1. Introduction: settlements at the edge

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The title of this book reflects an increased contemporary interest in the towns and villages of northern sparsely populated parts of developed nations by governments, policy makers, multinational companies and other stakeholders. Settlements in sparsely populated (or remote, as we use these terms interchangeably) areas are invariably small in comparison to southern settlements as well as being distant from major economic centres. Our focus on settlements draws attention to their demographic, economic, social, cultural and historical diversity.

The diversity of settlements within particular sparsely populated areas (like northern Sweden) and between jurisdictions (for example comparing Greenland to Alaska) is a key theme in this book. Diversity means that different settlements located in geographic proximity can exhibit highly divergent demographic and development pathways, making it difficult to apply top-down and regional development policies. Clustering or agglomerating remote settlements for analysis and understanding change may produce limited insights. This is because extreme diversity effectively means that demographic averages do not represent what might really be occurring for individual settlements in terms of demographic and socio-economic processes (Taylor, 2014). Averages also disguise subtle and important demographic interactions between remote settlements (Carson et al., 2011).

While much of the external interest in northern developed areas has been cyclical and motivated by nationalistic or political agendas (Carson, 2011a), altruistic motivations have also transpired. For example, Greenland is the world's largest non-continental island but has just 57000 residents, one-third of whom currently live in the capital, Nuuk. Many small Greenlandic settlements are losing population because of the transition from hunting and self-sufficiency to post-industrialisation (Hamilton et al., 2003). Through internal migration, Nuuk is increasingly dominating Greenland's population, economy and administration, placing smaller villages at risk of further losses of people, income and services. Nevertheless, the national policy for providing services to small villages is of equalisation, whereby certain services (power supply for houses, waste treatment and storage of

essential goods, for example) are provided to all settlements regardless of size. Meanwhile, and in contrast to the Greenlandic policy, in the far north of Australia during 2009 to 2012 under the 'Working Futures' policy, a limited number of remote Aboriginal towns were declared as 'Growth Towns' for implementing a hub and spoke model of service delivery. While the rationale was to ensure access to services from most settlements, the selection of the growth towns was embroiled in controversy and the policy itself criticised for forcing those in very small settlements to move to the larger settlements or to cities. While there have been critics, these policy examples, which are geographically poles apart, symbolise the challenges shared by governments, service providers, residents and others in meeting the needs of populations living in small and isolated settlements.

Northern settlements have been vital to national economic (particularly through resource extraction), cultural and strategic advancement in developed nations, despite being located far from the bulk of population and internal markets for products. However, from a policy perspective, settlements in remote regions have provided governments with a variety of 'wicked' problems (Head and Alford, 2013) and much of the policy flavour has focused on rectifying disadvantages (particularly for Indigenous peoples) and realising economic development potential by 'closing gaps'. Key issues faced by governments at multiple levels (national, state, provincial, territorial and local) have included balancing service provision, infrastructure development and support for remote residents with economic opportunities, healthy levels of private sector investments and achieving health and welfare goals for residents. Nonetheless, a discourse of deficit and problematisation in relation to remoteness and remote settlements exists in policies and literature specific to remote places for most of the nations featured in this book (Guenther et al., 2015). The tenet that remoteness equates to disadvantage, and therefore problems for policy makers and others, is at odds with the influence and contribution of remote populations and resources to national goals; thereby cloaking attention to the internal diversity which exists for both.

From an ontological perspective, and as microcosms of the extremes in human settlements, the rich and diverse circumstances unveiled in the history of remote settlements have at times been subverted by urban-based thinking (Carson et al., 2011). The 'southern' purview has tended to advocate that remote settlements are amorphous components within homogeneous regions with their characteristics, in particular their human geography and economic demography, explained largely in deterministic ways as a function of 'the region'. Some examples of externally composed regions and boundaries in sparsely populated areas featuring in this book include the 'Nordic Arctic' and 'Northern Australia'. Such regions

generally represent outcomes from historical and political processes, more so than spatial units which necessarily make sense for the purpose of analysis and policy making. The perception of individual settlements as having inherited demographic and other characteristics from the meta-regions in which they are situated (Smyth et al., 2005) has led to the tying of future prosperity and the overcoming of economic and social challenges to the notion of regional development.

'New Regionalism' is a stream of regional development which articulates primarily politically grounded suasions around regional development outside of urban areas in developed nations. New Regionalism has developed in response to global economic integration and increased connectivity which are seen to provide opportunities for peripheral regions by ameliorating factors of distance and remoteness from markets, labour and capital (Keating, 1998; Rodriguez-Pose and Gill, 2003). In political terms, New Regionalism symbolises a call from the largely urban-based seats of power for non-urban settlements to 'organise themselves' in order to subsume benefits from the global era as well as from their physical and human assets (Smyth et al., 2005).

An alternative to New Regionalism is to examine settlement level diversities and differences thorough the lens of demography and human geography. This approach provides a valuable platform for exogenous and internal interests to be articulated and deliberated in tandem during processes of research and consultations. The demographic lens points to an important theoretical shortcoming in the common bifurcation of 'rural' and 'remote' which is that regional purviews conceal the local context, and it is the local context which in fact drives regional change (Carson et al., 2011). Inattention to the diversity of settlements in sparsely populated areas thereby affects the voracity of and understanding about policy effectiveness, investments, resident welfare and community needs for settlements at the edge and their residents. Diversity and difference within and compared to other regions (such as rural and metropolitan southern settled areas) also means that the 'general rules' for generating knowledge, understanding systems and describing change do not apply to remote settlements (Carson et al., 2011; Taylor, 2011).

DEFINING SPARSELY POPULATED AREAS AND SETTLEMENTS

In the social sciences, the terms 'sparsely populated' and 'remote' are often applied interchangeably to denote areas where population densities are comparatively low, and relatively small settlements are located

at significant distances from the major centres of population, services and administrative or political seats of power (Huskey, 2006). Official definitions are available in the geographical frameworks implemented by national statistical agencies to delineate areas and sub-groups for the application of remote-specific policies, service delivery models and to identify service needs (and therefore cost and programme approaches). The Australian Bureau of Statistics, for example, uses a composite distance and access measure to define and denote remote places according to access by road network from populated localities to each of five different categories of service centres (ABS, 2014).

While distance, isolation and small population sizes provide one set of perspectives on the constitution of remoteness, many others exist. Distilling themes from 22 years of research papers submitted to the Western Regional Science Association's 'Remote Regions' stream, Huskey, for example, provided the following: 'Remote regions are regions that are environmentally extreme with significant Indigenous population. They also are or have been on the economic frontier, isolated from urban places, or the edge of development' (Huskey, 2006, p. 109).

Huskey's summary drew on Leven's (1986) work on economic remoteness which itself highlighted the importance of the interactions between human geography and economics in delineating remoteness. Indeed, balancing people and economy has been seen as the key to unlocking the potential of remote areas and settlements in major initiatives for 'developing the north' (Taylor et al., 2015). Leven's criteria for remoteness suggests that 'being remote' occurs when injections of more human, physical or financial capital to a settlement or area does not stimulate further economic development (Leven, 1986). This situation signifies there are economic constraints on the scale and scope of production in remote areas, although in post-industrial times there are many examples where such constraints have been overcome. Leven proposed three elements to remoteness – geographical, cultural and institutional. Geographical remoteness incorporates distances to markets, physical geography (including climate, soils and topography), as well as transport and infrastructure assets. Cultural remoteness speaks to the influence of the attributes of remote places on migration flows, and the push and pull factors for these. Institutional remoteness identifies the significant role of governments outside of remote areas in setting rules, laws and regulations which affect remote areas' capacity for innovation and production, as well as influencing migration flows to and from the area (Huskey, 2006). The key message in Leven's work is that human, physical and economic factors interact in remote areas to negate 'normal' and anticipated demographic and economic laws which might apply elsewhere.

Other encompassing terms are used for remote areas in developed nations including 'the Outback' in Australia or the 'Circumpolar North' with respect to the northern parts of the world's eight northernmost countries of Canada, Finland, Denmark (including Greenland and the Faroe Islands), Iceland, Norway, Russia, Sweden, and Alaska in the United States (University of the Arctic, 2015). The use of the term 'frontier(s)', particularly in the context of the founding and growth of Alaska (United States) has also been common. By way of contrast, Canada's official statistical agency (Statistics Canada) uses the term 'rural' in relation to settlements of less than 10 000 residents and distinguishes five rural zones (Scotland, too, defines 'rural' and 'remote rural') based on the proportion of employed residents who commute to a major city (Statistics Canada, 2013). But in Australia, 'rural' has a different definition and meaning where it is used interchangeably with the term 'regional' to denote hinterland areas adjacent or near to major cities in the southern and eastern areas of the country where population densities are relatively high and most of the population of the nation resides (ABS, 2014).

Capricious definitions for what or who constitutes 'remote' highlights that, in fact, remoteness is a relative term for which varying definitions exist and debates over constitution continue. While it implies distance and dislocation from a central or core zone (primarily major cities), the construct is fluid in both spatial and demographic terms. There is no perfect or universally accepted definition of remote since interplays between distance, history, people, environment and economies are constantly realigning the spheres of periphery and marginality. Who or what is remote depends on the question, 'remote from what?' (Huskey, 2006) and it is for these reasons that we have included as the final chapter in this volume, consideration of space settlements as the 'new frontier' in remoteness.

Likewise, delineating remote and urban settlements varies between nations and within nations according to institutional, geographic, cultural, economic or other perspectives. In the Nordic countries, remote settlements are defined as clusters of buildings with at least 200 inhabitants where the average distance between buildings does not exceed 200 metres (in Norway it is 50 metres). In Iceland a group of inhabitants numbering at least 50 persons is enough for designation as an 'urban nucleus', and in the Faroe Islands and Greenland all settlements are classified as villages regardless of their population size, and remain so until the last resident leaves. In Australia, several official geographical classifications are in place to distinguish remote settlements according to size, density and proximity to major cities. The national Australian geographic classification (the Australian Statistical Geography Standard) incorporates three structures

purposeful for demographic analysis and comparisons between settlements in sparsely populated areas. These are:

- Urban Centre/Localities – small localities are clusters of populations of 200 or more residents;
- The Remoteness Structure – which identifies remote and very remote places based on road distances to the nearest of five classes of Urban Centres; and
- Statistical Local Areas – generally represent individual settlements in rural and urban areas, but rarely do so in remote areas (ABS, 2015).

The multifarious and debatable concepts, definitions and perspectives on combinations of geographic and human attributes which constitute a remote area or settlement provides the opportunity for exploring the relationships between demography (the study of population change and people) with economic, cultural and institutional remoteness. Our aim in this book therefore is to undertake demographic expositions of the people living in and transitioning through settlements at the edge, which are defined according to their demographic and socio-economic characteristics, more so than delineating boundaries. We emphasise the importance of understanding local demography and change at the local level for policy. Our focus is on underscoring the causes and consequences of local divergences and changes in population, because it is the people living at or interacting with settlements who determine the collective capacity for change and improvements (however defined) in demographic, economic or cultural circumstances.

UNDERSTANDING SETTLEMENTS IN SPARSELY POPULATED AREAS

The book *Demography at the Edge* conveyed the overarching tenet that the systems and processes driving demographic, economic, social and cultural change in sparsely populated areas operate 'beyond the periphery' (Carson et al., 2011, p. 11). The periphery that remote areas are described as being 'beyond' is that referred to in Paul Krugman's (1991) seminal core–periphery theory. Core–periphery theory, and the associated economic models, emphasise the supplying role of the regions immediately surrounding major and growing core cities in facilitating increasing returns and the concentration of manufacturing into the urban core. With the physical location of agricultural activity being relatively fixed (to suitable land within transportable distance to markets for products produced in the periphery),

manufacturing has become increasingly concentrated into urban cores as the receiving points for hinterland products and people, as well as the location for services and products. Increasing concentrations of population and economic activity into the core in turn stimulates self-perpetuating growth in markets within the core.

Extending Krugman's core–periphery work, the field of New Economic Geography discourses the importance of incorporating spatiality into the field of regional economics because of its influence on core–periphery linkages (Sjóberg and Sjóholm, 2002). Contemporary studies in this area pay credence to core–periphery linkages aside from manufacturing including services, capital and education. In recent decades, core–periphery linkages have been observed as strengthened through improved transport infrastructure (important for commuting from the hinterland to the core), technological progress and continued rural to urban migration (BITRE, 2014). Linkages and flows of products, people and capital are strongly towards the urban centre, driving continued urbanisation that sees the cores increasingly dominate the national or jurisdictional population and economic landscape (BITRE, 2014). This has spurred the term 'sponge cities' as an alternative to 'core' (Budge, 2006) as emphasis of the encompassing draw of the core for hinterland people and products. Flows from the core to the periphery are far less in volumes and, as a result of urbanisation, are reducing in comparison to flows into the core, although they remain important as part of the overall core–periphery structure. Examples of the latter include 'tree change' migration of city dwellers to rural fringes in Sweden (Westlund, 2014) and movement of creative classes to hinterland regions, as has occurred in selected towns on the east coast of Australia (BITRE, 2014).

Legacies of core–periphery linkages are evident in the contemporary settlement patterns and population distributions for developed nations. In south-eastern Australia, for example, where all but one of Australia's major cities are located, the basic geometry of settlements observed in 1911 remains today despite relatively minor changes from the loss of small numbers of rural towns and the emergence of others, due primarily to fluctuations in natural and industrial conditions (BITRE, 2014). By contrast, the original European colonisation and settlement of sparsely populated areas occurred at a distance to pre-existing transport infrastructure, products and consumer markets. Some settlements were established through forced migration of residents from other settlements or regions including many of today's Indigenous settlements in Canada and Australia, as well as those established to house people dislocated by industrial or other projects. Remote settlements have emerged to fill specific functions and are largely independent of market forces. Settlement locations have transpired

sometimes by decree and policy, because of opportunism, sometimes by accident and sometimes (more often than might be expected) by the quirk or determination of an individual. This has produced a class of settlements with weak linkages to any core, making flows of labour, capital and products hard to predict and analyse (Carson, 2011b).

The 'beyond periphery' theory differentiated and distinguished the demographic attributes of sparsely populated areas to highlight that, while they share some similarities with the peripheries ascribed to in New Economic Geography, they are different in at least three important respects (Carson et al., 2011):

1. Core–periphery models have linkages that facilitate the emergence of new cities in the periphery from growth in the volume of flows for people, capital and products from the core to the periphery (BITRE, 2014). New cities in core–periphery structures may emerge from the growth of new markets in and around an expanding core, from demands for living close to the core for commuting or from growth in the creative classes and amenity seekers. Commuting and amenity seeking (or the combination of the two) have stimulated the rapid expansion of new cities in the periphery through urban to rural migration. Satellite cities, retirement areas and the general process of conurbation are examples. Beyond the periphery, in sparsely populated areas, a single urban centre does not dominate human and capital flows and the network, direction and scale of flows can change rapidly. Linkages between and beyond remote settlements can cease to exist, such as from the curtailment of key commercial air routes. Under these circumstances, there are not centres of sufficient population and economic scales to trigger the development of new cities.

2. While the core is readily identifiable in southern peripheral areas, in remote parts there may be multiple cores. The composition and relative prominence of demographic (through migration) and economic (through labour sourcing and supply) linkages between settlements in remote areas and those outside may vary rapidly in terms of both the pairing of such linkages (for example, settlement A with city B) and the scale of exchange. Alice Springs (population 28 000), for example, is located in the desert centre of Australia. The town has had low population growth during the past decade (Yuhun et al., 2013) with fluctuations in gender balances recorded from census to census. It became evident in the most recent census data (2011) that there had been significant migration of new residents from the State of Kerala, India. With insignificant past links to that state, Alice Springs attracted large (for a town of that size) numbers of new workers (mainly women) and

their families to fill skilled jobs in the health and para-health sectors during 2006 to 2011. In terms of core–periphery theory, the most obvious difference in this case to southern settlement dynamics is that the new core for Alice Springs (the State of Kerala) was in fact overseas, emerged suddenly and could not have been predicted by labour or demographic analysts. Without these 'new migrant communities' the town's population would have fallen by 5 per cent and become more male biased, less educated and less diverse.

3. Settlement architectures in core–periphery models feature tiers of settlements within the periphery itself (a fractal settlement structure). As they expanded, second-tier and third-tier cities, often termed 'regional centres' developed their own linkages and became internal cores for their own sub-peripheries (Budge and Butt, 2007). This network of linkages has helped establish step-migration patterns in urban hinterlands where residents move small distances to progressively larger centres with many ending up in the urban core (Plane et al., 2005). Nevertheless, regional centres are usually located within commuting distance to the major core and their growth serves to solidify linkages with the major 'sponge' city (Alexander and Mercer, 2007).

In sparsely populated areas there has been long-term gravitation of populations away from more remote towards less remote settlements for both Indigenous and other residents (Taylor et al., 2011a). However, the drawing capacity of the larger cities within remote areas to internal jurisdictional residents in the event of social upheaval, population and economic shocks may be relatively weak (Harwood et al., 2011). As such, step-migration, where individuals and families migrate from rural communities to progressively more urban areas, is less observable. Where it does occur, step-migration may feature fewer levels (or tiers) in the progressive movement of individuals and families towards major cities located outside of the remote region (Howe and Huskey, 2010). The physical distance between remote settlements of differing sizes reduces internal residential migration flows because of the cost (monetary, social and opportunity costs) of doing so (Howe and Huskey, 2010). This has helped to solidify the presence of industrial workforce practices that source labour externally including fly-in-fly-out and long-distance commuting in some remote areas where large resource extraction deposits are under way (Saxinger, 2015).

To help explain the demographic and economic geography of sparsely populated areas, and to differentiate them from rural, regional or peri-urban regions, Carson and colleagues (2011) proposed a set of descriptive words starting with the letter 'D'. The initial 'Seven Ds of Demographic

Research at the Edge' (Carson et al., 2011, pp. 11–15) have since become the 'Eight Ds' (in Carson and Carson, 2014) and provide a framework for the analysis of demographic change and its impacts for sparsely populated areas and, indeed, for settlements within these. The 'Eight Ds' serve as well to highlight and explain differences between settlements in sparsely populated areas and urban centres, urban hinterlands and their associated rural zones.

Settlements at the edge are:

1. *Diverse* In sparsely populated areas the demographic characteristics of individual settlements are highly diverse. There exist schisms between settlements in relation to basic demographic characteristics and population indicators such as absolute population size, rates of change (in key areas such as births and migration) and gender balances; as well as in the socio-economic status of residents including incomes, employment rates, housing and other areas (Carson and Carson, 2014). This is a function of diverse settlement histories, development foci and a mix of other factors for remote settlements. Diversity also manifests in other facets of the population compositions of small settlements including their cultural, racial and linguistic fabric.

   Diversity between settlements within sparsely populated areas means even those within geographic proximity can exhibit highly divergent development and demographic pathways into the future and that overarching policies for remote areas can have unintended effects at settlement level. Modelling settlement populations through clustering or agglomeration for the purpose of analysis and policy making is accordingly a difficult task. Diversity effectively means that demographic averages across clusters of settlements (for example, by region or according to administrative boundaries) do not represent what might really be occurring (demographically – for migration, mobility, fertility, mortality and family structures; and socio-economically – in housing, income, education and health) within and between settlement populations (Carson et al., 2011).

2. *Discontinuous* Settlement patterns in southern populated areas have emanated through geographic expansion outwards from major population centres in pursuit of establishing agricultural land and garnering resources. In many cases, newly established settlements were connected back to the source core via road or rail transport and have subsequently been interconnected with other settlements within the periphery by the same means (BITRE, 2014). This fanning out of settlements from the major urban centre established a pattern of

continuous and connected settlements (Bylund, 1960). In colonised nations like Australia, Canada and the United States, this mirrors patterns in the colonising nations (primarily Great Britain) with a legacy of strong linkages between core settlements and those in the periphery, as well as between individual settlements within the periphery (BITRE, 2014).

In sparsely populated areas, the geometry of settlements remains primarily non-patterned with settlements dotted at irregular intervals and generally no clear evidence of radiation out from larger cities. Northern settlements were settled beyond the zone of continuous settlement observed in southern populated areas as locations for individual settlements were determined according to discrete purposes. Some of the most common of these were the pursuit of location-based resources (for example, minerals or whales), global politics and nationalistic agendas (including establishing a presence in the north for frontier expansion), military strategies (establishing or expanding military capabilities), and sometimes by sheer accident. The historical source for people, capital and other resources to establish remote settlements has consequently varied by individual settlement and for individual settlements over time. The city of Anchorage, for example, originated as a camp for railway construction workers. Subsequently, Anchorage's population and economy grew from military investments and expansions (see Chapter 2). By contrast, Fairbanks, Alaska's second biggest city, emerged through equal measures of accident (the running aground of a steamship sent to establish a trading post in the region) and the pursuit of gold (Brower, 1994). The Russian north, meanwhile, was settled rapidly through waves of state-induced migration to provide the labour for extracting abundant natural resources (Stammler and Eilmensteiner-Saxinger, 2009).

3. *Disconnected* Large distances between settlements, poor transport linkages and population diversity have meant that remote settlements are relatively poorly connected to each other as well as to towns and cities elsewhere. In addition to the limiting factor of distance, establishing and maintaining internal connections (through improved transport systems, for example) may continue to be hampered by deficits in policy-making capacity within remote jurisdictions, and often this is associated with the high turnover of staff in policy-making capacities (Carson and Wellstead, 2015). Stemming from the discrete purposes and functions from which individual settlements originated, governments have struggled to encourage networks of innovation and activity among remote settlements (Cartan and Carson, 2009). A lack of critical mass, human and social capital combine with high turnover

to dampen network development endeavours. Furthermore, some settlements in remote areas are cordoned off altogether from establishing new connections by limits on outsider access (for example, defence bases and Indigenous settlements).

With little in the way of transport infrastructure and networks, settlement linkages may be a combination of weak, non-productive, favourably biased towards one settlement or uncohesive relationships (Carson, 2011b). Where they exist, links may be temporary and associations with internal and external centres may strengthen and decline over short periods. Consequently, migration, mobility and other flows between settlements within sparsely populated areas and between these and external populations are difficult to model, track and forecast (Taylor, 2014). Nevertheless, within the confines of remote settlements, population densities and the layout of housing may be similar to those found in suburbs of urban cities. Even the population of the most sparsely populated country on Earth, Greenland, is becoming concentrated and organised into suburban-type house blocks within the larger settlements. This legacy of the overlay and planting of urban planning schemes onto individual settlement plans and ongoing development means that, paradoxically, population densities within remote settlements may be quite dense, strengthening distance and dislocation between populations within remote areas (Carson and Carson, 2014).

4. *Dependent* Having been colonised through assortments of external decree, inspiration, trial and error, and investments funded from southern settled areas, settlements in sparsely populated areas have long been reliant on external forces for their establishment, development and growth, or have been directed by governmental statutes or proclamations to the same effect. Greenland, for example, having been first settled in 1721 by Danish missionaries, only wrestled self-government from Denmark in 2009. This 'overseeing' from outside of sparsely populated areas has established a perpetual power law distribution (see Barabási, 2002) where diversity within the system (within sparsely populated areas) has created inequality and, importantly in the context of the interplay of the Eight Ds, greater diversity produces greater inequality in the system (Taylor et al., 2011b).

There is also a long history of governments seeking to 'develop the north' with most iterations having been premised on perceived uninhibited riches situated in the north and desired by those living elsewhere (Ensign et al., 2014; Taylor et al., 2015). The post-colonial paradigm of northern development portrays northern sparsely populated areas as 'projects' which, if harnessed, promise great benefits for

residents and economies outside. Federal governments in most of the nations featured in this volume have agencies with specific northern (development) remits, such as in Canada, Alaska and Australia. The ongoing and important role of government employment and government devised interventions, are legacies of nationalism and frontierism. Both settlement and economic in systems in remote parts have become dependent on external labour and capital and subjected to cyclical interventions and attention from elsewhere in their respective nations (Carson, 2011a).

Northern and sparsely populated areas often feature high proportions of Indigenous (or Aboriginal) residents in their populations and this too has attracted centralised policies for their assimilation, protection and welfare at different historical junctures. In addition, and exemplary of the external labour dependency of settlements in sparsely populated areas, labour supply models for large resource extraction projects have increasingly favoured fly-in-fly-out or large workers' camps at the expense of sourcing from within, or at least housing external workers within remote communities (Ensign et al., 2011). The dependent nature of settlements at the edge can expose them to false positives and negatives in relation to population change and may blur the measurement of progress against social policy targets and evaluations of the contributions of economic and other developments to change (Taylor and Barnes, 2013).

5. *Delicate* For population estimates and indicators of population change, there exists a mathematical relationship between size and variations in indicators over time (Tayman et al., 1998). At the national and sub-national levels, forecasting change, which is the basis of planning for infrastructure and other investments, is relatively straightforward and accurate (Wilson, 2007). Settlements in sparsely populated areas are small and dynamic with the behavioural laws of population change often not conforming to expectations because of ever-changing population compositions through migration and mobility. Sparsely populated places feature many types of temporary and mobile populations, each with sensitivities in a social and demographic sense including those seeking to 'escape', temporary workers, tourists and mobile Indigenous populations. This issue creates delicate but important nuances at settlement levels over who might be considered a resident and those classified as visitors at a particular point in time (Taylor et al., 2015).

Sparsely populated areas and their settlements are also delicate for governments because they are home to marginalised and distant constituents who comprise a very low proportion of national,

and thus voting, populations. Despite their small populations, settlements in remote areas tend to draw (at least sporadically) significant resources and attention on a national scale; for example, the conditions under which remote-living northern Indigenous residents in both Canada and Australia have drawn regular media attention as well as deleterious reporting from institutions such as the United Nations (2014).

Remote settlements and areas where natural resources are prominent have also drawn attention for environmental issues and the tensions between political and industrial desires for new and expansive methods of production (like coal fracking in Alaska and the construction of a major liquefied natural gas, LNG, pipeline in Canada) and environmental concerns. Because of the delicacy of issues and populations it is difficult through standard means of research to know who is present and what their intentions might be in relation to their residency or short stay in the area. This delicacy associated with populations in northern and remote areas means generating balanced, inclusive and nuanced knowledge and understanding about population compositions and changes, on which planning for the future should be based, presents further complexities.

6. *Dynamic*   The small sizes of settlements in sparsely populated areas means they are prone both mathematically and in absolute terms to rapid and unforeseen shifts in their population compositions or in the size of their resident and temporary populations. A range of factors can dynamically alter settlement populations, including individual or longer-term climatic events (Carson, 2009; Hamilton et al., 2003), shifts in the viability of key industries (Rasmussen, 2011) and new or changed policies (Eilmsteiner-Saxinger, 2011). Even seemingly small and isolated events or actions by individuals or institutions can create population and economic dynamism (Yuhun et al., 2013). Dramatic demographic and social change in Greenland, as it transitioned from very small and scattered settlements reliant on hunting to a post-industrial economy with high urbanisation rates, was compressed into a few generations while elsewhere such changes took millennia (Hamilton and Rasmussen, 2010). Even large cities in northern peripheries may be subject to significant and short-fire population change. Murmansk (previously 468 000 people), the largest city in the Russian Arctic, for example, lost 35 per cent of its residents from 1989 to 2010 due to out-migration caused by bust cycles in natural resources and the extreme costs for the Russian government to sustain and subsidise administrative functions of the city after the fall of the Soviet Union (Heleniak, 2013).

Tipping points, which prelude major changes to age or gender compositions for remote settlements, may not be discernible, or at least not until the next major data collection (usually the census). Dynamic change can render pre-existing policies redundant or counter-operative to those required given the new size or composition of the population. For remote settlements demographers are unlikely to understand the pre-conditions and the full extent of factors associated with rapid compositional change. Consequently, changes are difficult to model and forecast, making knowledge about the context within which change has occurred in the past important for directing research, analysis, policy advice and planning (Carson et al., 2011). Conversely, rapid and fundamental compositional change is less likely altogether in larger population centres of southern areas of developed nations. Changes such as population ageing take place over generations and are more likely to be accurately forecast or detected through the analysis of available data during intercensal periods. In small and remote settlements by contrast, population ageing can manifest through the out-migration of just a small number of young people.

7. *Distant*   Most remote settlements are far from each other geographically, however, even those that are relatively proximal can remain isolated from each other with little in the way of human or economic connections. Although transport volumes, and particularly by air, have grown exponentially in recent decades, these have not necessarily breached distances between remote settlements and heavily populated areas in developed nations. For example, technology gains in aircraft design and capacity have allowed them to fly greater distances before refuelling, causing routes to bypass remote 'stations'. Internet-based forms of communication have reduced imperatives for face-to-face meetings, contributing to diminishing use of available transport forms and reducing the market for new routes or forms. Remote settlements in general are not incubators or hubs for emergent technologically driven global industry sectors such as robotics, nano-technologies, finance or medical research, although some have competitive advantages in the renewable energy sector.

In the past, remote settlements were very important to national settlement and development agendas. For a long time, the main form of communication between Australia and the 'mother country', England, was through the Overland Telegraph Line which ran up the centre of the country and spurned small settlements at regular intervals to repeat the Morse code signals which took some weeks to reach their destination. Such settlements are obsolete in terms of these functions nowadays. Collectively such technological improvements and the

process of population urbanisation have led to remote settlements becoming more, rather than less, isolated over time (Carson and Cleary, 2010). Such developments make it not only less likely that emerging industries will contribute significantly to employment and therefore resident population growth in remote settlements, but also less likely that short-term workers and tourists will visit and locate there. There may be a growing distance between northern economies and the investors and workers associated with these, as well as increasing distances within remote areas for residents to access services. For example, the growing use of externally residing workforces for projects under fly-in-fly-out and drive-in-drive-out practices, in preference to purpose-built townships, may contribute to a decline in (meaningful) services for residents in nearby host settlements, thus increasing the distances that residents must traverse to access health, education and other services (Australian Institute of Family Studies, 2014; Ensign et al., 2014).

The increasing distance between remote settlements and major hubs for transport and communications makes it difficult to attract and retain innovators, investors, skilled workers and other sub-groups in the population. Grandparents, who are poorly retained in many northern communities (Zeng et al., 2015), and women, whose aspirations for education and careers in large southern cities has led to their out-migration in large volumes from many areas, particularly in the Arctic north, are two important groups (Rasmussen, 2011). These factors make it difficult to generate clusters of economic activity involving multiple remote settlements and networks. Consequently, distance is reinforced, as is dependence on external skills and talent. Such dependence is revealed in the age-migration data to and from remote settlements which features a disproportionate representation of those in their twenties and thirties seeking to boost their careers and work experiences, only to leave within a relatively short time (Martel et al., 2013). Attracting and retaining people outside of their twenties and thirties is difficult and this contributes to maintenance of youthful age structures in northern parts. Purposeful attempts to reduce settlement isolation, for example, through costly new road infrastructure, can be rapidly reversed through natural disasters, internally driven changes in population sizes or because of policies. For example, the government of Western Australia has questioned the viability of small and remote Indigenous settlements in the north of that state in 2015, indicating a withdrawal of support for new infrastructure and raising the spectre that affected communities might close (SBS, 2015).

8. *Detailed*   The small size of settlements means minor demographic or socio-economic changes can have major downstream effects; seemingly innocuous events within one settlement can deliver significant changes in a short period. This is partly a mathematical function of being small. A handful of births above the long-term average number, for example, can dramatically increase the apparent birth rate in a small town. Planning for school students means that authorities must decide whether such increases are one-off events or likely to persist. Shocks can produce disproportionate effects and rapid or dramatic outcomes.

   Detailed also describes the impacts which are possible from internally and externally generated population and economic change overlaying onto small populations. In small settlements the diffusion of change is more rapid and changes to individual behaviours and preferences are likely to influence the behaviour of others. In Alaska during the 1970s, for example, minor numbers of educated women began leaving small villages for further education and careers in cities. However, this grew into what Hamilton (2008) described as a 'pipeline of women' leaving from small villages to cities in Alaska and elsewhere. Meanwhile, Taylor (2012) found very rapid diffusion of Internet-enabled mobile phones into the remote Indigenous communities in the Northern Territory had taken place over a short period, affecting some residents' perceptions about space and future migration intentions.

The Eight Ds familiarises us then with many of the opportunities and challenges facing settlements in sparsely populated areas of developed nations. While there are historical, cultural and institutional divergences within and between jurisdictions, in the future remote settlements are likely to encounter a range of challenges in common. A continuance of long-term population trends and environmental changes (urbanisation and climate change, for example) and specific issues relating to economy (especially the loss of young talent), age structures, gender bias and population ageing (Hörnström et al., 2015) are a few examples. Achieving balance in the population, with grandparents, university-aged young people and women commonly 'missing' from most places when compared with southern regions, and gainfully developing economic opportunities from within will continue as important challenges. Identifying and harnessing opportunities for economic diversification and growth is more likely through the application of context-specific research which recognises the importance of 'the local' and inherently recognises the importance of population issues as highlighted by the Eight Ds. Knowledge at the settlement level is integral

to this because it is at this scale that the interface between economics and population plays out for individual projects, initiatives and policies.

METHOD AND STRUCTURE OF THE BOOK

It is within these contexts that we explore the role of human geography, and primarily population issues, in shaping the past, present day and future of settlements in remote areas. Chapters in this book are based on case studies incorporating comparisons and contrasts from at least two geographic locations. These may be individual settlements or groups of settlements as well as jurisdictions within which settlements are located. Each chapter is 'topped and tailed' with methodological and theoretical content in line with the overall aims and themes of the book. There are three parts within the book. The first is concerned with describing the histories of settlements in sparsely populated areas and the ways in which these have been represented over space and time. Chapters in Part II are linked by the theme of understanding and building knowledge about settlements at the edge, including issues around data and methods for modelling populations at such small scales and with the characteristics described in this chapter. The final section of the book has chapters on future prospects for settlements at the edge in light of critical environmental, economic, workforce and other demographic issues. The book concludes with a summary chapter on the key messages and findings in this volume.

REFERENCES

Alexander, S. and D. Mercer (2007), Internal migration in Victoria Australia – testing the 'Sponge City' model, *Urban Policy and Research*, **25** (2), 229–55.

Australian Bureau of Statistics (ABS) (2014), *Remoteness Structures*, available at: http://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure (accessed 28 October 2015).

Australian Bureau of Statistics (ABS) (2015), *Australian Statistical Geography Standard (ASGS): Volume 5 – Remoteness Structure*, available at: http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/A277D01B6AF25F64C A257B03000D7EED/$File/1270055005_july%202011.pdf (accessed 28 October 2015).

Australian Institute of Family Studies (2014), *Fly-in Fly-out Workforce Practices in Australia: The Effects on Children and Family Relationships*, available at: https://aifs.gov.au/cfca/publications/fly-fly-out-workforce-practices-australia-effects/introduction (accessed 29 October 2015).

Barabási, A. (2002), *How Everything Is Connected to Everything Else*, New York: Perseus.

Brower, C. (1994), *Fifty Years below Zero, a Lifetime of Adventure in the Far North*, Fairbanks, AK: University of Alaska Press.

Budge, T. (2006), Sponge cities and small towns: a new economic partnership, in M. Rogers and D. Jones (eds), *The Changing Nature of Australia's Country Towns*, Ballarat: VURRN Press, pp. 281–90.

Budge, T. and A. Butt (2007), What about Australia's small cities: do they have their own planning and development agenda? available at: http://soac.fbe.unsw.edu.au/2007/SOAC/whataboutaustraliassmallcities.pdf (accessed 26 October 2015).

Bureau of Infrastructure, Transport and Regional Economics (BITRE) (2014), *The Evolution of Australian Towns: Report 136*, Canberra: Commonwealth of Australia.

Bylund, E. (1960), Theoretical considerations regarding the distribution of settlement in inner North Sweden, *Geografiska Annaler*, **42** (4), 225–31.

Carson, D. (2009), Demographic change, Katherine, and Cyclone Les, available at: http://www.cdu.edu.au/sites/default/files/research-brief-2009-44.pdf (accessed 7 December 2015).

Carson, D., P. Ensign, R. Rasmussen and A. Taylor (2011), Perspectives on 'demography at the edge', in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 3–20.

Carson, D.B. (2011a), Political economy, demography and development in Australia's Northern Territory, *Canadian Geographer*, **55** (2), 226–42.

Carson, D.B. (2011b), Skilled labour migration flows to Australia's Northern Territory 2001–2006: beyond periphery? *Australian Journal of Labour Economics*, **14** (1), 15–33.

Carson, D.B. and D.A. Carson (2014), Local economies of mobility in sparsely populated areas: cases from Australia's spine, *Journal of Rural Studies*, **36** (October), 340–49.

Carson, D.B. and J. Cleary (2010), Virtual realities: how remote dwelling populations become more remote over time despite technological improvements, *Sustainability*, **2** (5), 1282–96.

Carson, D. and A. Wellstead (2015), Government with a cast of dozens: policy capacity risks and policy work in the Northern Territory, *Australian Journal of Public Administration*, **74** (2), 162–75.

Cartan, G. and D.B. Carson (2009), Local engagement in economic development and industrial collaboration around Australia's Gunbarrel Highway, *Tourism Geographies*, **11** (2), 169–86.

Eilmsteiner-Saxinger, G. (2011), 'We feed the nation' – benefits and challenges of simultaneous use of resident and long-distance commuting labour in Russia's northern hydrocarbon industry, *Journal of Contemporary Issues in Business and Government*, **17** (1), 53–67.

Ensign, P.C., A. Giles and M.G. Reed (2011), Labour migration – what goes around comes around, in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 189–212.

Ensign, P.C., A.R. Giles and J. Oncescu (2014), Natural resource exploration and extraction in Northern Canada: intersections with community cohesion and social welfare, *Journal of Rural and Community Development*, **8** (4), 112–33.

Guenther, J., J. Halsey and S. Osborne (2015), From paradise to beyond:

geographical constructs and how they shape education in the bush, *Australian and International Journal of Rural Education*, **25** (3), 62–7.

Hamilton, L. (2008), Footprints: demographic effects of outmigration, available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.479.4918&rep=rep1&type=pdf (accessed 8 December 2015).

Hamilton, L. and R.O. Rasmussen (2010), Population, sex ratios and development in Greenland, *Arctic*, **63** (1), 43–52.

Hamilton, L., C. Brown and R.O. Rasmussen (2003), West Greenland's cod-to-shrimp transition: local dimensions of climatic change, *Arctic*, **56** (3), 271–82.

Harwood, S., D. Carson, E. Marino and N. McTurk (2011), Weather hazards, place and resilience in the remote norths, in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 307–20.

Head. B. and J. Alford (2013), Wicked problems: implications for public policy and management, *Administration and Society*, **47** (6), 711–39.

Heleniak, T. (2013), Boom and bust: population change in Russia's Arctic cities, policy note presented at the Arctic Urban Sustainability Conference, 30–31 May, available at: https://www.gwu.edu/~ieresgwu/assets/docs/Heleniak_BoomandBust%20PopulationChange.pdf (accessed 7 December 2015).

Hörnström, L., L. Perjo, I. Johnsen and A. Karlsdóttir (2015), Adapting to, or mitigating demographic change? National policies addressing demographic challenges in the Nordic countries, NORDREGIO Working Paper 2015:1, available at: http://www.nordregio.se/en/Publications/Publications-2015/Adapting-to-or-mitigating-demographic-change (accessed 26 October 2015).

Howe, L. and L. Huskey (2010), Migration decisions in Arctic Alaska: empirical evidence of the stepping stones hypothesis, available at: http://www2.census.gov/ces/wp/2010/CES-WP-10-41.pdf (accessed 12 October 2015).

Huskey, L. (2006), Limits to growth: remote regions, remote institutions, *Annals of Regional Science*, **40** (1), 147–55.

Keating, M. (1998), *The New Regionalism in Western Europe: Territorial Restructuring and Political Change*, Cheltenham, UK and Lyme, NH, USA: Edward Elgar.

Krugman, P. (1991), Increasing returns and economic geography, *Journal of Political Economy*, **99** (3), 483–99.

Leven, C. (1986), A note on the economics of remoteness, in E. Bylund and U. Wiberg (eds), *Regional Dynamics of Socio-Economic Change: The Experiences and Prospects in Sparsely Populated Areas*, Umea: CERUM, pp. 80–86.

Martel, C., D. Carson and A. Taylor (2013), Changing patterns of migration to Australia's Northern Territory: evidence of new forms of escalator migration to frontier regions? *Migration Letters*, **10** (1), 91–100.

Plane, D., C. Henriec and M. Perryd (2005), Migration up and down the urban hierarchy and across the life course, *Proceedings of the National Academy of Sciences of the United States*, **102** (43), 15313–18.

Rasmussen, R.O. (2011), Why the other half leave, in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 237–54.

Rodriguez-Pose, A. and N. Gill (2003), The global trend towards devolution and its implications, *Environment and Planning C: Government and Policy*, **21** (3), 333–5.

Saxinger, G. (2015), 'To you, to us, to oil and gas' – the symbolic and socio-economic attachment of the workforce to oil, gas and its spaces of extraction in

the Yamal-Nenets and Khanty-Mansi Autonomous Districts in Russia, *Fennia*, **193** (1), 83–98.

Sjóberg, O. and F. Sjóholm (2002), Common ground? Prospects for integrating the economic geography of geographers and economists, *Environment and Planning A*, **34** (3), 467–86.

Smyth, P., T. Reddel and A. Jones (eds) (2005), *Community and Local Governance in Australia*, Sydney: UNSW Press.

Special Broadcasting Service Corporation (SBS) (2015), WA community closures a 'wake-up call' for better representation, available at: http://www.sbs.com.au/news/storystream/wa-community-closures-wake-call-better-representation (accessed 28 October 2015).

Stammler, F. and G. Eilmsteiner-Saxinger (2009), Introduction: the northern industrial city as a place of life and of research, in F. Stammler and G. Eilmsteiner-Saxinger (eds), *Biography, Shift-Labour and Socialisation in a Northern Industrial City – the Far North: Particularities of Labour and Human Socialisation*, proceedings of the International Conference in Novy Urengoy, Russia, 4–6 December 2008, Finland: Arctic Centre, University of Lapland, pp. 9–16.

Statistics Canada (2013), *Rural and Small Town Canada Analysis Bulletin: Data and Definitions*, available at: http://www.statcan.gc.ca/pub/21-006-x/2012001/data-eng.htm (accessed 27 October 2015).

Taylor, A. (2011), The forecasting of remote area populations: numbers aren't everything, in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 39–52.

Taylor, A. (2012), More than mobile: migration and mobility impacts from the 'technologies of change' for indigenous communities in the remote Northern Territory of Australia, *Mobilities*, **7** (2), 269–94.

Taylor, A. (2014), Population projections for sparsely populated areas: reconciling 'error' and context, *International Journal of Population Research*, **14** (September), 1–9, available at: http://www.hindawi.com/journals/ijpr/2014/658157/ (accessed 11 May 2016).

Taylor, A. and T. Barnes (2013), Closing the gap on Indigenous life expectancies: what if we succeed? *Journal of Population Research*, **30** (2), 117–32.

Taylor, A., G. Johns, M. Steenkamp and J.G. Williams (2011a), The 'problem' of Indigenous migration in the globalised state, in D. Carson, R. Rasmussen, P. Ensign, L. Huskey and A. Taylor (eds), *Demography at the Edge: Remote Human Populations in Developed Nations*, Farnham, UK: Ashgate, pp. 163–88.

Taylor, A., S. Larson, N. Stoeckl and D. Carson (2011b), The *haves* and *have nots* in Australia's tropical north – new perspectives on a persisting problem, *Geographic Research*, **49** (1), 13–22.

Taylor, A., H. Payer and H. Brokensha (2015), The demography of developing Northern Australia, available at: http://www.cdu.edu.au/northern-institute/ni-research-briefs (accessed 29 October 2015).

Tayman, J., E. Schafer and L. Carter (1998), The role of population size in the determination and prediction of population forecast errors: an evaluation using confidence intervals for subcounty areas, *Population Research and Policy Review*, **17** (1), 1–20.

United Nations (2014), *Report of the Special Rapporteur on the Rights of Indigenous Peoples*, available at: http://unsr.jamesanaya.org/country-reports/the-situation-of-indigenous-peoples-in-canada (accessed 6 December 2015).

University of the Arctic (2015), *The Circumpolar North*, available at: http://
    education.uarctic.org/circumpolar-north (accessed 19 October 2015).
Westlund, H. (2014), An unplanned green wave: settlement patterns in Sweden
    during the 1990s, *Environment and Planning A*, **34** (8), 1395–410.
Wilson, T. (2007), The forecast accuracy of Australian Bureau of Statistics national
    population projections, *Journal of Population Research*, **24** (1), 91–117.
Yuhun, P., A. Taylor and J. Winter (2013), Alice according to you: a snapshot
    from the 2011 Census, available at: http://www.cdu.edu.au/northern-institute/
    ni-research-briefs (accessed 13 October 2015).
Zeng, B., H. Brokensha and A. Taylor (2015), Now you see us! A report on
    the policy and economic impacts from rapid growth in the number of senior
    Territorians, available at: http://www.cdu.edu.au/northern-institute/ni-research-
    briefs (accessed 19 October 2015).