

## Limits on Alofi: A Nonlinear Approach to Urban Redevelopment in a Small Island State

2004 Margetts J. and R. Barnett. In H. Edquist & H. Frichof (eds), *Proceedings of the 21<sup>st</sup> Annual Conference of the Society of Architectural Historians Australia and New Zealand*. Melbourne: Routledge, Vol. I, 307-312.

### ABSTRACT

Cyclone Heta struck Niue on 4 Jan 2004 with devastating impact. The whole of the southern part of the capital Alofi is no longer habitable. While there is a government desire to rebuild, this process is fraught. Limits to rebuilding are rooted firmly in the historical inheritance, and operate at a number of scales. Economic constraints, and land tenural systems coupled with the generally poor quality of the remaining building stock leave few options for urban redevelopment processes.

This paper explores the use of a self-organising model for small island tropical urbanism by working with the limit conditions imposed by environmental and historical parameters. We argue that the importation of architectural and urbanization practices from countries that are not subject to the cataclysmic instabilities of cyclonic ecologies are inappropriate for Alofi. We suggest that engagement with a theoretical paradigm derived from disturbance ecology which is time-based and ecosystem-led, can offer new ways for approaching the redevelopment of this pacific island capital.

When tropical cyclone Heta struck Alofi, the capital of Niue, on January 5<sup>th</sup> 2004, the population of one of the world's smallest independent nations was pushed to a limit condition. The southern part of the town was completely destroyed: infrastructure losses included government buildings such as the hospital and nurses' home, commercial buildings and the museum. The rest of Alofi and the west coast of the island suffered severe damage. On Niue, however, cyclones are a natural and expected event - they happen (but rarely so devastatingly). From an ecological point of view cyclones are a necessary part of the natural cycle that enables this diverse island landscape to regulate its condition. Self-organising systems such as ecosystems are homeorrhetic, which is to say they evolve by being pushed to far-from-equilibrium conditions, experiencing cataclysm and then shifting to a new order of complexity.<sup>1</sup> This paper argues that the rebuilding of the capital of Niue moves architecture towards a disciplinary limit, and proposes a negotiation of this extreme condition by means of an interplay between architecture and its disciplinary neighbour landscape architecture. Architecture approaches two thresholds then, that of its own ability to deal with the destruction of a tropical urban landscape, and that of its boundary with a discipline for which the generative power of natural process is both model and metaphor. The paper does not pretend to present a fully-fledged urban proposal, however. Its goal instead is to explore the formation of a self-organising model for small island tropical urbanism by working with the limit conditions imposed by environmental and historical parameters. It is intended that this model be tested in design studio.

The application of organic metaphors for the development of urban centres has a long history, but a resurgence of architectural interest in this figure over the last decade has taken a new direction. It is now the ecosystem, conceived as an interactive web of dynamic relations, that interests many architects and urbanists.<sup>2</sup> Of the more recent projects that utilise time-based ecosystem processes, some employ them as metaphor, others as a model. A Future Generations University competition entry<sup>3</sup>, for example, uses the components of the campus as a metaphorical analogue for the components in an ecosystem. On the other hand Koolhaas and Mau's Tree City<sup>4</sup>, uses the ecosystem as a model to generate an urban development strategy. The difference is critical. A model is a diagram with an output. It demonstrates how an organization functions, or provides evidence for a proposition. It does something. A model has inputs and outputs. A metaphor does none of these things. Metaphors evoke, qualify, resonate, by creating new relationships between things. Metaphors relate elements in totally different ways from models. Metaphors do not have outputs. A metaphor borrows language and imagery from one realm to describe or establish research or practice in another. Architectural interest in ecosystems most often works at the level of metaphor.

The architectural object has flirted with complex adaptive systems theory, but the real power of process-based design has been felt in architectural urbanism, a fact which may partially account for the number of architectural practices moving into urban design. Like an ecosystem, the urban field may be understood as an interactive dynamic system whose conditions and operations undergo continual change.<sup>5</sup> For instance, Koolhaas uses nonlinear systems as a design model, exploring the open-endedness and self-organisational qualities of ecosystems as they are now understood. Landscape architects have worked with ecosystem dynamics for decades,<sup>6</sup> but in landscape architecture the application of the ecosystem model to urban projects has mostly been confined to ameliorative natural systems restoration rather than to the forging of new strategies for the development of complex urban systems such as greenfields subdivisions and inner city redevelopments. The emerging discipline of ruderal ecology, the study of urban margins and abandoned urban terrain, offers a practical link between landscape architecture and urbanism. Alofi's devastated terrain is not dissimilar to other damaged urban landscapes such as bomb sites and abandoned industrial areas which, over time, can be sites of natural reclamation and ecological succession; sites which develop richly diverse flora and fauna. The key feature of ruderal ecology is that its subject is specifically urban. The flora and fauna that comprise urban ecologies are usually unique, and bear little resemblance to the composition within the surrounding countryside.

Ruderal ecology has developed as a consequence of changes in the discipline of ecology in general. Ecologists no longer hold the Clemensian view of ecosystems as closed, self-regulating, stable systems, which establish relatively enduring communities and a defined climax community.<sup>7</sup> Ecosystems are now seen as open systems in constant flux due both to natural and to human-induced disturbance.<sup>8</sup> Disturbance theory is playing an increasingly important role in the interpretation and understanding of ecosystem functioning. Disorder is regarded as necessary to 'healthy' landscapes. Disturbance, however, is just part of a larger cycle which includes colonisation and succession.<sup>9</sup> This cycle

was evident in Niue just three months after cyclone Heta. Plants were already colonising the extensive areas of bare rubble left in the wake of the cyclone, and in other, less damaged areas, the re-emergence and recovery of the flora was clear. The regenerative power of the landscape is very apparent, but the urban architectural elements of Alofi which took the full force of the cyclone show few signs of regeneration. There are several reasons why this is the case.

The government of Niue is struggling to find a way through the various constraints that impede the redevelopment process. Post-cyclone, there is a strong desire to rebuild, but much has changed and it is impossible simply to replace that which has been lost. Alofi is the urban focus of Niue and, while small in population, it is spread out over five and a half kilometres of road. A major planning exercise undertaken in 1994 by Riddell, a planner who has worked extensively in the Pacific, addressed many of the dispersal problems, but his proposal was only partially implemented.<sup>10</sup> His grouping together of some key facilities including tourist shops, the post office, bank and grocery stores around an existing green space was a partially successful attempt to form a centre for Alofi. Now there is the opportunity to develop this much further by taking a different approach. Riddell has identified pre-cyclone Alofi as having weak sense of place and an overall lack of cohesion. The difficulties experienced in the redevelopment process for Alofi suggest an architectural limit that may be overcome by time-based, ecosystem-led strategies.

Niue, the self-styled 'rock of Polynesia' is one of the world's smallest independent nations. Located between Tonga and the Cook Islands in the south Pacific this former atoll is a single, 259 sq. km 'high limestone island' composed of fossilised coral which has experienced emergence through sea-level fall.<sup>11</sup> The island is roughly circular in shape and is comprised of three main terraces. The largest terrace is approximately 60m above sea level and forms the major landscape of the island. This terrace is gently dished and represents the remains of the ancient central lagoon. A narrow terrace, some 100-200m wide, surrounds the main terrace at a lower level, about 32m below it and approximately 28m above sea level. Alofi and much of the ring road which circumnavigates the island are located on this terrace. The lower terrace drops more or less vertically into the sea forming impressive cliffs. Just below the surface of the sea there is a third terrace which is comprised of live coral. This, in turn, falls off sharply at its edge down to two more submerged terraces.<sup>12</sup>

Niue has been continuously occupied for approximately one thousand years. There were two main migrations, from Samoa and from Tonga. Contact and smaller migrations also occurred from several of the Cook Islands (Pukapuka, Aitutaki and Rarotonga)<sup>13</sup>. Prior to European contact a number of autonomous tribal groups made up the population but with missionary support a king was elected in 1876. Niue became a British protectorate in 1900 and by the following year it was annexed by New Zealand as part of the Cook Islands. After a period of increasing autonomy Niue was granted self-government in association with New Zealand in 1974. The Head of Government is an elected premier (currently Hon. Young Vivian), and local government is exercised by 14 village councils.

Land tenure is vested through family descent groups or mangafaoa, each of which has an elected leader. Individuals within the group have an allotment of land solely for their use, which traditionally was subject only to continuing use.<sup>14</sup> Although land was never alienated, the desire of Niueans to emigrate permanently appears to be very strong. Ninety-three per cent of Niueans live overseas and the country has been suffering population decline for many years.<sup>15</sup> In 1950 the population was estimated to be over 5,000, but the current population stands at approximately 1300 despite booming natural increase.<sup>16</sup> One of the indicators of the declining population is the fact that nearly half the housing stock is deserted; 412 unoccupied dwellings as opposed to 475 occupied homes.<sup>17</sup>

Approximately 11% of the total hurricanes worldwide<sup>18</sup> occur in the south pacific, but, while tropical cyclones are relatively common, they rarely hit with the force of cyclone Heta. The last major tropical cyclone to greatly affect Niue was cyclone Ofa in 1990, but the damage was nowhere near as extensive as that inflicted by Heta. It is unknown exactly how strong the winds of cyclone Heta were, but the last recorded wind-speed measured at the airport was 300km per hour; just before the device disintegrated. While the wind was extremely powerful, it was the sea that caused most of the damage. As the cyclone travelled over the surface of the ocean, it was sufficiently strong to push large quantities of water before it, causing dramatic, localised, sea-level rise. During cyclone Heta the sea level rose some 28m to the top of the lower terrace. Massive waves, surfing on the elevated sea level, then swept over this lower terrace, obliterating almost everything before them.

While international assistance with rebuilding has been forthcoming, most noticeably from the French government who sent very practical help in the form of workmen from Tahiti to assist with the clean up, there are larger issues of replacing the urban infrastructure which still need addressing. Niue has a considerable infrastructure for such a tiny population, and the costs associated with this community far outweigh any comparable community in New Zealand.<sup>19</sup>

What are the limits to the redevelopment of Alofi? Three main factors can be identified. They are historical in origin and operate at three scales. At the national scale there are economic or budgetary constraints; at the local scale land tenure issues limit the availability of suitable land on which to build; at the level of the individual site the quality of the existing building stock is extremely poor. This paper explores each of these constraints, and then proposes a landscape-based strategy which may assist in sidestepping them in order to offer a different development scenario.

## ECONOMIC LIMITS

Under the terms of its association, New Zealand is required to provide ongoing economic and administrative assistance to Niue.<sup>20</sup> While New Zealand does provide assistance, there is pressure from the New Zealand Government for Niue to

be as independent as possible. Aid and remittances form the core of the economy, as sources of other revenue, such as agriculture, tourism, stamps and the leasing of phone and internet codes, are extremely circumscribed. Immediately following the cyclone there were suggestions (in New Zealand, at least) that the damage may be more than Niue's fragile economy could withstand, and that the island should return to New Zealand rule.<sup>21</sup> These suggestions have been shelved for now, but the problem of funding the recovery process remains. Any form of development requires substantial funds, but the amount required to re-establish Niue's infrastructure is enormous. New Zealand granted \$5 million in aid immediately after Heta, but this quickly disappeared on housing, grants to the private sector, and heavy machinery.<sup>22</sup> There are still major expenses to be incurred, including the cost of replacing the hospital and hotel, repairing roads, and re-establishing tourist access tracks to the coast and forest.

The government is faced with many difficulties when it comes to income generation. Employment opportunities are few, and most of the wage and salary earners on-island work for the government. The cyclone has damaged the emergent tourism industry and this will take some time to recover, although it should be acknowledged that with the lack of beaches and the usual tourist draw-cards, it was never going to be anything more than a niche market, regardless of recent events. Agricultural products are limited, and income possibilities from agricultural production are likely to remain modest.

While remittances support locals at a family level, international aid plays a very important role. Since the cyclone, the premier has been very active in canvassing several of the regional organisations operating in the Pacific for assistance. There are several main drawbacks to securing this kind of assistance, not the least being that these organisations are driven by their own agendas, and funds are generally tightly tied to these. There is also an enormous amount of paperwork associated with, first the securing of these funds, and then by the reporting requirements which are burdensome and costly for a small public service. Money for urban redevelopment is unlikely to be easily obtained.

#### PLANNING LIMITS

Even if money was secured, rebuilding is not as straightforward as replacing what has been lost. The land that was most badly hit by the waves has been declared unavailable for redevelopment. Landowners may rebuild on previously occupied sites, but the government has made it clear that they do so at their own risk. This forces the relocation of many of Alofi's key services and facilities, a situation which presents another problem for the government, as only small areas of land held by the crown are available for development. Some of these are no longer safe building zones, thus reducing the overall land available even more. Riddell's 1992 planning proposal<sup>23</sup> suggested re-allocating government services within existing buildings to make efficiencies and logical groupings, and this strategy is still available to a certain extent, although it won't meet the overall land requirements. The alternative is for the government to legislate to force

landowners to sell or lease their land to the state, but Niue has a long history of land disputes, and this is by no means an easy option.

Crocombe observes that land disputes in the Pacific are not necessarily a function of need.<sup>24</sup> In Tonga for instance, despite a dense population, land-related contestation is negligible. Niue, on the other hand, has a low population density (8 per square kilometre compared to 140 in Tonga); and a low proportion of people who gain their living by the exercise of land rights. Yet in the 1980s the rate of land disputes was 100 times higher in Niue than in Tonga. The difference is not in not to be sought in terms of need but in legal and administrative structures. While the majority of landowners in Niue live overseas on a permanent basis, their land rights 'back home' remain a source of identity and are fiercely protected. Any move by the Niue government to force the purchase of land may cause ill-will with the off-shore owners, and anecdotal evidence suggests that non-cooperation is almost guaranteed. This leaves the government faced with relocating the essential services where it can obtain land and cooperation, which will almost certainly not be in locations amenable to cohesive urban development.

#### BUILDING STOCK LIMITS

One of the material difficulties faced during the cleaning up process was the presence of asbestos. After a major cyclone in 1960 the New Zealand government supplied new roofing for the island's 700 damaged houses. At the time of Heta approximately 95% of Niue's 475 occupied homes had asbestos roofing, and of the 412 unoccupied homes, 352 had been identified as unsafe because of asbestos.<sup>25</sup> Although the New Zealand government sent specialists to oversee the asbestos clean-up post cyclone, and by the end of January 2004 the asbestos risk was reported as 'contained',<sup>26</sup> it was clear from personal site inspections in April 2004 that this was far from the actual case. Cyclone damage to the buildings had in fact exacerbated the issue. An unfenced dump contained piles of uncovered, disintegrating asbestos open to wind and water action. As far as can be ascertained there are no immediate plans for the asbestos to be removed; meanwhile it poses a significant health risk. The asbestos problem is indicative of the overall poor quality of the remaining building stock. While there are a few isolated examples of architecturally significant buildings, such as some houses constructed of coral, and a legacy of concrete 'hurricane houses' built in the 1960s, these are generally now uninhabited as they are starting to deteriorate structurally. Therefore it remains the case that buildings throughout the island are constructed from poor quality materials.

While the temptation is to plan and design an urban infrastructure that will 'resist' or at least minimize future cyclonic devastation, and to implement this through incremental injections of targeted aid packages which focus on architectural reconstruction, it is apparent that redevelopment in Alofi will not occur rapidly, nor does it appear likely that an 'ideal' scenario in the form of a massive reconstruction package can be made available. Perhaps it is better to rethink the notion of 'devastation.' Just as forest fires have been reconceived by landscape ecologists as necessary to, rather than

destructive of, natural forest landscapes, and forest management practices have been adjusted accordingly, the episodic cyclonic disturbance of small island states such as Niue may prompt a reevaluation of tropical urbanism. The influence of cyclones on pacific island urban infrastructure provides an opportunity to consider how urban development may be conceived in terms of ecosystem forces and cycles. Niue requires an urban infrastructure that can operate under dynamic, fluctuating conditions. If it is conceived not as an ordered, rigid distribution of architectural objects, but as a socio-spatial pattern that can change and evolve, Alofi might, as it were, self-organise into a resilient urban ecology.

A strategy is required which can accommodate multiple constraints, yet offer realistic and achievable outcomes in the short term. A strong emphasis on landscape operations may result in a physical community infrastructure that, like biotic communities, respond positively and appropriately according to the long processes of evolutionary change. Used as an urbanization model rather than as a metaphor, the colonization-succession-disturbance process offers an alternative to formal intervention-based cultural aesthetic models which are currently the norm.<sup>27</sup> The town of Alofi, situated on its narrow terrace, occupies a dramatic edge. In ecology, edge conditions are the most rich and complex, for they undergo continual disturbance. It is in this dynamic threshold between one kind of landscape and another, vulnerable and exposed, consisting of elements from both landscapes, that colonisation and succession processes are most active. In this notion we find a significant proposition for Alofi. Biota that subsist in edge conditions must change in order to survive. Perhaps the town of Alofi must likewise accept continual reevaluation and transformation.

How does colonization occur in biotic communities? Environmental factors such as soil conditions, winds, water, insects, animals and birds are key elements. Most important of course is the availability of a source of seeds of different species of plants. The interaction of these environmental processes contributes to the development of plant communities within a nested hierarchy of relational ecosystems. These communities are not only adapted to the local environmental conditions, but the environmental conditions are constitutive of the ecosystems that comprise them. You cannot have one without the other. Colonisation proceeds from within. Succession occurs over time as plant communities develop through interaction with other processes and provide the conditions for further colonisation and growth. There is no end to succession. The notion of climax communities is now redundant, a product of a lingering teleological conception of succession. Instead there is only change. Inevitably cataclysm occurs in the form of fire, eruption, earthquake or indeed human activity. Without such perturbations there would be no complexity. Nobel Prize-winning physicist Ilya Prigogine describes the mathematics of these complex adaptive systems in his classic text *Order Out of Chaos*.<sup>28</sup>

Niue consists of an extensive biotic diversity cycling through various stages of succession at the same time. There is a very strong arboreal matrix of native and exotic species being driven through both phylogenetic and ontogenetic phases by a huge range of propagules adapted to a range of conditions. This means that the regenerative capacity of the flora is robust - there are multiple starting points for new colonies in environmentally specific conditions. Different micro-

environments are composed of different mixes derived from the surrounding matrix. The clue here for the urban development of Alofi is to provide a heterogeneous mix of forms that respond to a particular set of initial conditions. These 'colonisers' will change their local environment, which as it changes permits a greater range of urban elements to establish.

How can this model be implemented at Alofi? Perhaps it would begin with two types of colonisation, by plants and by buildings. In the first instance, adventive biotic colonisation is already occurring, with the best-suited plants gaining a foothold in the most devastated areas. This could be supplemented by directed shade-tree planting in groups, avenues and groves wherever possible, to form a vegetative urban structure based on the tropical requirement for shade as an urban amenity. Only one species of tree should be used for this operation, so as to provide initial coherence and form. These trees will grow extremely fast in the tropical environment. Secondly, inexpensive, easily-replaced, relocatable dwellings, commercial and government buildings could be constructed on sites that are selected according to three criteria;

- 1) they are immediately available. The buildings can be moved (or reconstructed) as other sites become possible;
- 2) they are linked by pedestrian desire lines, both existing and in the process of formation.
- 3) they are close to the new tree plantings.

A further operation would be the laying of services across the surface of the landscape. Electricity and water are distributed through surficial conduits that can be readily repaired and/or relocated. Along with pedestrian routes these vectors form the energetic pathways that link the nodes of the urban ecosystem. At particular places, anointed by popular usage, seats and drinking fountains are placed under the shade of the urban trees. The location of these elements, too, can change, as the urban formation evolves. Thus the fostering of human movement through Alofi will be achieved through tree planting, providing plentiful shade: a key requirement of any pedestrian activity in the tropics. The cohesion provided by the vegetation and the strong pedestrian links would minimise the effect of the indeterminate location of the buildings and services. Instead of a car-dominated urban layout, which has fostered the ribbon development of Alofi, a clustering strategy drawn from plant seed-dispersal patterns could be adopted, permitting greater ease of pedestrian access and more efficient use of available redevelopment sites. With respect to building materials a snap-lock construction methodology seems appropriate. Prefabrication makes refabrication less complicated and more easily undertaken. Cyclone damage could be repaired from existing materials without massive operational costs for the clearance of demolished buildings, and the construction of new ones.

Clearly a great deal of further research into materials, economic factors, construction and demolition procedures and social and cultural traditions and preferences is required, before a detailed planning and design strategy can be formulated for Alofi. Population surveys would have to be carried out and existing relationships with suppliers and contractors explored and renegotiated. Different implementation models should be investigated, for cost and material

efficiency. Governments and NGOs would have to be involved. Above all, the new strategy for Alofi would have to be 'packaged' and 'sold' to all stakeholders, and agreed upon prior to any investment in the programme.

In this brief sketch, the town of Alofi is understood as always emergent, never fully-formed. It requires that its planners, administrators and inhabitants (the community) accept that it is always in a state of flux and relatively indifferent to overall form and extent, as long as local and specific services are being delivered to the places and in the ways the community expects and desires. Recolonised by plants and buildings according to patterns of customary usage, Alofi begins to develop a spatial organisation that can change and evolve because there is no dramatic financial investment in infrastructure. The urban succession that thus takes place occurs according to local environmental and community conditions. Government investment in infrastructure would 'seed' individual and family investment, and sites unavailable for community use because of local ownership conditions may well be colonised in the same way over time as the town morphs according to its intrinsic algorithms.

Through this strategy, sites available for the development of buildings, public open space, paths or roadways, would have an indeterminate future, either left to continue successional processes or reclaimed as required. It will not matter if redevelopment occurs over extended periods of time, as time itself is an important factor within the strategy. In reality it is most likely that in the tropical environment of Niue the processes set in place will occur quickly and have a dramatic impact within a short time frame.

## CONCLUSION

This paper has presented what might at first glance be thought of as a rather fanciful or even irresponsible urban development proposal – a proposal, perhaps, that the inhabitants of Alofi would reject. We argue, however, that until the modern period, processes of urbanisation have always occurred according to local and specific conditions. The architecture and layout of traditional Pacific island settlements, with their customary building materials and community-generated patterns of organization, are a case in point.<sup>29</sup> The importation of architectural and urbanization practices from countries that are not subject to the cataclysmic instabilities of cyclonic ecologies is inappropriate for Alofi. Ecological resilience is not a matter of withstanding sudden devastating force, but of deep organisational patterns that absorb it and use it catalytically as energetic material for continual reorganisation. At Alofi architecture reaches its disciplinary limit. We suggest that it can cross this threshold by engaging with a theoretical paradigm derived from disturbance ecology currently under investigation in recent landscape architectural practice. The next stage of this research is the development of a joint architecture and landscape architecture design studio to explore the spatial and organisational implications of the proposal.

---

<sup>1</sup> E.P. Odum, *Ecology: A Bridge Between Science and Society*, Sunderland: Sinauer Associates, 1997, p. 72.

- 
- <sup>2</sup> See for example, Michael Batty, 'Introduction,' *Environment and Planning B: Planning and Design*, 27, 2, p167-8 and Nikos A Salingaros, 'Complexity and Urban Coherence,' *Journal of Urban Design*, 5, 2000, pp 291-316.
- <sup>3</sup> Peter Davidson and Donald L. Bates, 'Future Generations University,' *Architectural Design*, 67, 5/6 (May-June 1997): 32-36
- <sup>4</sup> Charles Waldheim, 'Park = City?' *Landscape Architecture*, 3, 2001: 80-85, 98-99
- <sup>5</sup> See for instance: Stan Allen, 'From Object to Field,' *Architectural Design*, 67, 5/6 (May-June 1997): 24-31; and Manuel De Landa, 'The Nonlinear Development of Cities,' in A. Marras, *Eco-Tec: Architecture of the In-Between*, 1998. pp ??
- <sup>6</sup> See for instance: Ian McHarg, *Design With Nature*, New York: John Wiley and Sons, 1992; and George F. Thompson and Frederick R. Steiner (eds), *Ecological Design and Planning*, New York: Wiley, 1997.
- <sup>7</sup> F.E. Clements, 'Nature and Structure of the Climax,' in L.A. Real and J.H. Brown (eds), *Foundations of Ecology: Classic papers with commentaries*, The University of Chicago Press, 1991.
- <sup>8</sup> Forman and Godron describe disturbance as 'a major natural process of landscape development.' (see R.T.T. Forman and M. Godron, *Landscape Ecology*, New York: Wiley, 1986). Pickett and White state that disturbance is an event that disrupts the function of ecosystems over widely ranging temporal and spatial scales (see S.T. Pickett and P.S. White (eds), *Ecology of Natural Disturbance and Patch Dynamics*, Florida: Academic Press, 1985). The type, intensity and frequency of disturbance affects patch dynamics and resulting landscape mosaic.
- <sup>9</sup> Simon Bell, *Landscape Pattern, Perception and Process*, London: Spon, 1999.
- <sup>10</sup> Robert Riddell, *Urban Planning Need for a Capital Centre at Alofi with Emphasis on a Retail Centre*, Suva: South Pacific Bureau for Economic Cooperation, 1992.
- <sup>11</sup> Patrick D. Nunn, *Oceanic Islands*, Oxford: Blackwell, 1994. p. 196.
- <sup>12</sup> J.C. Schofield, *The Geology and Hydrology of Niue Island, South Pacific*, New Zealand Department of Scientific and Industrial Research: Geological Survey Bulletin 62, 1959, p. 7.
- <sup>13</sup> Michael M. Trotter, *Niue Island Archaeological Survey*, Christchurch: Canterbury Museum, 1979.
- <sup>14</sup> Ron Crocombe, *Land Tenure in the Pacific*, 3<sup>rd</sup> Edition, Suva: University of the South Pacific, 1987, p. 378.
- <sup>15</sup> Ron Crocombe, *The South Pacific*, Suva: University of the South Pacific, 2001, p. 318.
- <sup>16</sup> Figures given for the population vary. Some commentators give the population at closer to 2,000 but this figure includes everyone on-island at a given time. 1,300 appears to be a reasonable estimate of the permanent population, although it should be noted that Niue's population is very mobile.
- <sup>17</sup> John Andrews, 'Replacing Niue Roofs Could Cost NZ Millions,' *New Zealand Herald*, Dec.27, 2003.
- <sup>18</sup> Nunn, *Oceanic Islands*, p. 165.
- <sup>19</sup> See John Connel and John Lea, *Urbanism in the Island Pacific*, 2002, London: Routledge, for a detailed discussion of the idiosyncratic nature of Pacific Island urbanism.
- <sup>20</sup> T. Angelo, Niue Constitutional Advisor, quoted in F.A. Tauafafi, 'New Way for Niue', *Tapu*, 2004, p. 28.
- <sup>21</sup> For example see D. Fisher, 'Niue May Return to New Zealand Rule,' *New Zealand Herald*, 11 Jan., 2004, p. 1; and Editorial: 'Viable Future for Niue Looks Bleak,' *New Zealand Herald*, 13 Jan., 2004.
- <sup>22</sup> Personal Communication, Young Vivian, Premier of Niue. 14 April, 2004.
- <sup>23</sup> Riddell, *Urban Planning Need*, 1992.
- <sup>24</sup> Crocombe, *The South Pacific*, p. 299.
- <sup>25</sup> Andrews, *New Zealand Herald*, Dec 27, 2004.
- <sup>26</sup> Radio New Zealand Newswire 'Immediate Health Risk on Niue from Asbestos Contained.' 20 Jan., 2004.
- <sup>27</sup> We would argue that many of the problems identified by Connel and Lea (2002) are caused by the fact that western cultural aesthetic models have become standard in Pacific urbanism.
- <sup>28</sup> Ilya Prigogine and Isabel Stengers, *Order Out of Chaos*, New York: Bantam Books, 1984.
- <sup>29</sup> See Connel and Lea, *Urbanism in the Island Pacific*, p. 212: 'Pacific urbanism emphasises the role of historical specificity, plurality and difference; ultimately there are few universals in a region where culture (and emotion) are of pervasive importance.'