station, a few banks, tourist information, bicycle rental, a few shops selling food and souvenirs, a craft market, a few guest houses, a hospital, a library, and a place for fishermen to sell their wares (a fish market is under construction).

This part of the island has the densest road network, with most of the island's 20 km of roads. The main roads (12 km) lead through the centre of *La Passe*, along its southern edge to the east, from *La Passe* to the south to *Union* and north to *Anse Severe* and onward along the east coast to *Anse Fourmis*. Secondary roads (*La Passe–Grand Anse* and the eastern edge of *La Passe*) total 7 km. Most roads are paved. Smaller streets and avenues in *La Passe* are, however, dirt roads. Traffic predominantly consists of cyclists, who rapidly grew in number. In 1991 there were 239 bicycles on the island, and 1,039 by 2003. In 2003, there were 17 bicycle rental shops on the island (Günther 2004). In 2018, the number of bicycles is similar, but difficult to estimate because, in addition to large rental companies, numerous boarding house owners also have bicycles available. However, it is bikes that have become the most desirable means of transport, which is sometimes expressed in thefts. This is the most common of the few crimes on La Digue. Traditionally, buffalo teams were also useful for penetrating the island, and in the 1970s was still the main mode of transport (there were 12 in 2003). In 1983, there were only 10 cars on the island – mainly vans used to transport goods used in agriculture, fishing and boat construction. Seven years later their number had increased five-fold (Günther 2004). This trend, which was not conducive to sustainable development, has stopped. In 2018, the pool of motorised vehicles dropped to a few trucks and Japanese taxi vans. However, numerous electric

vehicles appeared – both several-person vehicles resembling large golf carts, which were used to transport guests to marinas, restaurants and island tours, and electric bicycles. However, electric vehicles have replaced the traditional buffalo teams – only two remain: in *Union* and *Anse Severe*.

To the east of the main road running along the coast, residential districts (of good standard and cleanliness) were created, and, further inland, a large farm cultivating bananas, taro, various fruits and vegetables and with areas for grazing a few cows. To the east there is intense construction on the slopes along the road to *Nid d'Aigle* and parallel to the hills. Guest houses and private residences alike are being created there. On the road to the top, cassava, fruit trees and bananas are being cultivated. One is struck by the cleanliness, which is far above the standards of many tropical islands. In the south of the plateau, there is a school, a kindergarten and a church in the vicinity of *Anse La Réunion*. The role of the Catholic church in the social and cultural life of La Digue residents is noticeable.

From the beginning of colonisation, the main cultivated areas were particularly in the south of the plateau, where in the early 1960s the *Union Estate* agricultural cooperative was established as a model farm (currently controlled by the Ministry of Finance) (Doumenge 1987). In *Union Estate* (Fig. 3), of the 650 hectares, coconut palms covering 65 ha on the plateau, and a similar area scattered across the slopes. In the 1970s, annual copra production was estimated at 120 tonnes. In addition, some cinnamon bark was obtained, and, until 1969, oil of patchouli, the cultivation of which was then discontinued. Vanilla is grown on 10 ha of the plateau. Buffalo teams are used to press coconut oil from copra obtained from a "radiator" (*calorifère*) – a coconut pulp drier. In *Union*, lime was produced (in 1969 there were two traditional lime kilns on the island) (Dupon, 1977). There is also a small boatyard. The workers live on the slopes, and in their domestic gardens they grow cassava, sweet potatoes, yams, taro, maize and vegetables. They have the right to pick a reasonable number of coconuts and jackfruit, and to raise poultry and cows. In the built-up belt there are workshops, a warehouse, and a boat hangar. Since 1972, the property has been open to tourists. The colonial house was formerly the residence of the President of Seychelles. It is now a museum and art gallery.

The rest of the plateau consists mostly of built-up areas. In 2002, built-up areas already covered 136 ha (45% of the plateau area), and numerous investments have since significantly increased the built-up zone. At the beginning of the 21st century,

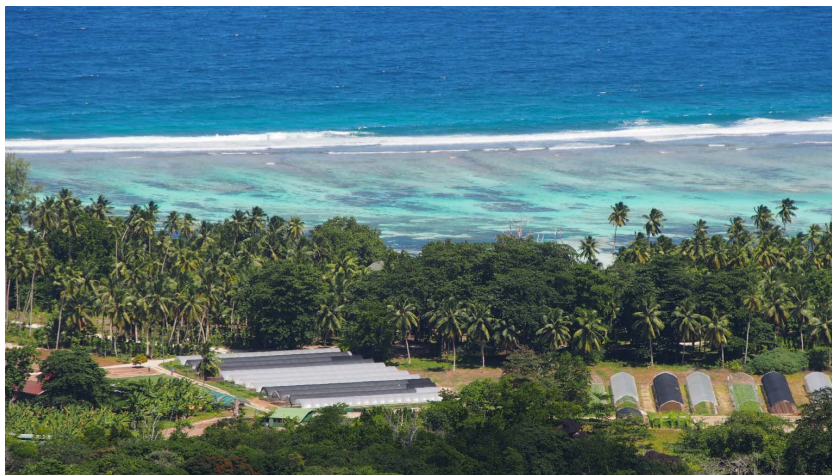


Figure 3. Union Estate and Anse Source d'Argent (photo by Maciej Henryk Jędrusik)

the building line did not exceed the 50-m contour line. In 2018, new homes appeared above this altitude, especially along the road leading to *Nid d'Aigle*. In the middle of the plateau there is a forest with a distinguished reserve (*Veuve Reserve*) of the endemic species *Black paradise flycatcher* (Henri et al. 2004). In 2002, wooded areas covered 70 ha (23%) and their share has not changed. The western edge of the plateau was occupied by beaches (24 ha – 8%), according to Günther (2004). In the middle of the plateau there are two water intake zones with a total area of approx. 0.5 km², and one treatment station using water from three streams: the *Macgaw*, *Maurice Payet* and *Ange*. In 2003, due to the growing demand for water and the lack of surface and groundwater reserves, a seawater desalination plant was established. Increasing population pressure required a landfill to be built and gradually enlarged (on *Union Estate*), which in 2003 was already taking in six tonnes of refuse per day (Günther 2004). The electricity demand is met by a power plant on the larger, neighbouring island of Praslin. The limited space and fear of ruining the landscape have discouraged the building of a power plant on La Digue (“Vision 21” 2001). For the same reasons, there is no sewage treatment plant or mains sewer system on the island. Most farms and hotel facilities collect impurities in individual cesspits. Only larger hotels have small facilities for wastewater treatment.

North of *La Passe*, on the northern edge of the plateau, behind a slight rise, is the largest cemetery, 200 m from *Anse Severe*. There, the mountains approach the coast, leaving only a narrow coastal belt along which a narrow road leads to a few bays in the east: *Patates*, *Gaulettes*, *Grosse Roche*, *Banane* and *Fourmis*. The other beaches in the east (*Caiman*, *Cocos*, *Petite Anse* and *Grand Anse*) are undeveloped and almost inaccessible from the north. *Grand Anse* can be reached by a mostly paved road from *La Passe* through *La Retraite* pass. From *Grand Anse* a well-defined path leads to *Petite Anse* and *Anse Cocos* through forest and granite rocks (Fig. 4). Reaching the deserted beaches in the south (*Anse Marron*, *Anse Bonnet Carré*, *Anse aux Cedres* and *Anse Pierrot*) requires an exhausting journey, preferably with a guide. By contrast, it is easy to reach the *Anse Source d'Argent* (called also *Anse la Source à Jean*) beach (from the north, via *Union Estate*), which in January 1998 the monthly *Géo* listed as one of Earth's 10 “mythical” beaches (Gay 2004). It was this beach (and the positive marketing mentioned above) that made La Digue popular among tourists (Fig. 5).

Tourism is also favoured by the Seychelles' reputation as healthy islands. The archipelago is still free from the *zika* virus,

which is encouraging to pregnant women wanting to visit a tropical island. The Seychelles, including La Digue, are a popular wedding tourism destination. But infectious diseases do appear, usually introduced by tourists. This was the case with the 2005 Chikungunya epidemic in Seychelles, which was brought by a visitor from Mauritius. In mid-September 2005, the first peak of 11 cases occurred, with cases also recorded on La Digue; the second peak was in early February 2006, and the third at the end of May 2007. A total of 10,000 cases were recorded on the archipelago (Renault et al. 2012). These are nonetheless incidents, rather than the rule, and thus do not discourage tourists.

The first hotel – *La Digue Island Lodge* – was built in 1970 (Günther 2004). In 1980, it had a capacity of 68 beds (ibid.), and 100 in 1990 (Gay 2004). In 1984, there were two small hotels and two family-run boarding houses on the island (Doumenge JP 1987). Between 1987 and 1997, 20 new hotels and boarding houses were built and in 1999 the accommodation base had a capacity of 428 places. Official data (“Vision 21” 2001) for 2000 show 420 places, of which 120 were in the only large hotel and 300 in smaller facilities. In 2004, there were 414 legal accommodation places and 100 available to tourists unofficially. There was one large hotel with 120 beds, 14 smaller hotels and guest houses and 8 self-catering facilities (Günther 2004). In 2004, there was 1 hotel bed per 5.1 island residents, and tourist occupancy was 70%. Eight hundred of the 2,000 inhabitants were working in tourism and all hotels and lodgings belonged to residents of La Digue (Gay 2004). The exception was a few bungalows on *Union Estate* controlled by the Seychelles Ministry of Finance. In 2018 these were being offered by the largest hotel – *La Digue Island Lodge*. In July 2018 there were 102 accommodation facilities on the island (information from an interview with a tourist sector employee; according to a Google search there were 86 facilities), which were mostly guest houses and self-catering with an average 15-guest capacity (estimates based on a sample of 24 facilities, according to Beylot-Turcotte (2018)). The largest hotel, *La Digue Island Lodge*, caters for 150 guests. The total capacity of the accommodation base in 2018 can therefore be estimated at 1,700 beds (Fig. 6). Almost all accommodation facilities are located on the plateau, with a few on the north and north-east coasts. In several places on the plateau and on the edge of *Anse Severe*, new hotel facilities were built in the summer of 2018.

This tourist boom is associated with the great popularity of the Seychelles, and global connections to the archipelago being opened by *Emirates* and *Qatar Airways*. More than half of the



Figure 4. Granites on Anse Cocos beach (photo by Maciej Henryk Jędrusik)



Figure 5. Anse Source d'Argent (photo by Maciej Henryk Jędrusik)

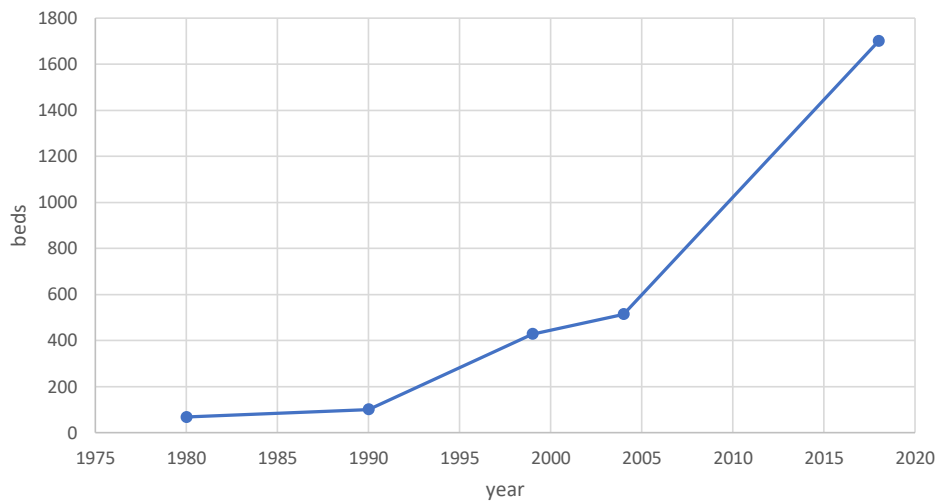


Figure 6. Evolution of the accommodation base on La Digue
Sources: based on Beylot-Turcotte 2018, Doumenge J.-P. 1987, Günther 2004

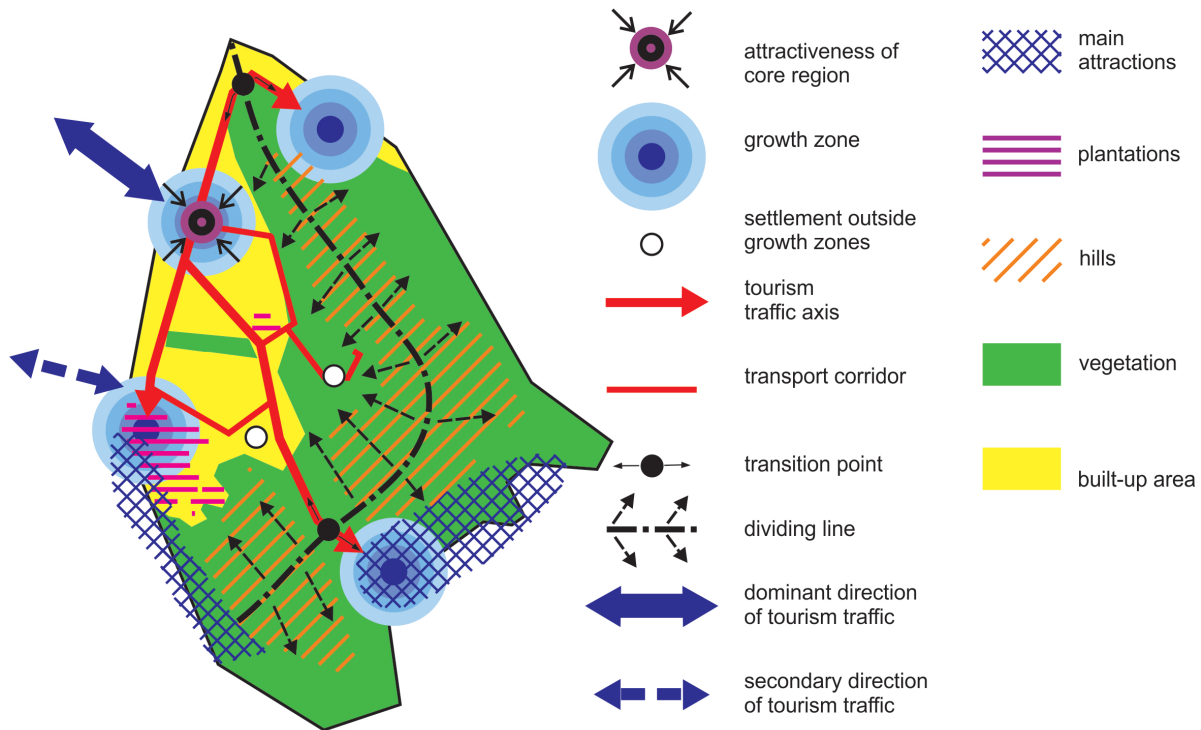


Figure 7. La Digue – chorème (Authors: M. Jędrusik, I. Gołębiowska)

tourists coming to the archipelago visit La Digue: calculations from the end of the 20th century indicate 57% ("Vision 21" 2001). Frequent ferry connections with Praslin encourages day-trippers. Günther (2004) estimates their number at approximately 55,000 for 2003, while Tharreau estimates over 90,000 for 2018 (Tharreau et al. 2018). Both authors estimate the number of tourists staying at around 90,000 annually. It is interesting, but easy to understand because of a very limited space to use, there is no developed enclave tourism (Baldacchino 2015; Saarinen 2017) on La Digue.

Tourists are attracted by the exceptional natural features, which allow both sunbathing and active tourism. Starting in 1990, climbing routes were designated on La Digue (50 routes to *Boulder Anse d'Argent*), and cycling has been growing since 1980, with potential mountain bike routes estimated at 100 to 300 km. In 1990, organised trekking started. Nine beaches (*Anse Bonnet Carré, Anse Cocos, Anse La Réunion, Anse Patates, Anse Pierrot, Anse Severe, Anse Source d'Argent, Anse Union* and *Grand Anse* (with periodic restrictions) were designated as good bathing areas. Furthermore, *Anse La Réunion, Anse Patates, Anse Union d'Argent* and *Anse Union* allow snorkelling, and *Grand Anse* allows sailing and water sports. Eight dive sites have been designated around La Digue (Naria & Sherwin 2011). In 2004 there were 1 dive centre, 16 boat rental companies and, since June 2003, *Safari Club* has offered walking tours of the island (Günther 2004). In 2018, the range of offers and number of offices increased slightly: large enterprises appeared, including *Mason's Travel*.

In 2004, in a very interesting study on sustainable tourism on La Digue, Saskia Günther proposed four scenarios for the island's future tourist development: 1. uncontrolled development 2. development in an authentic Creole style 3. sustainable development with an emphasis on nature protection 4. luxury tourism development. With a SWOT analysis, the island's strengths were recognised to be: peaceful, relaxing atmosphere; traditional lifestyle; friendly people; low vehicle traffic; ethnic

homogeneity; good conditions for family tourism; easy access by sea; endemic bird species (*Paradise Flycatcher*); landscape beauty (especially the granite coasts that symbolise the Seychelles); and good exploitation of accommodation facilities. In 2018, reality does not reflect any of the scenarios outlined by Günther. The development of tourist and paratourist facilities (those designed for general use, but also commonly used by tourists) is intense but not uncontrolled. The authentic Creole style is giving way to modern models – the old houses have almost all disappeared, and the residents, especially the young, do not differ in dress from their Western peers. Pro-ecological practices are in evidence (cleanliness, the lack of high-rise construction, numerous information boards, lack of tourist development on the beautiful beaches in the east of the island), but at the same time, the growing tourism is burdening the environment (depletion of fresh water resources, pollution, waste management issues). New hotels and guest houses have a decent standard and are available to more than just the richest. There is no 5-star hotel on the island.

Determining functional regions on La Digue

The description of La Digue above reveals a clear structure to its spatial development. There is a clear dichotomy and asymmetry resulting from the natural environmental features. There is a longitudinal axis delimiting the island's very heavily developed west coast, with a well-developed shoreline bordered by lagoons demarcated by coral reefs and the coast's immediate plain of slightly over 1 km wide (the plateau). It is there that all the most important economic and administrative functions of the island are concentrated. The axis is marked by a series of heavily wooded elevations, which are mostly protected areas. The east coast is almost devoid of coral reefs, and the only ones in the north-east of the lagoon are very narrow. In the western part there is the most important point of contact with the outside world. The potential growth poles – in the case of La Digue this

Table 2. Prevailing functions of La Digue micro-regions

	CBD	T (tourism)	A (plantation-agriculture)	Rim (residential intensive main)	Ris (residential intensive secondary)	Rs (residential secondary)	N (nature)
CBD	1						
T		2				6	10, 11
A		3					8
Rim				4			
Ris					5		
Rs							
N		9				7	12

applies only to tourism – are the best beaches in the south-west (*Anse Source d'Argent*) and in the east (*Grand Anse* and neighbouring beaches). In this latter location, tourism potential is in competition with ecological requirements (protected areas). Development of the north (*Anse Severe*) and north-east coasts are a secondary direction of development, with the available area being much narrower than in the island's west. The internal development axis, associated with investments more for residents than for newcomers, runs latitudinally from the administrative centre (*La Passe*) towards the lower slopes at the foot of the *Nid d'Aigle*.

The above description is presented as a *chorème* (Fig. 7). The *chorèmes* method, which has developed in France in particular since the 1980s (Brunet 1986, Cheylan et al. 1990, Grzegorzczak 2011), allows spatial phenomena and processes to be presented using simple geometric forms: points, lines, polygons and networks presenting the basic spatial development and dependencies in order to facilitate analysis. These forms make it possible to show spatial dynamics (*dynamique territoriale*), attraction (*attraction*), contact (*contact*), hierarchy (*hierarchie*), tropism (*tropisme*), network connections (*quadrillage*) and meshing (*maillage*). Due to their ability to present individual spatial features, *chorèmes* are primarily used in case study analyses; the present article is just such a case study.

A review of processes and dependencies allows La Digue to be divided into 12 functional micro-regions (Fig. 8). This procedure was based on building density, types of use and land cover, and the dominant economic and social function of the area. The data for this process were collected by the author during the field study in July 2018 and verified using the land use map. The following traits describing the island's dominant functions were selected to determine the divisions:

1. administration, trade and other tangible and intangible services (including essential social infrastructure elements);
2. tourism (and leisure);
3. farming;
4. residential development (of various intensity);
5. protected natural areas.

A matrix of the characteristics of each micro-region is shown in Table 2. The columns contain a given region's dominant function, with the complementary function in the rows. The individual regions (Table 3) can be characterised as described below.

Region 1 (CBD) – La Passe: the island's administrative and service centre. Port, marina and sailing lines, tourist agencies, transport centre (taxi rank, bicycle rentals), shops (grocery, souvenirs), ATMs, handicrafts market, library, hospital, fuel station, energy centre and several good restaurants, fast-food

takeaways, a hotel and several guest houses near the shoreline. Due to its importance and functional diversity, the region can be considered the local Central Business District (CBD).

Region 2 (T) – the Anse Réunion coast: includes a narrow strip of coast (extending up to 150 m inland) and lagoon waters (max. 300 m wide). Tourist establishments dominate, with the largest being *La Digue Island Lodge*. Hotel buildings are concentrated on the coast. Behind these, along the road, there are smaller guest houses between shops (including the largest supermarket on the island), restaurants of various sizes (including takeaways) and small service providers. There is also a helicopter pad and a telephony centre.

Region 3 (T+A) – Union and the waters of Anse Union: infrastructure and attractions related to tourism (several bungalows managed by *La Digue Island Lodge*, a restaurant, an art gallery, architectural monuments, an old cemetery, a copra drier and oil press, the largest granite monolith in the Seychelles, a reserve with 50 giant tortoises, a sports field); and related to farming (plantations with vanilla, vegetables, coconut palms, animal rearing).

Region 4 (Rim) – La Passe and La Réunion: beyond the coast. These are the most important, high-density residential areas. Construction reaches the lower slopes of the hills. There, and in the nearest belt of the CBD, there are a few guest houses. There are small businesses (including a sawmill).

Region 5 (Ris) – southern La Réunion: similar to region 4 (mainly residential) but with a slightly lower density; it is more wooded and part wetland (*La Mare Soupape*). Ongoing projects, increasing building density, are visible.

Region 6 (Rs+T) – the south-east of the plateau (Roche Bois) and the mountain pass to the east coast (La Retraite). A less densely built-up area with minor tourist developments (guest houses, bars, fresh-fruit juice bars) and trade (a sawmill).

Region 7 (Rs+N) – the east of the plateau and Bellevue (slopes below Nid d'Aigle). Low density of residential development. Stately houses surrounded by gardens and orchards. An area of building expansion (development) on wooded slopes not subject to protection.

Region 8 (N+As) – a narrow, latitudinal belt in the centre of Réunion. Protected wooded areas (the *Veuve* nature reserve) and the only large farm other than *Union* (food crops, fruit trees, cattle rearing).

Region 9 (Ts+N) – the north and north-east coasts over Anse Severe and Anse Patates and narrow lagoons. Secondary tourist area. Reasonable tourist infrastructure, constantly expanding northwards. Towards the south along the narrow coast there are individual tourist developments (a few guest houses, a restaurant). Slopes are heavily wooded, but not very steep, and favour hiking.

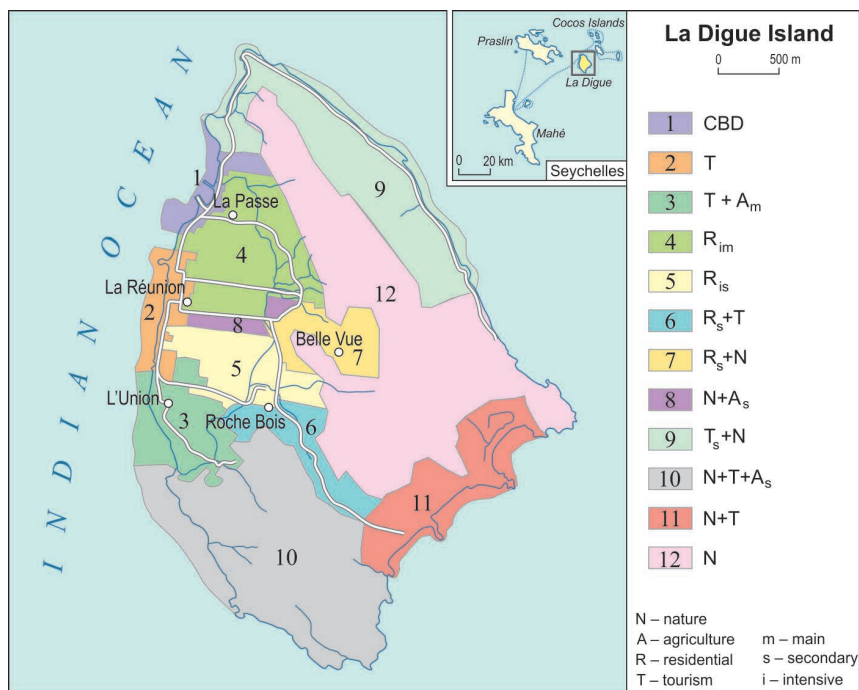


Figure 8. Functional micro-regions on La Digue (Authors: M. Jędrusik, I. Gołębiewska)

Table 3. Location and specialisation of micro-regions on La Digue

Region	Name	Function
1	Capital	CBD
2	Anse Réunion	T
3	Union	T+Am
4	La Passe	Rim
5	Réunion	Ris
6	La Retraite	Rs+T
7	Bellevue	Rs+N
8	Veuve	N+As
9	Anse Severe	Ts+N
10	Anse Source d'Argent	N+T+As
11	Grand Anse	N+T
12	Collines	N

Where: CBD – Central Business District; T – Tourism; A – plantation-agriculture; R – residential; N – nature
 m – main; i – intensive; s – secondary

Region 10 (N+T+As) – Anse Source d'Argent and neighbouring coves and adjacent slopes. A tourist region without permanent infrastructure. The island's world-renowned, most picturesque part. Numerous paths (for trekking with a guide) and climbing routes. Parts of the slopes feature scattered coconut palm plantations.

Region 11 (N+T) – Grand Anse, Petite Anse, Anse Cocos and their nearby facilities (within 200 m). A tourist region with little infrastructure (a restaurant, bicycle parking). Different beach tourism options than Region 10. Possibility to use well-marked paths along the coast. No signs of farming on the wooded slopes.

Region 12 (N) – hills from Anse Patates to Grand Anse. A protected, natural wooded area. Guided trekking possible. The most popular route is to the *Nid d'Aigle* viewpoint.

Conclusion

Two and a half centuries of community and economic evolution on La Digue have led to four dominant spatial functions: administrative, residential, tourist and “ecological”. Half a century ago, farming lost its prominence and can now only be regarded as complementary to the lead functions. The 12 designated functional micro-regions are slightly dominated by areas of environmental value that have been barely transformed by human activity. They dominate in number (4), but above all in area (representing nearly two-thirds of the island's surface).

Similar in number (4), but occupying a much smaller area, are residential regions (of various density, and supplemented by secondary functions such as tourism and protected natural areas).

Tourist functions of varying intensity are concentrated in three regions and complemented by secondary functions (farming). One special region is the administrative and service centre.

The groups of regions mentioned have a spatial cohesion that is clearly related to natural environmental features, and especially to topography. The “natural” regions include:

1. hills;
2. residential regions (the plateau);
3. tourist regions (the coasts with beaches);
4. a well-developed shoreline.

The administrative and service centre was also located in the most potentially convenient location, in terms of options for both contact with the outside world and communication within the island. The spatial organisation has a noticeable logic to it. Interestingly, this logic has not been disturbed as globalisation causes the island's function to evolve. Pressure from the outside world has led to the evolution of functions (the transition from agriculture to tourism), but not of the logic of spatial development. This may indicate the dominant role of the natural environment in this area.

So, the answer to the second question of the study confirms the deterministic direction of the island's development. Maybe the most important factor of this relation is the very limited area of the island. It is interesting to observe the lack of development of the tourist enclaves on the island. This is an important difference compared to the other touristic areas (islands) in the tropical world, but even on the Seychelles archipelago.

The answers to the other questions are not so clear. Can La Digue be treated as an isolate? La Digue's population is formed by immigrants who settled the island a little over two centuries ago. Therefore, the La Digue community is not a relict, but has existed since the beginning in strong isolation, diminishing in the second half of 20th century, especially after 1970. So, isolation can be considered as an important development factor. Maybe this phenomenon has influenced the features of the economy, the society and, as a result, the specific spatial management.

What features of La Digue are at risk? With the expansion of the world, the sustainability that had been apparent on La Digue for almost 200 years began to decrease after 1970, when the tourism boom began. Tourism is always a shock for all the principles (natural, social, cultural, and so on) that govern the "affected" area. Natural resources are transformed on a large scale, often irreversibly. These natural resources (areas for construction, untouched nature, empty beaches, the uniqueness

of the place) begin to deplete, and cultural specificity (values of authenticity) to disappear. With the increasing number of tourists this entire unique microworld is at risk. Even banning tourists from visiting La Digue in the future may not restore its original balance.

This is also a source for the three answers of this study that are lacking. Is it possible to forecast the development of the island's development in the future? The closer the limits of resources (and development) are to being reached, the more probable the fate of La Digue in the future will be towards decline. But, as described before, none of previous scenarios regarding the development of this island have been realised. So, this could be another scenario that will not come true.

The changes of boundaries of micro-regions won't be revolutionary. There is simply no place for the new regions. The density of the building areas also makes an important change in the prevailing function of the micro-regions difficult. The only relatively "free" spaces are the farming zones and natural reserves on the slopes. Expansion in those directions are possible, but very risky because of tourists looking for natural beauty.

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