

SEARCHING FOR CENTENARIANS:

URBAN ANALYSIS OF THE WORLD'S LONGEST LIVED COMMUNITIES

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Urban designers, architects, and planners are well versed in understanding how to shape, form, and adapt cities, but is there more to understand in how those cities are shaping their residents? Might life spans be the best new urban design metric?

01 RATIONALE

This report summarizes a high-level urban analysis on the world's longest lived communities, commonly known as Blue Zones.

Our lives are dictated by the environments in which we live. As populations continue to migrate to cities and dense city living becomes the common human denominator - are we as designers at Perkins+Will prepared with the necessary knowledge on the health implications of our built environment? Can we supplement our understanding of urban design and architecture to include public health innovations and understanding beyond what is currently practiced to design urban environments for happy, healthy people of all ages, encouraging societal resiliency, sociability, active lifestyles, and sustainable urban form?

To this end, we undertook a high level urban analysis of the regions with populations known to reach extraordinary rates of centenarians in order to develop an understanding of the conditions we should aim for in our designs to create the healthiest living environments. If we are looking to create environments for livability, let us look to the environments which produce the longest lived populations.



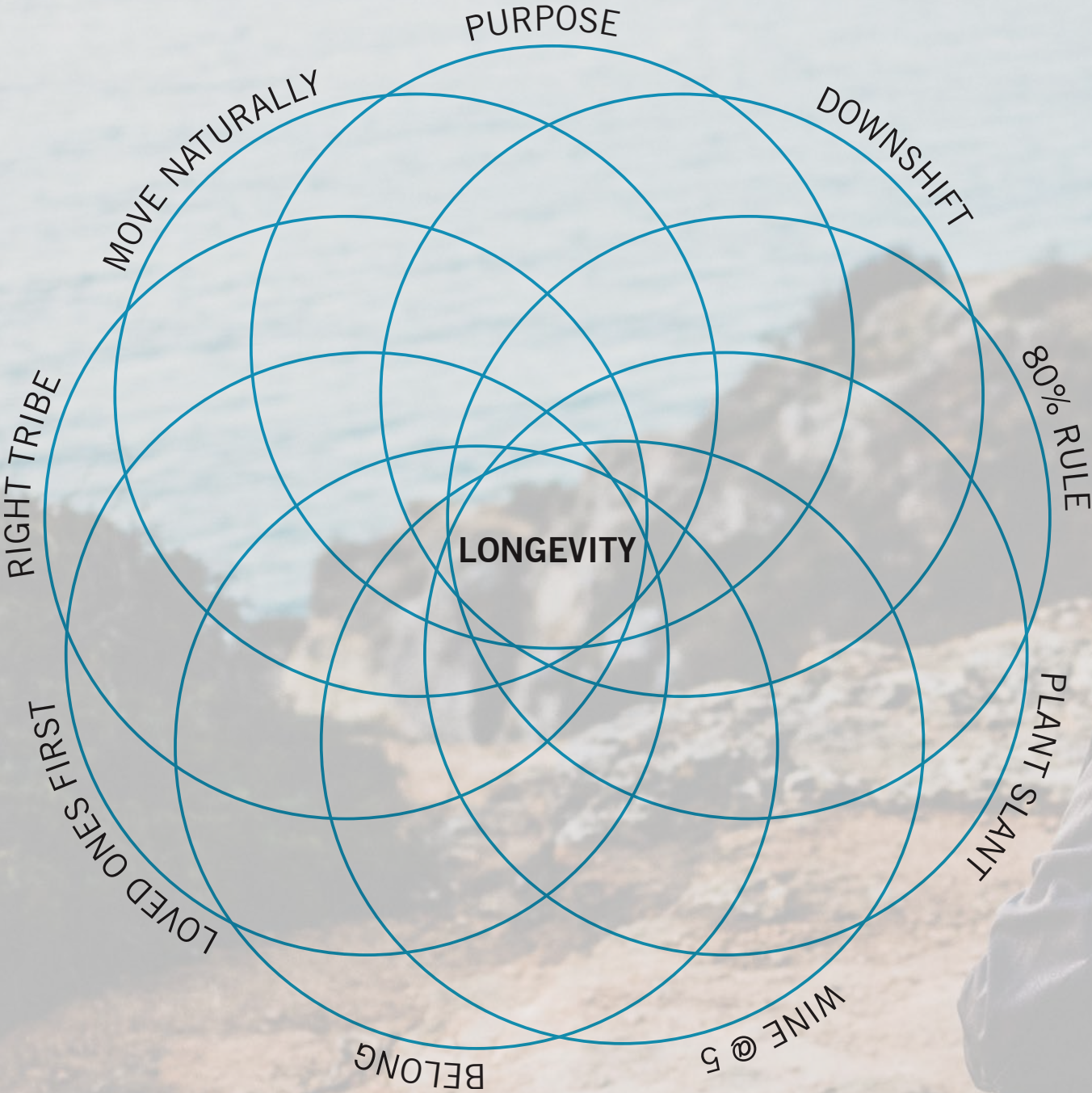
02 RESEARCH SUBJECT

A Blue Zone is defined by Poulain, Michel, et al (2003) as a “limited homogenous geographical area where the population shares the same lifestyle and environment and its longevity has proved to be exceptionally high”. There are four Blue Zones identified in their study: Sardinia Italy, Ikaria Greece, Nicoya Peninsula Costa Rica, and Okinawa Japan. These four regions represent discrete case studies of communities that support the development of centenarians.



03 LITERATURE REVIEW

Existing research into the subject of Blue Zones builds upon the work of Poulain, Michel, et al (2003), whose initial study identified the anomalous longevity exhibited in these localized regions and coined the term “Blue Zones”. However, the majority of this existing research focuses not on the built environment, but on the humanities and health sciences – providing insights into the lifestyles, diets, exercise habits and social behaviour of the inhabitants.

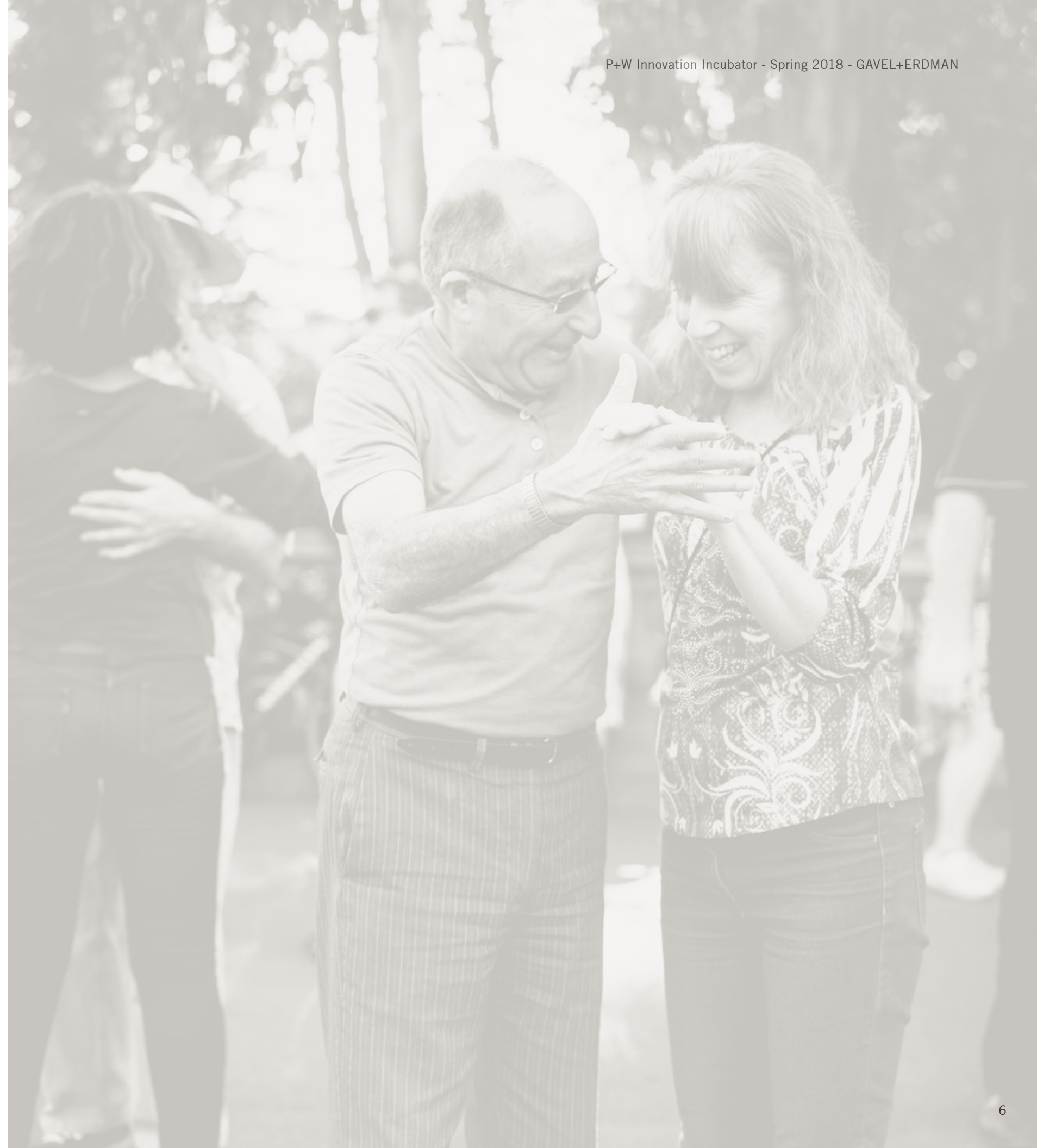


Potential lifestyle determinants of Blue Zones, Buettner and Skemp (2016)

03 LITERATURE REVIEW

Buettner and Skemp (2016) hypothesize what could be the lifestyle determinants of Blue Zone inhabitants:

1. **Move naturally.** The world's longest lived people do not pump iron, run marathons, or join gyms. Instead, they live in environments that constantly nudge them into moving without thinking about it.
2. **Purpose.** The Okinawans call it Ikigai and the Nicoyans call it plan de vida; for both, it translates to "why I wake up in the morning." Knowing your sense of purpose is worth up to 7 years of extra life expectancy.
3. **80% Rule.** Hara hachi bu, the Okinawan 2500-year old Confucian mantra said before meals reminds them to stop eating when their stomachs are 80% full.
4. **Downshift.** Even people in the Blue Zones experience stress. Stress leads to chronic inflammation, associated with every major age-related disease. What the world's longest-lived people have that we don't are routines to shed that stress. Okinawans take a few moments each day to remember their ancestors, Ikarians take a nap, and Sardinians do happy hour.
5. **Plant slant.** Beans, including fava, black, soy, and lentils, are the cornerstone of most centenarian diets.
6. **Wine @ 5.** People in all Blue Zones drink alcohol moderately and regularly. Moderate drinkers outlive nondrinkers. The trick is to drink 1 to 2 glasses per day.
7. **Belong.** All but 5 of the 263 centenarians interviewed belonged to some faith-based community. Denomination does not seem to matter.
8. **Loved ones first.** Successful centenarians in the Blue Zones put their families first. This means keeping aging parents and grandparents nearby or in the home.
9. **Right tribe.** The world's longest lived people chose or were born into social circles that supported healthy behaviors, Okinawans created moais, groups of 5 friends that committed to each other for life.



03 LITERATURE REVIEW

Dan Buettner’s research into Blue Zone communities provides the road map for this focused research. In his book “The Blue Zones” (2008), Buettner identifies sub-regions and communities within the four Blue Zones where concentrations of centenarians are found. The legwork of identifying and verifying these specific areas is by far the most challenging aspect of longevity spatial research and significantly empowers those wishing to conduct further study. Furthermore, Buettner’s general descriptions of centenarian’s specific living conditions provides invaluable insight, allowing for a comparison to the wider communities in which they are located and determining if their situations would be typical in the area.



04 APPROACH

The findings in this report are the result of a design-focused investigation into possible built-environment factors contributing to the extreme longevity present in the four Blue Zone communities. However, because of the small number of sites having been identified as fitting the criteria of a Blue Zone, conducting a comparative analysis with the intention of discovering / analyzing commonalities between the urban environments would result in statistically weak correlations and is the wrong approach for this research.

The established commonality of the four sites is their population’s remarkable propensity for longevity. There are too many variables contributing to this longevity and an insufficient sample size to infer that any one specific urban environment commonality equates to significant longevity. Furthermore, the four Blue Zone areas exist in notably different regions, cultures, societies, and population densities. Each region has distinct merits for urban analysis research based on the population’s significant longevity alone, and each region may teach a different lesson. Because of this, the approach taken for this report is a more general identification and assessment of potential built-form and spatial attributes that may be contributing to the creation of an environment supporting longevity and livability in each Blue Zone.



04 APPROACH

For each of the identified Blue Zones, data was attempted to be collected/ developed to support urban analysis looking specifically at:

- Context
 - Architectural Patterns
 - Urban + Land Use Patterns
 - Historic Context (Morphology of Community)
- Scale
 - Granularity
 - Street Rhythm
 - Massing
 - Community
- Environment
 - Topography
 - Hydrology
 - Climate
 - Landscape/Ecology
- Circulation and Transportation

Due to language barriers and the often remote nature of these regions, data for this analysis was difficult to obtain and often had to be developed through web-based sources such as Google Earth and OpenStreetMap. Furthermore, as the analysis was undertaken, it became apparent that some of the tools and metrics that urban designers typically rely upon are insufficient or create impractical data in the rural context in which many of the Blue Zones exist. To compensate for this, a qualitative assessment and collection of observations was also developed for the Blues Zones.

Within each region three communities were studied. The selection process focused on those towns either specifically mentioned by Buettner in “The Blue Zones” or communities representative of various urban scales in an attempt to begin to establish what urban and spatial conditions are consistent across a region





GEOGRAPHIC FEATURES

Area (km²)	1,559 km²
Population	42,113
Density (Inhab / km²)	27
Average Latitude	39 N
Site Altitude	Mid-Mountain
Average Land Steepness	High
Proximity to the Sea	Yes

CLIMATE

Climate	Mediterranean
Average Annual Temp and Range (C)	16.9C (16-18)
Average Annual Rainfall (mm)	~800mm
Relative Humidity (%)	65%

LAND CHARACTERISTICS

Main Geological Features	Granite and Basalt
Background Radioactivity	High
Drinking Water Hardness	Low
Forest Coverage (%)	83.1%

SOCIO-ECONOMIC INDEXES

Local Income (LI) per capita	\$19,872
Agriculture (% of LI)	1.4
Manufacturing (% of LI)	16.8
Services (% of LI)	81.8
Vehicles per 1,000 Inhabitants	360

LIFESTYLE AND HEALTH INDICATORS

Daily Food Intake per Capita (kcal)	2600
Smoking Rate (%)	~20%
Obesity Rate (% BMI above 30)	8.7%
Suicide Rate (Cases/100,000)	15.3

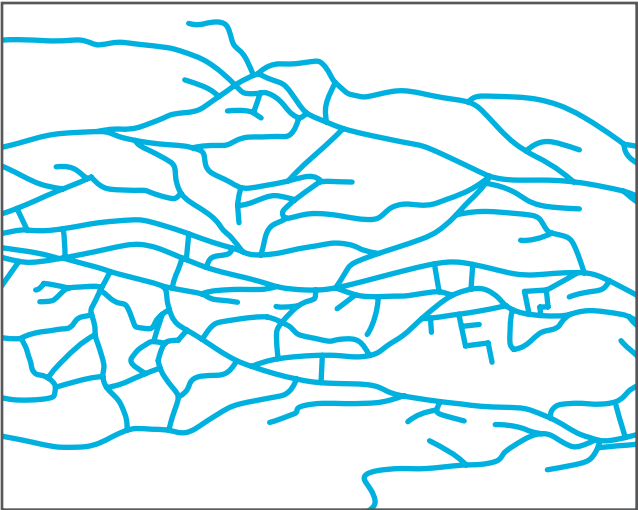
05 SARDINIA

Several hundred kilometers off the west coast of the Italian mainland lies the island of Sardinia and the isolated mountainous region of Ogliastro, an area renowned for extreme longevity, particularly in men. The ancient communities of this region are typically small, dense, and rural. Theories around the longevity witnessed here revolve around the shepherding lifestyle of the men involving low-stress days filled with long walks outside through the rugged terrain, the sense of purpose instilled by this lifelong occupation, the cardiovascular health provided by this consistent gentle exercise, and Mediterranean diet. The towns’ locations provides access to fresh produce, plant based diets, and local wines notably high in antioxidants. The small, dense communities enable tight-knit social circles with multigenerational families often living in close proximity to one another. The historically isolated nature of the region, resulting in a distinct genetic makeup of the inhabitants, has also been considered as a possible explanation for the high rates of centenarians in the region.



SARDINIA, ITALY

BAUNEI



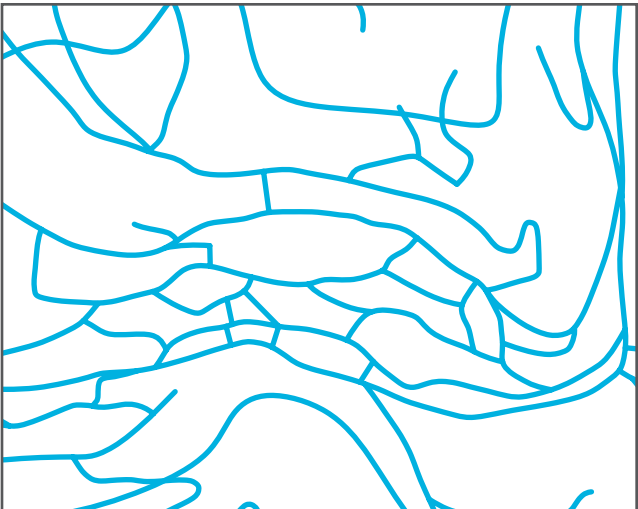
POPULATION	3,880
POP. DENSITY People/ Km ²	17/km2
URBAN SCALE Size of urban area	32/ha.
CONNECTIVITY ~Intersections / Km ²	564/km2

ARZANA



POPULATION	2,430
POP. DENSITY People/ Km ²	15/km2
URBAN SCALE Size of urban area	150/ha.
CONNECTIVITY ~Intersections / Km ²	260/km2

SEULO

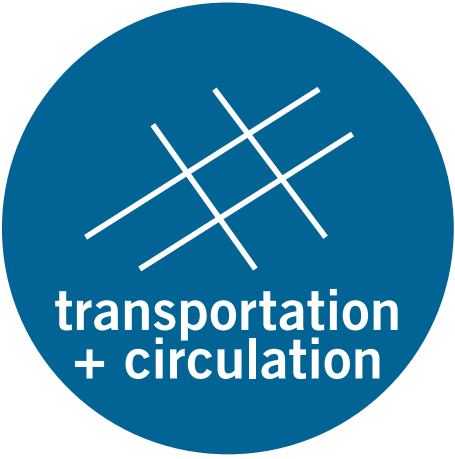


POPULATION	970
POP. DENSITY People/ Km ²	16/km2
URBAN SCALE Size of urban area	21/ha.
CONNECTIVITY ~Intersections / Km ²	324/km2

OBSERVATIONS



The common architecture and development patterns of the towns studied in Sardinia are similar to that found in other regions of southern Italy; small 2-3 storey houses with minimal yards, densely clustered along roads following the contours of steep hillsides and valley bottoms. Predominantly masonry buildings with upper balconies and minimal ornamentation.



With a well developed road network, automobile travel appears to be the dominant mode of transportation for long distance travel. Within towns however, pedestrian movement is well supported with many staircases and pathways for navigating the steep terrain. Many narrow right-of-ways appear to be informal shared spaces for all modes.



Like many European communities the largest buildings in the towns studied were religious in nature. Even in the largest communities, buildings rarely exceeded 6-Storeys. Site coverage appears quite high in the urban areas leaving little minimal private open space.



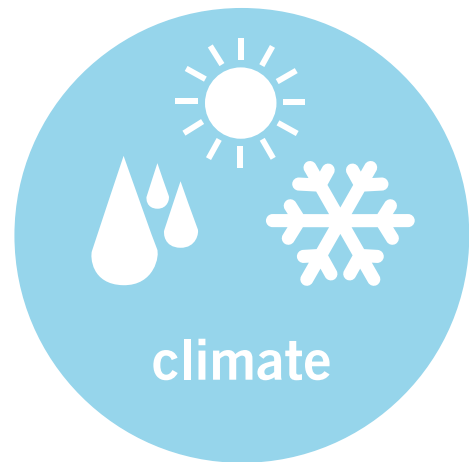
OBSERVATIONS



The steep, arid mountains of the region play a decisive role in the development patterns of the towns studied. The rugged terrain is likely a primary driver behind the compact, dense community form surrounded by terraced agricultural fields. the small right of ways result in minimal street planting found outside of parks and plazas.



The communities studied are but the current iteration of a rich history of inhabitation on the island stretching back thousands of years. It is likely many of the development patterns studied have been established for countless generations without undergoing much fundamental change, particularly in regards to the location of communities and their internal circulation.



Moderated by the Mediterranean and the higher altitudes of many of the communities, the climate of the region is surprisingly moderate. Communities and agriculture appear well adapted to sustainably address the lower levels of rainfall of the region.





GEOGRAPHIC FEATURES

Area (km²)	778 km²
Population	326,953
Density (Inhab/km²)	67
Average Latitude	10 N
Site Altitude	Hills
Average Land Steepness	Medium
Proximity to the Sea	Yes

CLIMATE

Climate	Tropical
Average Annual Temp and Range (C)	26.4C (23-28)
Average Annual Rainfall (mm)	2,178mm
Relative Humidity (%)	81%

LAND CHARACTERISTICS

Main Geological Features	Sedimentary
Background Radioactivity	Low
Drinking Water Hardness	High
Forest Coverage (%)	3%

SOCIO-ECONOMIC INDEXES

Local Income (LI) per Capita	\$8,700
Agriculture (% of LI)	18.2
Manufacturing (% of LI)	7.7
Services (% of LI)	64
Vehicles per 1,000 Inhabitants	177

LIFESTYLE AND HEALTH INDICATORS

Daily Food Intake per Capita (kcal)	2392
Smoking Rate (%)	40.3%
Obesity Rate (% BMI above 30)	23.6%
Suicide Rate (Cases/100,000)	7.3

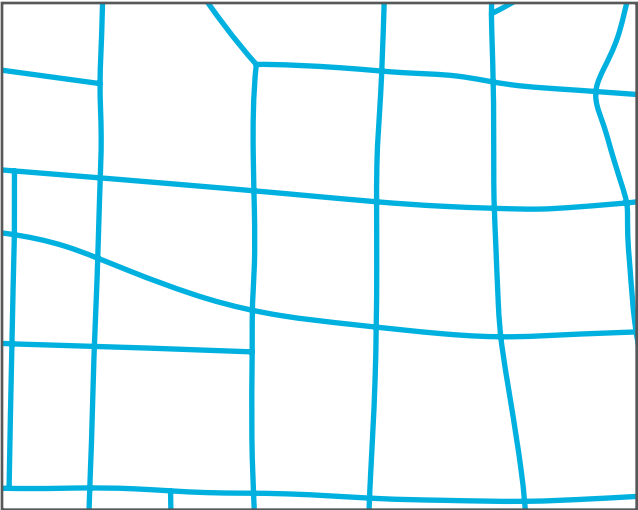
06 NICOYA PENINSULA

On Central America’s Pacific coast, the lush jungles of Costa Rica become surrounded by the sea at the Nicoya Peninsula. The rural communities at the centre of this region in many ways provide further corroborating evidence to the theories of longevity posited about Sardinia. The centenarians found here have predominantly lived rural lifestyles, with long full days of outdoor work and diets free of processed foods. Centenarians also commonly have a strong sense of purpose in their lives through their faith and their families. Although the urban structure of the communities of the region are notably different than Sardinia’s, with far less dense town centres and more formal grid layouts, the individual homes are comparably small and provide similar access and connection to the natural environment.



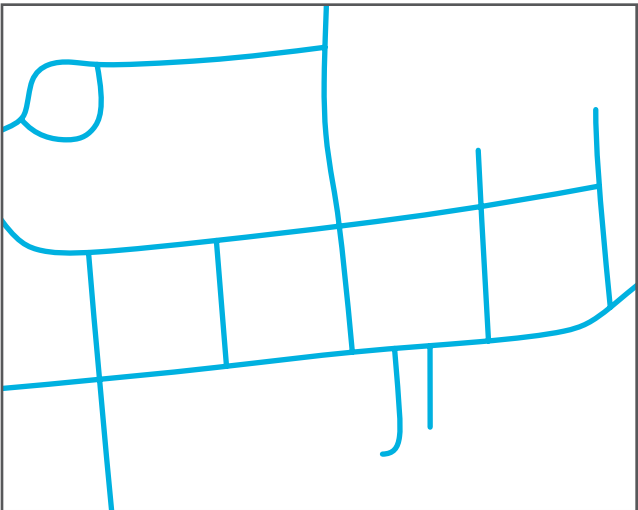
NICOYA, COSTA RICA

NICOYA



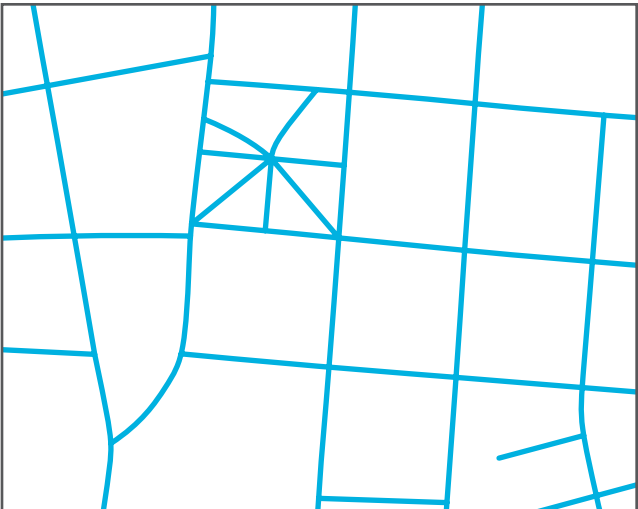
POPULATION	24,946
POP. DENSITY People/ Km ²	90/km2
URBAN SCALE Size of urban area	426/ha.
CONNECTIVITY ~Intersections / Km ²	140/km2

VEINTISIETE DE ABRIL



POPULATION	7,539
POP. DENSITY People/ Km ²	25/km2
URBAN SCALE Size of urban area	154/ha.
CONNECTIVITY ~Intersections / Km ²	60/km2

HOJANCHA

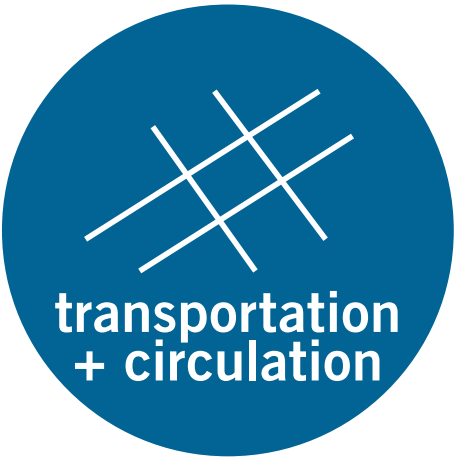


POPULATION	4,386
POP. DENSITY People/ Km ²	55/km2
URBAN SCALE Size of urban area	148/ha.
CONNECTIVITY ~Intersections / Km ²	144/km2

OBSERVATIONS



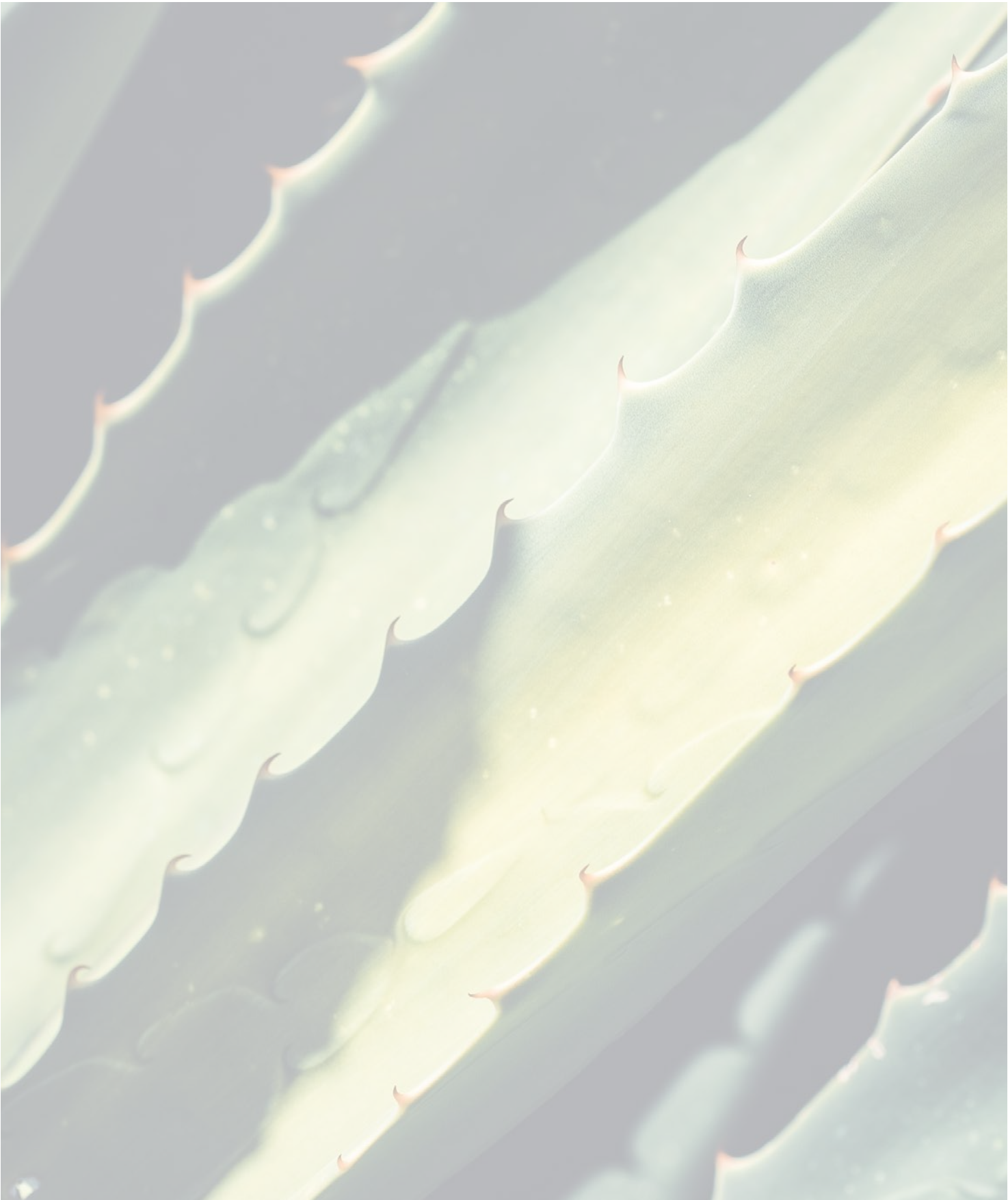
The only “New World” community identified in the study, the architecture/urban patterns of the Nicoyan Peninsula could be considered contemporary compared to the other regions studied. Like many Central American communities, towns are laid out in a grid structure and are composed of low-rise masonry buildings with the influence of traditional Spanish design apparent.



The grid layout of these communities appears to be supportive of pedestrian movement but reliant on automobiles or motorcycles for longer journeys. Modal separation is evident in urban centres with sidewalks provided on many streets.



The towns of the Nicoya Peninsula take the form of clustered low rise communities, with little to no high rise development in place. Though site coverage is relatively high in urban areas, it appears low enough to often allow rear-yard gardens and urban vegetation.



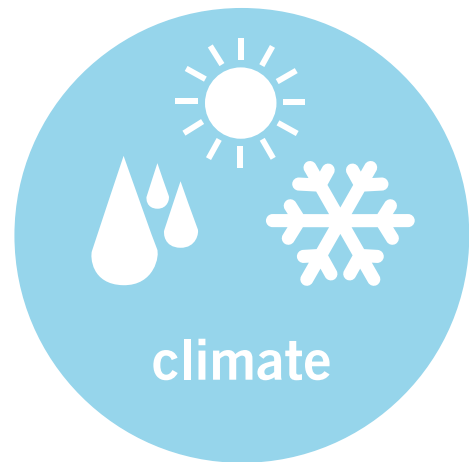
OBSERVATIONS



Connected to the mainland by a isthmus, the Nicoyan Peninsula is surrounded on four sides by water, however the centenarian communities are predominantly located away from the coast towards the centre. In this area, deforested mountainous terrain surrounds cleared valley bottoms used for agriculture. A patchy network of jungle forest clings to steep, inaccessible areas and in the few parks of the region.



A popular tourist destination known for its beaches, the Nicoya Peninsula was once home substantial pre-colonial communities. However, current spatial organization in the traditional Spanish-American pattern, central plazas surrounded by a grid pattern of streets aligned with the cardinal directions, indicates little remains of the layout of these original settlements



The region’s tropical climate, high humidity, and significant rainfall have a large impact on the built form of Nicoya’s communities. Porticos, verandas, and other covered yet open structures are common allowing for natural ventilation.





GEOGRAPHIC FEATURES

Area (km²)	255 km²
Population	8,312
Density (Inhab/km²)	31
Average Latitude	37 N
Site Altitude	Mid-Mountain
Average Land Steepness	High
Proximity to the Sea	Yes

CLIMATE

Climate	Mediterranean
Average Annual Temp and Range (C)	18.9C (16-22)
Average Annual Rainfall (mm)	631mm
Relative Humidity (%)	66%

LAND CHARACTERISTICS

Main Geological Features	Granite
Background Radioactivity	High
Drinking Water Hardness	Low
Forest Coverage (%)	>80%

SOCIO-ECONOMIC INDEXES

Local Income (LI) per Capita	\$26,235
Agriculture (% of LI)	12.2
Manufacturing (% of LI)	9.7
Services (% of LI)	78.1
Vehicles per 1,000 Inhabitants	200

LIFESTYLE AND HEALTH INDICATORS

Daily Food Intake per Capita (kcal)	<1500
Smoking Rate (%)	82%
Obesity Rate (% BMI above 30)	12%
Suicide Rate (Cases/100,000)	2.35

07 IKARIA

This unassuming small rocky island found in the Aegean Sea off the coast of Turkey hosts a population with life expectancies 8 years longer than the average American (Buettner, 2008). The ancient Mediterranean towns found here densely cluster along steep dry hillsides overlooking the ocean. Despite a turbulent history, contemporary life on the island appears to be slow and laid back. Similar in many regards to the Sardinian Blue Zone, theories about longevity here revolve around the low-stress lifestyles and particularly the Mediterranean diet of residents. Compared to many of the Greek islands, Ikaria has a relatively small and recent tourist presence. Like Ogliastro and Nicoya, the historically isolated nature of the island may have resulted in a genetics being a contributing factor to the longevity witnessed here.



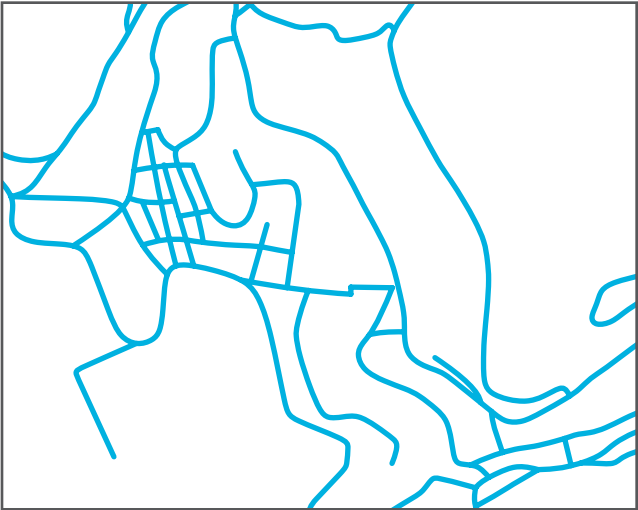
IKARIA, GREECE

AGIOS KIRYKOS



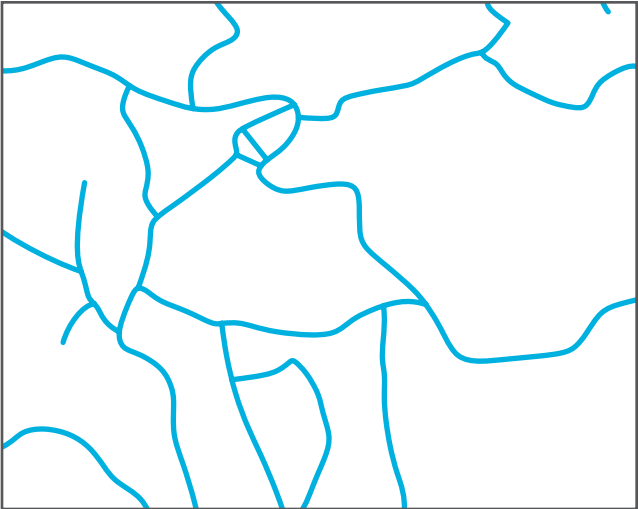
POPULATION	2,955
POP. DENSITY People/ Km ²	47/km2
URBAN SCALE Size of urban area	141/ha.
CONNECTIVITY ~Intersections / Km ²	380/km2

EVDILOS



POPULATION	768
POP. DENSITY People/ Km ²	35/km2
URBAN SCALE Size of urban area	82/ha.
CONNECTIVITY ~Intersections / Km ²	248/km2

RACHES

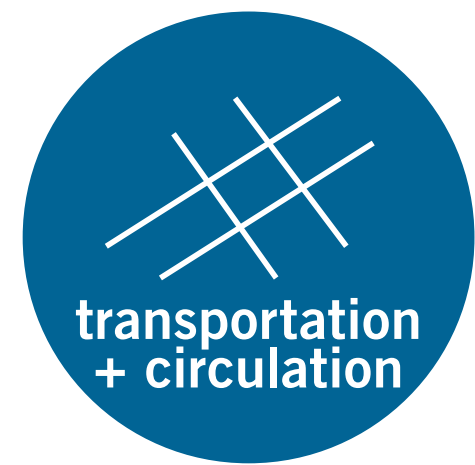


POPULATION	1,125
POP. DENSITY People/ Km ²	21/km2
URBAN SCALE Size of urban area	39/ha.
CONNECTIVITY ~Intersections / Km ²	100/km2

OBSERVATIONS



Similar to Sardinia, Ikarian architecture and development patterns are rooted in the traditional Mediterranean vernacular. 2-3 storey structures cluster in dense whitewashed villages clinging to the steep hillsides of the island.



Icaria's circulation networks are highly influenced and limited by the geography of the region. Most roads trace roundabout routes along contours slowly climbing to reach destinations. Many right-of-ways are connected via staircases and pathways at grades that would be inaccessible to vehicles, but allow pedestrians to pass.



Icaria's buildings typically have simple massing with 2-3 storeys of relatively small floorplates. In contrast to Sardina however, communities appear less dense and with less site coverage allowing more room for gardens and landscaping in urban areas.



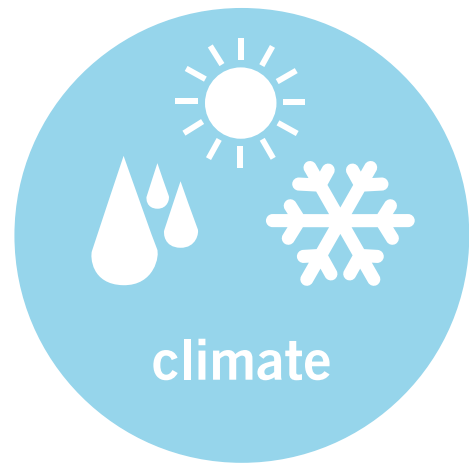
OBSERVATIONS



The small size of the island and steep mountainous terrain results in geography playing an extremely strong role in the patterns of urban development. A high mountainous spine traverses the island extending cliffs and ravines towards the coast on either side creating a contrast between verdant slopes and barren rocky outcrops.



Inhabited since at least 7000 BC, Ikaria's location in the central Aegean sea has ensured its ongoing settlement. The fundamental structure of its communities have undergone minimal change in the modern era, however the islands did suffer under Axis occupation during WWII. Quality of life has improved dramatically since 1960's infrastructural investment.



Climate plays a strong role in the structure of the island's urban fabric. The steep, barren, mountainous cliffs forming the topography of the island are in part a result of erosion due to the arid climate of the region and minimal rainfall amounts the island receives.





GEOGRAPHIC FEATURES

Area (km²)	1201 km²
Population	1,384,762
Density (Inhab/km²)	1,015
Average Latitude	26 N
Site Altitude	Sea Level
Average Land Steepness	Low
Proximity to the Sea	Yes

CLIMATE

Climate	Subtropical
Average Annual Temp and Range (C)	22.4C (16-27)
Average Annual Rainfall (mm)	~2,000mm
Relative Humidity (%)	71%

LAND CHARACTERISTICS

Main Geological Features	Coralline
Background Radioactivity	Low
Drinking Water Hardness	High
Forest Coverage (%)	46%

SOCIO-ECONOMIC INDEXES

Local Income (LI) per capita	\$21,000
Agriculture (% of LI)	1.9
Manufacturing (% of LI)	4.7
Services (% of LI)	89.5
Vehicles per 1,000 Inhabitants	490

LIFESTYLE AND HEALTH INDICATORS

Daily Food Intake per Capita (kcal)	<2000
Smoking Rate (%)	4.6%
Obesity Rate (% BMI above 30)	10-40%
Suicide Rate (Cases/100,000)	9.1

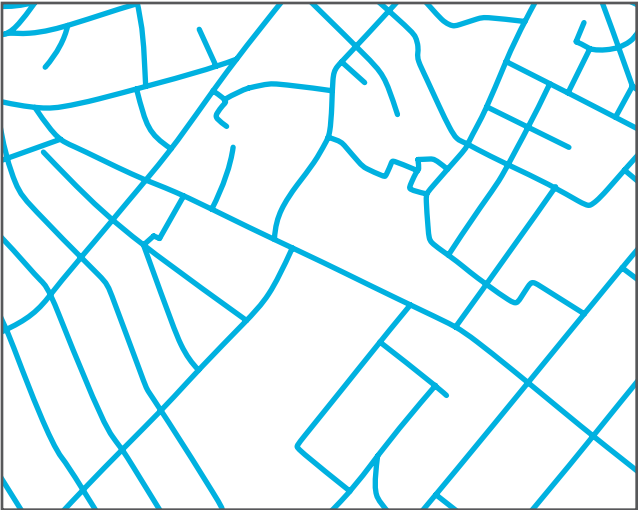
08 OKINAWA

Though this chain of South Pacific islands is currently Japanese, its ocean location between China, Taiwan, and Japan and a history under the rule of various powers gives it a distinct culture and climate in the country. Its history and geographic location plays a strong role in the built form found on the island. Urban areas are sandwiched between steep terrain and the coast resulting in dense communities and structures have to be built strong to weather the typhoons that seasonally batter the islands. Unlike the other Blue Zones, Okinawa’s centenarians can be found in a major urban metropolis with all the complications and stressors that come with city life. Theories around longevity on Okinawa focus on the strong social support networks and sense of purpose that the island’s elderly maintain.



OKINAWA, JAPAN

GREATER NAHA



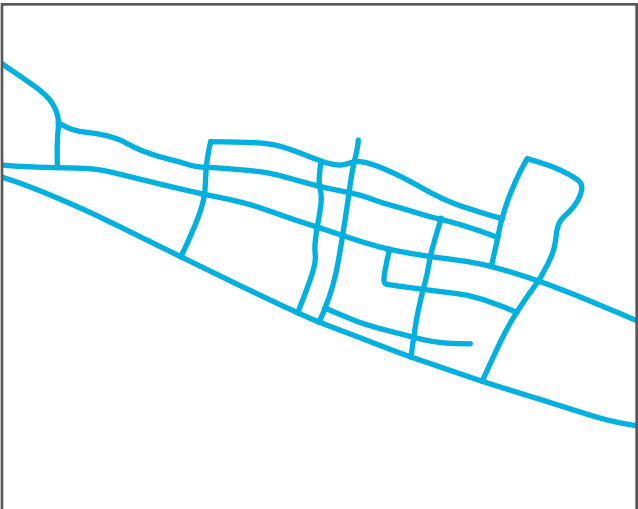
POPULATION	1,179,627
POP. DENSITY People/ Km ²	2,465/km2
URBAN SCALE Size of urban area	44,081/ha.
CONNECTIVITY ~Intersections / Km ²	392/km2

KUNIGAMI



POPULATION	4,908
POP. DENSITY People/ Km ²	25/km2
URBAN SCALE Size of urban area	89/ha.
CONNECTIVITY ~Intersections / Km ²	364/km2

OGIMI

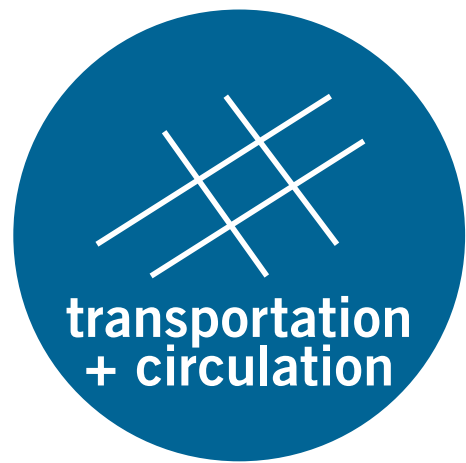


POPULATION	3,024
POP. DENSITY People/ Km ²	48/km2
URBAN SCALE Size of urban area	16/ha.
CONNECTIVITY ~Intersections / Km ²	108/km2

OBSERVATIONS



The expansive, dense city of Naha envelops much of the main island of Okinawa. This teeming metropolis is composed predominantly of contemporary, concrete mid-rise buildings. With strong influences from South-East Asia, mainland Japan, and the USA, the architectural style reflects a utilitarian hodgepodge of these styles.



The cities of the Okinawan islands tend to be structured around defined street grids except where geography or historic settlements have established circulation patterns in organic forms that follow the natural contours of the land. A 13km Monorail system runs through Naha with elsewhere reliant upon extensive road infrastructure and air/sea port facilities.



The small development lots and floorplates common to Okinawan communities have resulted in predominantly mid-rise (3-15 storeys) massing. With minimal to no setbacks, this scale creates strong, dynamic streetwalls and highly defined public realm often with narrow sidewalks sandwiched without buffer between roads and building faces or walls.



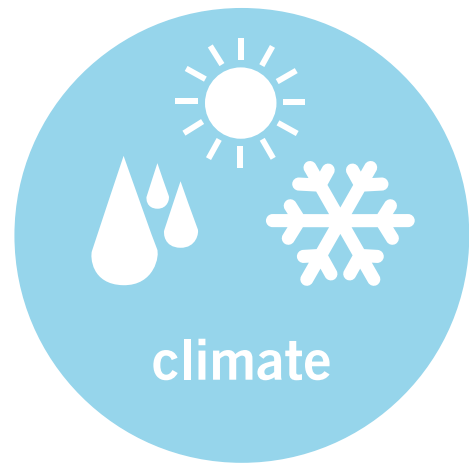
OBSERVATIONS



Rarely more than a few kilometers wide, Okinawa’s island setting plays a strong role its built environment with the majority of communities built along the low lying coastline around ports or river mouths. From coastal plains and sandy bays, the topography quickly rises into lush jungle covered ravines and eroded mountainous ridges.



Control over the Ryukyu Kingdom (Okinawa) has swayed between various interests of eastern Asia for hundreds of years, coming under control of Japan in 1868. Towards the end of WWII, the US invaded, resulting in the death of 1/3 of its population and the destruction of Naha. The legacy of this is the very contemporary city and continued strong US presence.



The sub-tropical climate of the islands allows for a year round outdoor lifestyle however, due to the small pedestrian zones in the urban areas, green spaces are often limited to city parks. The climate of the islands also facilitates the presence of substantial coral reefs surrounding and composing much of the islands geology.

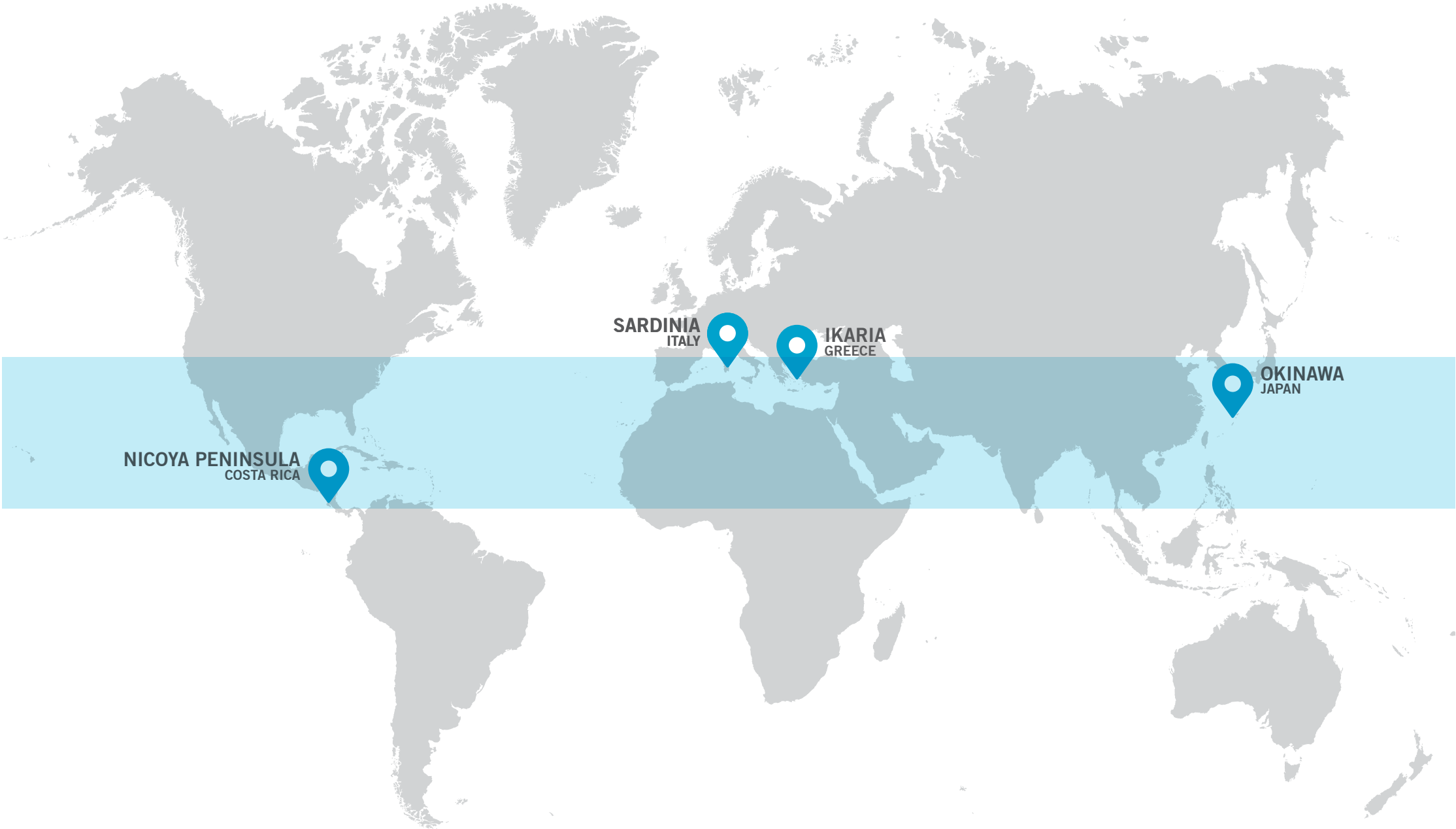


09 OVERALL OBSERVATIONS

These Blue Zone sites all possess unique spatial and environmental features that may help contribute to the impressive longevity witnessed therein. Despite our understanding that an attempt to directly correlate commonalities between these four singular urban environments would result in statistically weak data, a superficial comparison does provide some initial observations of potential contributing factors that we, as planners, architects, and urban designers, could further explore in our designs.

Latitude and Climate

It is hard to ignore the obvious role latitude and therefore climate plays in the lifestyles and built environments of the Blue Zone regions. It is noteworthy that none of the regions are found north of the 40th parallel despite the great wealth and strong healthcare systems typically found in northern countries. One theory on how latitude may contribute to longevity is that more stable, consistent exposure to UV light can not only reduce incidents of skin cancer, but the resulting increased Vitamin-D production may also have significant health benefits. The climate of the Blue Zone regions also enables built forms with blurred lines between indoor and outdoor space and year-round growing seasons for fresh local produce. The lifestyles of the majority of centenarians as described by Buettner and Skemp (2016) involve days spent outdoors in the fresh air and sunshine.



09 OVERALL OBSERVATIONS

Embrace Challenging Topography

The cities, towns, and villages of the Blue Zone sites are situated in environments that force aerobic exercise upon their residents. Many of the urban areas within the sites are located in mountainous regions or along coastlines that strongly influence the development patterns of the built environment. Roads and paths are forced to switchback up mountainsides and wind along coastlines, buildings take on a terraced form, and the limited availability of buildable land results in compact, fairly dense development form. Unfortunately, this typology is often at odds with many accepted sustainable building practices such as avoiding the development of slopes and near water to minimize erosion, protect habitat, and reduce stress on natural water systems.



There are No Retirement Homes in Blue Zones

An observation that comes more from the literature review than the urban analysis, none of the centenarians described in Dan Buettner’s book lived in dedicated “old age” homes. All were extremely well supported through family and social networks and lived either independently or with a family member to care for them. The sense of purpose that these living arrangements instill forms the foundation for one of the leading theories behind centenarians longevity. Shifting western society’s views towards alternative living arrangements involving extended family is no small feat, but there is room to explore how this change might impact the design and layout of units to be more supportive of multiple adults living together in familial and platonic arrangements.



09 OVERALL OBSERVATIONS

Small Living

Not only are many of the urban areas within the Blue Zones towns of relatively small populations, but the size of the urban boundaries of the towns is similarly compact. Despite being predominantly rural communities, the dense nature of these towns combined with their small scale may not only contribute to a higher level of walkability, but likely an increased level of socialization among residents. These urban forms that encourage socialization between residents may be a key contributor to significantly increased longevity. There is also the possibility that the small scale of these communities provides their residents with greater opportunities to escape the urban environment altogether and connect with nature, which has also been shown to contribute to improved health outcomes.



10 CONCLUSIONS

Due to the extremely small sample size, the jury is still out on what the exact contributing factors to the extreme longevity witnessed in Blue Zones are. For now it appears that the well established health tenants of enjoying time with friends and family, eating right, and getting plenty of fresh air, sunshine, and exercise are principles that we should strive to reinforce in our designs to create a built environment that fosters centenarians.

11 NEXT STEPS

Through this research, we have identified the Blue Zone of Okinawa, Japan as a particularly appropriate candidate for further investigation due to its distinct characteristics relative to the other Blue Zones. Okinawa's more urban character and significantly higher population density, with 1,015 inhabitants per square kilometer relative to the next highest Blue Zone's 67 inhabitants per square kilometer (Poulain, Michel, et al, 2003), make it a more comparable example to the work of Perkins + Will's Urban Design group.

This study was particularly challenging due to the difficult nature of obtaining the necessary data with which to conduct urban analysis for these remote, rural areas. In order to develop more robust analysis in a future study, Okinawa's urban environment represents the best potential for offsite data collection.

That said, the findings of this research would be significantly bolstered through a site visit to a Blue Zone.

While much of contemporary urban analysis can be performed remotely thanks to online resources and advances in GIS and modeling software, there are certain elements that cannot be adequately understood from a distance.

An investigation into the sensory, cultural, and fundamental human experience of a place is essential to developing a comprehensive understanding of an environment and is highly dependent on direct, first-hand observation. Noise, odors, cleanliness/pollution, food; these elements cannot be assessed meaningfully without direct on-site experience. A thorough understanding of these elements is particularly imperative when studying Blue Zones, due to much of the existing evidence supporting resident's longevity pointing to these cultural and dietary factors.

A future study would benefit substantially through first-hand experience and interaction with the residents of the Blue Zone located in Okinawa, Japan. In addition to using time in the community to confirm and expand upon the findings of this preliminary urban analysis, documentation the urban design elements of Okinawa could be developed through extensive photography, urban sketching, videography, and conversations with locals of all ages. Direct exposure to and immersion within the lifestyle and built-environment of a Blue Zone will strengthen understanding of the design features that result in the healthiest communities in the world.



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