To each, their beach: Unveiling nexus between architecture and society in urban beaches

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1. Introduction

Architecture structures the system of space in which we live and move. (Hillier and Hanson, 1984)

This paper addresses nexus between architecture and society in urban beaches to ascertain how some built form attributes may contribute to rendering these recreational public spaces more or less lively and inclusive. By seeking to identify “syntaxes [that may contribute to] put together in space what is socially differentiated” (Hillier et al., 1976, p. 183), architectural variables relating to diverse modes of use, awareness and social interaction in public spaces that were found to help promote urban vitality in other studies were examined in the light of information about whether and to what extent diverse beachgoers were present at each beach, were mutually aware of the others’ presence, felt familiar with the area and praised it.

As federal properties that should allow free access to all, Brazilian beaches are often described as democratic arenas, although it is clear that different
people choose different beaches and that these may be subjected to contrasting (often unfavourable) reputations, generally accepted at face value.

The research on which this paper is based—devised to root a doctoral thesis—was motivated by the realisation that the urban beaches in Natal, Brazil, whilst being major recreational public spaces intensively used all year round, are characterised by labels influenced by social and locational prejudices, which renders them no-go places for some groups, despite featuring common traits—enticing landscapes, public transport and leisure facilities. The three urban beaches selected as case studies are set apart from one another (preventing blurred boundaries) and have contrasting reputations overlaid with locational and social nuances: Redinha as a remote place frequented by common folk, Praia do Meio as ‘decadent’, and Ponta Negra as middle-class and touristy.

Studies of relations between architecture and how urban beaches are used in Brazil are scarce in the literature. This seems peculiar in light of the strong appeal attached to beaches as public spaces where residents and visitors can mingle and relax—a situation that ideally would involve civility, courtesy or at least tolerance, alongside the co-awareness of social differences amongst people who have diverse levels of familiarity with the area. This study therefore seeks to improve knowledge about how architecture may affect the way people use the beaches, rendering them more or less lively and socially inclusive by relating objective physical attributes to social life.

By ‘objective physical attributes’ or simply ‘architecture’ we address some of the voids and the masses (Holanda, 2013) which form part of the built scenery, which contains and surrounds the beaches’ waterfronts: spatial configuration—from global to local varying scales; and built form—land use, building heights, and interface between public and private spaces. The way that people use the beaches relates to who does what, with whom, where and when, and is investigated through observation and questionnaires designed to reveal social differences, familiarity with the area and how users appraise it.

1.1 Beaches in Natal
With over 8,000 kilometres of coastline, a tropical climate and a historically rooted seaside culture, beaches in Brazil are important spaces for leisure and socialising, being places where people are expected to enjoy contact with nature and with other people. This is strengthened in many towns by the meagre availability and poor maintenance of other public areas appropriate for leisure uses. As federal property that cannot be legally privatised, the beaches should be freely accessible to everyone, fostering the belief that they are exemplary democratic arenas. However, social and locational aspects are generally cited as reasons to frequent or avoid certain beaches, and different groups tend to choose different areas. Some of the variables examined here were addressed in the study of an urban beach in Fortaleza, Brazil (Donegan and Trigueiro, 2012), the results of which revealed relations between physical attributes found in waterfront premises and social aspects of their customers. Such links bear affinity with findings in studies developed elsewhere, as in the case of diverging views from different publics at South African beaches (Dixon and Durrheim, 2004).

Although perception, regular use and favourable assessments are seen as key factors in the maintenance of beaches as well as other environmentally fragile areas, and certain physical attributes (i.e. leisure facilities and cleanliness) are deemed important in influencing people’s perceptions and stimulating use, most studies of urban beaches have tended to concentrate on their environmental vulnerability and intensity of occupation (Breton, Clapés, Marquês, et al., 1996; Quintela, Silva, Calado, et al.,...
2012), with physical attributes rarely being brought to the research foreground.

The three beaches studied here — Redinha, Praia do Meio and Ponta Negra — benefit from beautiful natural sceneries, fine sand, warm bathing waters, are served by public transport and are equipped with waterfront promenades dotted with stalls that function as bars/restaurants. On the other hand, the most superficial observation reveals that frequencers of each beach are quite different, as seem to be their modes of use.

In the early stages of informal talk about the investigated beaches with people in various places in Natal, it transpired that views were recurrently similar and complied with impressions often expressed in the media.1

Redinha was branded a far-away place that has not changed much throughout the years, being favoured by ‘common people’, especially those from Zona Norte. It is worth noting that Redinha is located a mere 6 kilometres north of the old town centre (as opposed to Ponta Negra, 14 kilometres south of it), and that Zona Norte was originally a working-class residential neighbourhood in the north sector of town, which despite increasingly becoming a mixed-class new centrality, still suffers strong stereotyping as a poor area.

Praia do Meio, located close to the old city centre, is described as a decaying area, formerly frequented by everybody but now the haunt of ‘locals’, meaning dwellers of poor residential enclaves in the vicinity, which include regenerated slum areas, or slum-scale settlements.

Ponta Negra, located at the extreme south of Natal, is viewed as a middle-class beach in a middle-class neighbourhood (poor enclaves do exist but are well tucked away from view), and as a tourism and leisure centre, featuring the Morro do Careca in the background — a massive dune, whose image often represents the city and even the state — as its landmark [Figure 1].

It seems curious that important landmarks in the vicinities of the other beaches are seldom mentioned, for instance the Reis Magos Fortress, a listed national heritage monument located in-between Redinha and Praia do Meio, which dates from 1598,

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Figure 1
(i) Natal aerial image (highlighting the airport and old town centre) and (ii) images of the studied beaches. Source: (i) Google Earth, edited.
being the first construction in the whole state and the reason for the town’s foundation. Another example is the rocky formation known as Ponta do Morcego, pictured in postcards of Natal, which frames the southern border of Praia do Meio.

In many older coastal settlements in Brazil, beaches have historically been separated from the main street grid, as the towns’ initial occupation sites were often elevated land tracts. Natal’s foundational nucleus was located on top of a hill overlooking the Potengi River — the “Great Northern River” or Rio Grande do Norte, which named the state — whose estuary was protected by the fortress. Up to 1960, amongst the beaches only Praia do Meio was urban, but by 1980 the street structure had reached Redinha, across the river, and Ponta Negra, on the city’s southern border. In 2007 a second bridge was built over the Potengi estuary, completing a north-south coastal route across Natal through Praia do Meio to Ponta Negra, with both these areas gaining accessibility. Redinha, however, gained little if any benefit from the route as most of its settlement lies under the bridge.

1.2 Architecture and modes of use

In the search for architectural features that may encourage fields of co-presence in public spaces (Hillier et al., 1987), findings from studies relating to this issue were reviewed, thus setting the basis for selecting the architectural and social variables examined here. The idea that emerged from studies that no single spatial variable ‘explains’ urban vitality and inclusiveness, reinforces the recognition of cities as problems in organised complexity, as pointed out by Jacobs (1992) in the 1960s. However, built form and spatial configuration were seen to affect how different groups interact, raising more or less social capital in neighbourhoods (Marcus and Legeby, 2012). In the literature, certain properties of spatial configuration (the architectural voids) and built form (the architectural masses) were especially related to potential movement, encounter and avoidance, which enlightened our search by helping to define what was to be observed, represented, quantified and analysed in the field, as well as the content of the questionnaires presented to interviewees at the beaches.

It has long been established that diverse land uses foment the interplay of different actors and activities (Jacobs, 1992), and that strong public/private interface, allowed by the way built shells relate to public spaces, is important for local street life (Van Nes, 2009; Ferraz, 2008; Mello, 2008). Studies also point out that reduced walking continuity for pedestrians (e.g. places severed by intense vehicular traffic), lessens the sense of well-being in local communities (Appleyard and Lintell, 1969; Anciaes et al., 2014).

Findings show that segregated areas tend to be continually used by marginalised groups (Vaughan, 2007), while connected areas tend to exhibit greater levels of social mixture (Carpenter and Peponis, 2010). Accessibility, visibility, and articulation to the city’s grid were found to be crucial for the appropriation and regular use of urban waterfronts, aiding in their maintenance (Mello, 2008). Higher accessibility, along with more elaborate waterfront leisure facilities were favoured by tourists and youngsters, whereas modest leisure facilities in less accessible areas were chosen by long-term frequenters and local families (Donegan and Trigueiro, 2012). Emergent accessibility appeared to trigger building renewals and appropriation by richer people in various towns (Trigueiro and Medeiros, 2003; Carmo, 2014).

Whilst it is clear that spatial properties may affect uses differently from place to place, consistent coincidences regarding accessibility measures at successive scales were considered to benefit the mingling of distinct flows, and therefore of a potentially varied range of people going about their daily activities.
Accessibility measures that indicate potential movement from one space to all others (or *to-movement integration*) have been related to the flows of visitors; whereas measures that highlight spaces preferred when all potential journeys across the urban grid are considered (or *through-movement choice*) are related to the flows of residents or people familiarised with the area (Hillier, 2009). Besides aiding legibility in urban settlements (Medeiros, 2013), positive accessibility correlations at distinct topological radii characterise settlements that are working well as independent systems (Perdikogianni and Penn, 2005).

Places with high correlations between types of potential movement at successive metric scales are equated with higher levels of co-presence, a richer mix of land uses and interdependence of activities and trips (Vaughan et al., 2013). Furthermore, correlations of such accessibilities at different scales are related to neighbourhoods’ ‘embeddedness’ in a wider urban fabric (Yang and Hillier, 2012), and to areas with greater co-presence amongst different people (Al-Ghatam, 2015).

The brief overview above covers a fraction of the revised literature that explores the overlap of accessibilities related to grids that ‘spread out’ and connect better to surroundings, thus providing a framework for confluence of various trips and activities, a property herein termed ‘resilience through accessibilities’ — indicating elasticity, or the ability to resist progressive intervals of street grid lengths without losing potential accessibility. Thus, accessibility measures at varying scales were investigated and correlated in the studied beaches, and then compared to aspects of their built form observed in loco.

In the pursuit of identifying social attitudes about sharing public space with others, which we agree to be an essential part of ‘being in society’ (Legeby, 2013), some aspects emerged in the literature as relevant and feasible to investigate within the research framework of temporal and human resources. Mutual awareness of differences concerning the other and positive appraisals of the area are aspects that, combined, indicate a somewhat tolerant, or less ‘class hating’ atmosphere (Holanda, 2013). Familiarity with the area was another aspect to consider in calibrating information about the levels of awareness and appraisal, in line with the belief that when people regularly use an area they tend to value it, accept the presence of other frequenters, and concern themselves with its maintenance, thus being prone to act positively towards the area, as pointed out in studies of urban waterfronts (Mello, 2008).

To ascertain mutual awareness of differences concerning the other, the interviewer also needed to touch upon the very delicate issue of class distinction, which was beyond the scope of this research to investigate in depth. It was therefore decided that education levels and neighbourhood of residence (only for Natal’s residents) would be enquired as proxies for income and, therefore, class. Brazilian society, albeit notoriously unequal, is also notoriously the result of racial miscegenation, so that although ethnic cleavage lurks underneath this apparent racial mix, social divisions are markedly linked to income and, to a lesser but still very relevant extent, education. By enquiring about place of residence it was possible to gauge to what extent dwellers from different neighbourhoods (with diverse average incomes), as well as these and visitors from other towns (close or far away) mixed in each studied beach. Age and gender were also recorded.

2. Our study: Exploring nexus between architecture and society in urban beaches

What then are the differences and recurrences in the architectural profiles — space configuration and built form — of each beach? Are people from different social niches present and how do they
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enjoy themselves while there? To what extent can the beaches be considered as lively and socially inclusive arenas? And how does architecture affect these aspects? In order to answer these questions, architecture and society were examined in the studied beaches by exploring: (a) spatial configuration, (b) built form, and (c) social characteristics of beachgoers and their views.

Spatial configuration was approached in topological and, to a lesser extent, geometrical terms, by means of two syntax analysis procedures for representing and quantifying accessibility — axial and angular segment — considering measurements relating to potential to-movement (integration values) and through-movement (choice) at diverse radii of topological reach and metric distances. Built form was observed and mapped regarding land use, building heights, modes of interface between public/private spaces and of spatial continuity at the waterfront. The extent to which social mixture was present, and attitudes towards this presence, were assessed through questionnaires focusing on indicators of socio-economic status, familiarity with the area and how interviewees gauged its qualities.

2.1 Of space

The city’s spatial configuration was examined through axial and angular segment analysis (ASA), processed in UCL Depthmap. Normalised choice (NACH) and integration (NAIN) values were also calculated for ASA to compare systems of different sizes (Hillier et al., 2012) within the city. For the global spatial representation, besides the street grid of Natal’s municipal boundary, streets officially belonging to other towns that make up the city’s metropolitan ensemble were added wherever there was continuity of occupation; that is, buildings alongside roads that connect them to the municipal perimeter.

The road complex linking the metropolitan area to the present airport [Figures 1 and 2], operating since 2014, was also added to the global representation because airports are key generators of movement and, by the same token, the land alongside these routes is becoming increasingly occupied.

To compare the spatial configuration in the vicinity of each of the studied beaches, for both axial and ASA, graph layers were separated from the Natal system, creating subsystems that extend between 300 to 400 metres from their waterfronts, and correspond to the surveyed and mapped built form area. The numbers of lines and of segments are displayed in Tables 1 and 3 that show Redinha as the subsystem with fewest units, in comparison to Praia do Meio and Ponta Negra, which approximate in number, despite the fact that Ponta Negra stretches across a larger area [Figures 6 and 7].

As discussed by Medeiros (2013), when comparing a sample of 164 towns around the world (44 in Brazil), Natal has low average levels of global integration (Rn, Table 1), sustaining his thesis that Brazilian cities are markedly fragmented. The correlation between local and global integration values in axial analysis [Table 2] (including synergy and intelligibility, relating to how easily a global attribute is perceived locally) is also low.

Table 1

<table>
<thead>
<tr>
<th>Integration</th>
<th>Con</th>
<th>R3</th>
<th>R6</th>
<th>R13</th>
<th>Rn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal (n=13215)</td>
<td>3.832</td>
<td>2.114</td>
<td>1.644</td>
<td>1.107</td>
<td>0.631</td>
</tr>
<tr>
<td>Redinha (n=46)</td>
<td>2.957</td>
<td>1.380</td>
<td>1.018</td>
<td>0.787</td>
<td>0.502</td>
</tr>
<tr>
<td>Praia do Meio (n=127)</td>
<td>3.992</td>
<td>1.812</td>
<td>1.419</td>
<td>1.063</td>
<td>0.687</td>
</tr>
<tr>
<td>Ponta Negra (n=108)</td>
<td>4.518</td>
<td>1.950</td>
<td>1.461</td>
<td>0.928</td>
<td>0.556</td>
</tr>
</tbody>
</table>
In both axial analysis and ASA, the integration core expands across a large area centrally located (in geometric terms) south-east of the old town centre but still reaching its fringes [Figure 2]. However, in axial analysis (potential to-movement) the integration core is more concentrated as few very integrated lines cross the river, whereas in ASA it spreads south-west, and reaches the north zone over the Igapó Bridge. Both modelling instances seem faithful to the city’s spatial structure as the axial map captures the area generally viewed as the city’s larger active centre (which concentrates the majority — in number and variety — of service and commercial activities), and the ASA map captures arteries linking the north and south sides of town, signalling the grid expansion towards the new airport sited in the municipality of São Gonçalo, part of Natal’s metropolitan conurbation. NACH values

<table>
<thead>
<tr>
<th></th>
<th>Rn-Con Intelligibility</th>
<th>Rn-R3 Synergy</th>
<th>R13-R3</th>
<th>R13-Con</th>
<th>R3-Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal</td>
<td>0.0367</td>
<td>0.3153</td>
<td>0.421</td>
<td>0.0449</td>
<td>0.2780</td>
</tr>
<tr>
<td>Redinha</td>
<td>0.2961</td>
<td>0.5074</td>
<td>0.5174</td>
<td>0.2961</td>
<td>0.7950</td>
</tr>
<tr>
<td>Praia do Meio</td>
<td>0.2605</td>
<td>0.5582</td>
<td>0.351</td>
<td>0.1544</td>
<td>0.6711</td>
</tr>
<tr>
<td>Ponta Negra</td>
<td>0.1457</td>
<td>0.3287</td>
<td>0.5025</td>
<td>0.2264</td>
<td>0.5990</td>
</tr>
</tbody>
</table>

Table 2
Correlation between topological radii (axial analysis), highlighting top levels.

Figure 2
Natal’s segment map (ASA) showing normalised integration (NAIN).
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(potential through-movement) further highlight a system constituted by few roads that function as the main access to most urban areas [Figure 3].

The studied beaches lie outside Natal’s integration core at both axial and ASA modelling, as does the coastal route that links the three of them. Such fragmentation is partly the effect of their natural boundaries. Redinha is located on a corner where the sea meets the estuary of the Potengi; Praia do Meio stretches in-between the seashore and a steep hill, being also close to the river (to its north), and to Parque das Dunas (to its south), a conservation area that extends along the sea line towards Ponta Negra, this beach being limited at its southern side by the Morro do Careca, another conservation area.

Although Praia do Meio is metrically very close to the integration core, it is not embedded in it, partially due to the steep topography of its setting. Redinha is also metrically near the topological centre, but cannot be reached by it because most of the neighbourhood is located under the bridge [Figures 2 and 3]. On the other hand, Ponta Negra, metrically distant from the city’s integration core, is linked by a direct thoroughfare that stretches to the topological centre. This thoroughfare — Roberto Freire Avenue — is flanked by occupied street grids on both sides for most of its extension.

Numbers show that Redinha is the most segregated beach at all examined radii (Axial and ASA, Tables 1 and 3), reaching lower levels than Natal.
on average. However, high correlations between axial analysis radii suggest spatial legibility, and that the neighbourhood functions well as an independent system (Perdikogianni and Penn, 2005). This relates to areas termed as “oases in the labyrinth” by Medeiros (2013): old city centres in Brazilian cities were identified as privileged areas with high local-global synchrony, being more legible than expansion areas. Redinha was in fact an independent settlement later engulfed by Natal’s grid, and its built form reinforces the idea of a marked local identity.

Praia do Meio is, on average, well integrated at global and higher radii (axial: Rn and R13; ASA: NACH), and shows high synergy [Table 2]. However, roads tend to be highly accessible either globally or locally, suggesting abrupt transitions between scales of potential movement.

Ponta Negra’s accessibility measures are the highest, on average, at local and intermediate radii (axial: R3/R6 and NACH, ASA 400 to 5,000 metres). Furthermore, when considering angular deviations, its average integration levels surpass even Praia do Meio globally [NAIN, ASA, Table 3]. This reinforces its strong continuity with surroundings despite the neighbourhood being far from the city’s global integration core. On the other hand, lower topological radii correlations suggest that it does not function well as an independent system.

In Ponta Negra, NACH/NAIN correlations are high throughout all intermediate metric radii up to global, from 1,200 metres to ‘n’ [Table 4], whereas for Redinha and Praia do Meio, high correlations concentrate on local radii, so that slightly lower correlation levels are maintained throughout medium to global radii for Redinha, and a steady drop occurs for Praia do Meio beyond 800 metres.

Positive correlation levels (R2 over 0.40) between metric radii for NAIN and NACH (higher for NAIN) [Table 5] are maintained for Ponta Negra, whereas Redinha has the lowest levels.

<table>
<thead>
<tr>
<th>NAIN</th>
<th>NACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>1200</td>
</tr>
<tr>
<td>Natal (n=40060)</td>
<td>1.358</td>
</tr>
<tr>
<td>Redinha (n=90)</td>
<td>1.096</td>
</tr>
<tr>
<td>Praia do Meio (n=358)</td>
<td>1.278</td>
</tr>
<tr>
<td>Ponta Negra (n=307)</td>
<td>1.324</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Natal</th>
<th>Redinha</th>
<th>Praia do Meio</th>
<th>Ponta Negra</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.299</td>
<td>0.340</td>
<td>0.332</td>
<td>0.316</td>
</tr>
<tr>
<td>0.444</td>
<td>0.424</td>
<td>0.271</td>
<td>0.256</td>
</tr>
<tr>
<td>0.449</td>
<td>0.402</td>
<td>0.385</td>
<td>0.388</td>
</tr>
<tr>
<td>0.291</td>
<td>0.408</td>
<td>0.461</td>
<td>0.502</td>
</tr>
</tbody>
</table>

Table 3
Levels of NAIN and NACH (ASA) for metric radii, highlighting top average levels.

<table>
<thead>
<tr>
<th>Natal</th>
<th>Redinha</th>
<th>Praia do Meio</th>
<th>Ponta Negra</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2966</td>
<td>0.4752</td>
<td>0.4858</td>
<td>0.2309</td>
</tr>
<tr>
<td>0.1703</td>
<td>0.1462</td>
<td>0.5662</td>
<td>0.8518</td>
</tr>
</tbody>
</table>

Table 4
NAIN/NACH correlation levels in different metric radii, highlighting top values.

Table 5
Correlations between metric radii for NAIN and NACH, highlighting top values.
Redinha and Praia do Meio present higher confluence between topological radii [Table 2], suggesting they function better as independent systems than Ponta Negra. In these beaches the convergence of potential to- and through-movement (NAIN/NACH correlations) concentrates on local radii, whereas in Ponta Negra it spreads throughout the grid [Table 4], suggesting that journeys taken by visitors and locals merge in an ampler spectrum. Furthermore, NAIN correlations between metric radii are significantly higher for Ponta Negra [Table 5], indicating that to-movement, associated with visitors, also converges at different scales. Results reinforce that in Ponta Negra, distinct routes are better embedded in the overall grid, whereas in Redinha and Praia do Meio the overlap of distinct routes is restricted to local residents (NACH correlations).

2.2 Of buildings
In our search to ascertain how the interplay of voids and masses affects the ways the studied beaches are used, their built form was analysed concerning: (i) land use and built height, within an area of 300 to 400 metres around their waterfront promenades; and (ii) physical attributes that define levels of interface between public and private spaces, surveyed for the waterfront buildings.

The classification of land use types was defined by adapting categories established in studies with similar aims, seeking to identify activities likely to occur with varied intensity and frequency, and to attract beachgoers of distinct profile types (Nascimento, 2011; Perdikogianni and Penn, 2005; Vaughan et al., 2013). Recurrent activities found in these areas were thus grouped as: (a) leisure/tourism—hotels/lodging facilities, catering and leisure; (b) community—places of worship, education, healthcare, and community services and associations; (c) green spaces—outdoor amenities, open spaces or preservation areas that cannot be built upon; (d) vacant—spaces with no present uses, but that can be built upon; and (e) storage — warehouses, garages.

In Redinha, buildings are small and low, being mostly ground floor level, and there are few vacant premises [Figure 4]. Non-residential uses mainly comprise churches and community facilities, a school and a market (labelled as ‘Commercial Centre’). Some residences are permanent, some second homes—this being the only studied area that does not have hotels or lodging facilities. As a unique trait, there are boat warehouses south of the surveyed area, resembling a fishing village. Community facilities and small commerce concentrate on segments with high accessibility, especially locally (e.g. NACH R400m), both at the waterfront and at the highlighted area in Figure 5. Most non-residential uses on the waterfront face the river rather than the sea, mixing leisure facilities for visitors (restaurants/bars) with local uses (e.g. school, churches). The beach promenade connects to a square with parking space, a church, a leisure club, and a traditional food market surrounded by restaurants. The waterfront area has the strongest public/private interfaces (no blank walls) amongst the studied cases, and the square, the promenade and the sand areas form a continuous ensemble, with almost no change on floor level [Figure 8-i]. The stalls are closely packed together, one group facing the river, another the sea.

The tight public/private spaces interface and few vacant buildings or plots in Redinha reinforce its spatial configuration analysis (high correlations through topological radii), highlighting the area’s legibility, especially from the residents’ viewpoint.

Praia do Meio has three distinct architectural profiles [Figure 5]: (i) hotels, restaurants and medium-rise buildings (up to six storeys), as well as many vacant premises, are sparsely distributed on blocks closer to the beach; (ii) a dense ensemble of small, low-rise buildings, mostly attached, is located one to three blocks away from the beach, on roads seg-
Figure 4
Land uses and local accessibility (NACH r400m) at Redinha.
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Figure 5
Land uses and local accessibility (NACH 400m) at Praia do Meio.
regulated at global and intermediate radii but highly accessible locally, as if space configures them to work in isolation from the wider city fabric (following Parham, 2012); (iii) high-rise luxury residences and healthcare institutes located up the hill towards the south-west of the surveyed area, on a street grid highly accessible in global terms, which is part of the city’s integration core. The hill, a key feature of the scenery — included in the survey catchment area due to its metric proximity to Praia do Meio’s waterfront — is technically another administrative unit, the neighbourhood of Petropolis, one of the wealthiest in town. The healthcare facilities located there (including an important university hospital) attract users on a metropolitan scale.

Praia do Meio is the only beach where the waterfront road (Pres. Café Filho Avenue) has medium integration and medium to high choice levels globally (being part of the city’s coastal route) and hence suffers intense vehicular movement. This highly integrated configuration is a recent phenomenon, as the opening of the main stretch of coastal route dates from 1985 and the new bridge, which completed it by linking north and south coasts, was opened in 2007. The avenue exhibits hotels, catering, commerce and vacant premises, many of which display blank walls to the streets. By the waterfront, stalls concentrate in two groups, corresponding to places at the beach with larger sand patches and better bathing waters. One group is located halfway along the waterfront within the neighbourhood perimeter, and another near its northern border. The building ensemble across the road from both stalls groups show weak private/public interfaces and barely any tertiary activities, especially to the north. It is also difficult for people to cross the coastal avenue as they have to walk fairly long lengths of badly kept narrow sidewalks (opposite the waterfront promenade) to find crossing points. The severing role of routes with large-scale (vehicular) movement has often been pointed out in the literature (Anciaes et al., 2014; Appleyard and Lintell, 1969). Walking is also hindered by discontinuity between the promenade and the sand, due to ground level differences and fences with few access points [Figure 7-ii].

Ponta Negra has the longest coastline (3 kilometres) and the largest proportion of non-residential uses: hotels/lodging, catering, general and varied commercial and service outlets, plus vacant premises. Local commerce, community facilities and residences cluster on segments with high local accessibility (e.g. NACH 400m, highlighted area in Figure 6), which also have uses that appeal to tourists and may attract general affluence.

Roberto Freire Avenue, the most accessible road at global and intermediate radii is also highly accessible locally. It is flanked by high-rise buildings (reaching 30 storeys), commercial centres, restaurants, bars and hotels that attract people from other neighbourhoods, and coexist with smaller, local commerce. This avenue follows the coastline, but is located three to four blocks away from it and has building restrictions on the side facing the sea to prevent the scenery being blocked from view.

Concerning private/public interfaces at the waterfront, two areas can be distinguished: (i) a northern stretch with few tertiary activities, and weak interfaces (many blank walls), where the promenade is solely for pedestrians; and (ii) a southern stretch with bars, restaurants and commerce, and stronger public/private interfaces, where a vehicular thoroughfare (Erivan França street) runs alongside the promenade.

In terms of public/private interfaces at plots facing the waterfront [Figure 8-i], Praia do Meio has the least constituted interfaces and Redinha the most. In both Redinha and Ponta Negra, the waterfront complex (formed by street, promenade and sand tract) is more continuous than that of Praia do Meio. Although in Ponta Negra there are ground level changes between the promenade and the sand stretch, visibility is not broken by physical barriers.
and access to the sand can be gained anywhere (at least for those not physically impaired) by means of a low jump [Figure 7].

In the three studied cases, many commercial and catering facilities comply with their role as leisure/socialising areas, Ponta Negra having the largest proportion of non-residential uses, and Praia do Meio the smallest [Figure 8-ii]: Ponta Negra more hotels and Redinha none. But in Redinha, the proportion of vacant premises is much lower than in the other two beaches, especially Ponta Negra.

Few vacant premises in Redinha evidence a fairly consolidated built form ensemble; indeed the main waterfront buildings (the market and the
church) have been there for well over half a century. On the other hand, Ponta Negra’s many vacant plots — together with our observations over recent years — indicate a less consolidated built ensemble with speedy renewals, as has been the case in highly integrated areas of Natal (e.g Trigueiro and Medeiros, 2003). In Ponta Negra many of these changes have been driven towards (and by) tourism. The built form in Praia do Meio suggests a somewhat derelict area which seems to suffer the effects of being at the fringes of the city’s integration core, but not well-knitted to it.

In all beaches, non-residential uses concentrate: (i) at the waterfront, especially those that support leisure; (ii) on streets with high local accessibility, mainly concerning catering facilities for the local clientele; (iii) on streets with high global accessibility. Land use distribution and spatial configuration suggests that visitors and locals intermingle at Ponta Negra and Redinha (albeit at different scales), but not at Praia do Meio, where roads concentrating activities for visitors are clearly separated from those focusing on community uses.
2.3 Of uses: people and their views
This section underlines and compares the main findings from the questionnaire survey used in interviews at the three studied beaches, comprising 390 questionnaires in total, 130 per beach. At each beach, two survey points were chosen to account for some built form variety in the vicinity; people were approached at different times of day (morning, lunch, afternoon), on varied weekdays (Wednesday, Saturday and Sunday) and in the months of November (2014) and January (2015) to cover school/holiday periods. Information resulting from the survey is related to architectural attributes of each area in the last section of this paper.

The main aspects addressed by the questionnaires were:
(i) People’s profiles were sought to verify the distribution of visitors and local residents and the presence of social mixture, defined in terms of gender, age, phase of life, schooling level, and estimated income. Phase of life was gauged by asking people’s ages, and whether they had children (if so, how often they took them to the beach). The combined information about place of residence and level of schooling served as a proxy for potential income—taking as reference the average income of the population in Natal’s neighbourhoods, according to the national 2010 census (IBGE, Instituto Brasileiro de Geografia e Estatística); place of residence was also the reference for identifying visitors (from the state, other states or abroad) and residents (locals or from other neighbourhoods);
(ii) Familiarity with the area was estimated according to how long respondents had been coming to the beach and how often they did so;
(iii) Appraisal of the beach was addressed by means of (a) environmental images (interviewees were invited to name the first thing that came to mind when they thought about the beach); (b) how they judged aspects relating to other people at the beach: security, cleanliness, landscape, access, leisure facilities; (c) how interviewees arrived at the beach and how long they took to get there; and (d) what activities (up to three) they highlighted as doing at the beach;

Appraisal concerning the other two beaches was established by inviting respondents to cite environmental images regarding the other two studied beaches.

Answers concerning environmental images were labelled in groups (e.g. objective/subjective, negative/positive) and the evaluation of key aspects was ranked on a Likert scale (from terrible to excellent).

Responses revealed Redinha beachgoers to be mainly family groups residing in Natal (chiefly Zona Norte), and some visitors who mostly came from towns within the state (21.5%, 28 people). On average, the income and education levels of Redinha beachgoers were found to be the lowest amongst the studied cases. Praia do Meio had the largest proportion of young people (79.2%, 103 people), who resided in various neighbourhoods of the city and had slightly higher education and income levels than those at Redinha. In Ponta Negra, most interviewees were tourists (40% or 52 people, against 37.7% or 49 people who lived in Natal), of which the largest portion came from other states in north-east Brazil; of those living in Natal, most came from its south sector. People at Ponta Negra were found to have the highest levels of education and income amongst the case studies. Figure 9 shows the distribution of people according to (i) schooling level and (ii) place of residence, at each beach and in total. Gender was balanced across all of the studied beaches, with female or male respondents representing at least 40% of the interviewed population in each case.

Unsurprisingly, familiarity levels were high at Redinha and Praia do Meio, as people were found
to visit the respective areas frequently, having
known them for many years; whereas respondents
in Ponta Negra exhibited low familiarity levels, with
many being first-time visitors.

In terms of how the other studied beaches were
appraised by interviewees, Praia do Meio received
the worst evaluation, with emphasis on security
issues, whereas Ponta Negra was best evaluated.
For Ponta Negra, negatively appraised aspects
concerned cleanliness and leisure facilities.

When people were asked about the first thing
that came into their minds concerning the other
beaches, most answers had negative connotations,
revealing a general animosity. There was only one
case in which positive remarks surpassed negative
ones, being from people at Praia do Meio concern-
ing Redinha, an attitude that suggests some sort of
solidarity or at least sympathy. Tensions were higher
between Ponta Negra and Praia do Meio, especially
from people at Ponta Negra.

At all beaches, the activities frequently cited
by respondents were of a passive — e.g. ‘relaxing’
or ‘resting’ — or social nature — e.g. ‘chatting’,
reinforcing their roles as venues for leisure pursuits
and socialising. In Redinha, social activities were
recurrently mentioned, whereas in Ponta Negra the
focus was on passive ones.

Regarding mobility, journey times for beachgo-
ers were longest for Redinha (many by car), and
shortest for Ponta Negra. This, together with the land
use survey, suggests that visitors to Redinha travel
from far away, whereas in the case of Ponta Negra,
non-residents probably lodge in hotels in the vicinity.

As a whole, urban liveliness and social inclusiveness
were limited across all beaches. While favourable views from a fairly mixed social group
were found in Ponta Negra, low levels of familiarity
with the area makes this unlikely to help sustain
urban liveliness in the long term.

3. Discussion—architecture and society
In answer to this paper’s central question — whether
and how architectural form relates to the character
and reputation of our studied beaches — findings
indicate that architecture expresses and enables
modes of use and social life in each case, thus
reinforcing attitudes and beliefs about the beaches.

Contrasting architectural profiles of spatial configu-
ration and built form weave distinct urban logics,
underpinning diverging views and bringing preju-
dices to light.

The topological segregation of Redinha, the
least accessible beach, may account for ‘remote-
ness’; the presence of a simple, low-rise built
ensemble and the longest journey times. High
confluence between topological accessibilities
facilitates legibility, which matches the high levels
of familiarity with the area reported by respondents,
mostly families. The strong interface linking private and public spaces on the waterfront at Redinha, where few plots are left vacant, may explain a more favourable evaluation of vulnerability to anti-social actions than that at Praia do Meio, despite Redinha interviewees seeming less privileged, both in terms of income and education.

Although the streets do not connect well to surroundings at both Redinha and Praia do Meio, which tends to delineate them as enclaves, in Redinha the combination of low global accessibility, high local spatial legibility and strong private/public interfaces may contribute to attracting local people as well as visitors from other cities in the state, who seem to feel comfortable bringing their families along. It should be noted that there is less social mixture at Redinha (and therefore contrast), which might account for a more relaxed attitude. This also, of course, contributes to the general view of the beach as a ‘far-away haunt for the common folk’, who as an economically less privileged group, tend to reside in segregated areas, as pointed out in various studies (Vaughan, 2007; Donegan and Trigueiro, 2012).

Rather than ‘decadent’, Praia do Meio emerged from the study as highly ‘mismatched’, if the three ensembles (and the people there) are considered: the waterfront, the hilltop, and the community in between. The reference to ‘decadence’ in the media discourse about Praia do Meio may reflect a nostalgia tinted with sociocultural discrimination, as this was once the chosen spot for the well-to-do who, nowadays, if wanting to enjoy seashores at all, are more likely to choose Ponta Negra or places out of town and out of public transport reach. As the financially better off deserted the promenade and sands of Praia do Meio, it was left to ‘the others’.

At Praia do Meio, high global accessibility and proximity to the city’s integration core alternate with fairly or strongly segregated enclaves, so that potential movement routes at progressive intervals of reach length do not correspond. Potential flows unlikely to overlap may account for the scarce co-presence of distinct groups at Praia do Meio, be they residents or visitors: the ones who enjoy the beach; those that work, pass through there; or the wealthy occupants of tower blocks up the hill, who overlook the beach from their vantage points.

In summary, the most striking differences concerning spatial properties amongst the beaches were embedment in the wider urban fabric and resilience through accessibilities, key factors that can help the convergence of potential to- and through-flows and the confluence of journeys that facilitate co-presence among different groups, as pointed out in various studies (Dhanani and Vaughan, 2013; Vaughan et al., 2013, Yang and Hillier, 2012; Hillier et al., 2012).

Ponta Negra, however metrically far away from the city’s global integration core, reaches high accessibility levels and resilience through accessibilities, that sustain potential movement flows ‘spreading out’ to neighbouring areas. Such a potential generator of converging journeys appears to correspond to the mixing of diverse land uses in the built ensemble — residences, community facilities, commerce and tourism — and to stimulate the coexistence of residents and visitors. This blend of land use may be the reason why this beach received the most favourable comments from interviewees.

Ponta Negra, where an ampler array of architectural variables thought to facilitate urban vitality was present (e.g. diverse land uses and overlaps of journeys) is, therefore, the studied case found to be closest to the idea of a lively, socially inclusive area. Yet, we must bear in mind that those results are mainly a counterpoint to what was found for Redinha and Praia do Meio, with the aggravating factor that low familiarity with the area betrays a temporary relationship and suggests that most of the interviewed people there were only visiting.

There are many directions that studies aiming to unveil architecture/society relationships in
public spaces, especially beaches, in Brazil could develop. Some of the aspects out of scope for this study which could reveal more include the distribution of people with distinct social characteristics at specific spots, and the observation and mapping of their journeys and activities as well as the presence of certain amenities and physical attributes at a finer grain. It would also be valuable to find out how relations between architecture and society in other coastal cities in Brazil compare to these findings.

On the whole, there was no evidence that the space in any of the studied beaches, regardless of how crowded they were with inhabitants and visitors, ‘mixed them all together’. As such, our quest for instances of lively, socially inclusive public spaces was of limited success, as irrespective of their poignant natural beauty, the beaches were found to express, strengthen and support a well-known nationwide (or perhaps even worldwide) polarity between the more or less socially privileged. In Natal, this finds spatial embodiment in the polarity between a poorer north and a richer south sector and its translation into ignorance of, and uneasiness towards, the other. The architecture of the beaches in Natal, therefore, by expressing a segmented society and enabling the flows of people of varied social niches to remain separate, mostly contributes to setting them apart, each to their own.

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References


Hillier, B. and Hanson, J. (1984), The social logic of space, Cambridge, UK: Cambridge University Press.


Holanda, F. (2013), 10 mandamentos da arquitetura, Brasília: FRBH.


Legeby, A. (2013), Patterns of co-presence: Spatial configuration and social segregation, Stockholm: KTH.


Mello, S.S. de (2008), NA BEIRA DO RIO TEM UMA CIDADE: urbanidade e valorização dos corpos d’água, Brasilia: UnB.


