

# **Growing adaptively?: Responding to climate change through regional spatial planning in England and Australia**

**Ian Smith, Jago Dodson, Brendan Gleeson and Paul Burton**



**Urban Research Program**

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© Ian Smith, Jago Dodson,  
Brendan Gleeson and Paul Burton  
Urban Research Program  
Griffith University  
Brisbane, QLD 4111  
[www.griffith.edu.au/urp](http://www.griffith.edu.au/urp)

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## **About the Authors**

The authors of this report are Ian Smith (Cities Research Centre, UWE, England), Jago Dodson, Brendan Gleeson and Paul Burton (all of the Urban Research Program).

Email: [ian5.smith@uwe.ac.uk](mailto:ian5.smith@uwe.ac.uk)  
[j.dodson@griffith.edu.au](mailto:j.dodson@griffith.edu.au)  
[brendan.gleeson@griffith.edu.au](mailto:brendan.gleeson@griffith.edu.au)  
[p.burton@griffith.edu.au](mailto:p.burton@griffith.edu.au)



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## Introduction

Recent debates about the re-territorialisation and rescaling of the state (e.g., Brenner 1999, 2005), have heralded a new emphasis on the concept of the region in planning and public policy literatures. The exact territorial extent of what constitutes a 'region' may vary and indeed the very territorialisation of the 'region' is a process of social construction (after Syngedouw 1997) in a multi-level set of governance arrangements (see Gibbs et al 2002). Regional governance can be used productively as a theoretical lens for understanding how new corporate arrangements at the regional scale have reconstituted the institutional space in which economic development (McGuirk 2003), land use (Healey et al 1999) and sustainability strategies (Gibbs et al 2002) are formulated and implemented. For the purposes of this paper, regional governance arrangements are those that arise at an intermediary point between national and local government arrangements.

The paper investigates the potential contribution of new regional governance structures in two nations to the production of emergent integrated policy responses that can sensibly frame both aspirations for urban growth (especially related to housing) and the sustainable adaptation of regional societies to the impacts of climate change. The particular focus of this paper is the balancing of economic growth and environmental concerns in two growing and economically prosperous regions. However, the wider challenge of balancing economic and environmental outcomes is not restricted to such growing regions. Declining regions face different but similarly difficult challenges. In all cases, the management of population and housing growth has been a common component of spatial planning policy in most advanced economies for many years. More recently awareness has emerged that spatial planning can also frame the adaptation of socio-economic assets such as housing stocks and, where feasible, of lifestyles to the various manifestations of climate change.

The tensions and complementarities between planning for urban growth and planning for climate change will be illustrated for two regions: South West England (SWE) in the UK and South East Queensland (SEQ) in Australia. These regions have similar spatial planning regimes albeit within different urban systems and confront analogous problems of urban and regional growth management. However, they have different governance frameworks in place: in England regional governance emerged according to an *administrative logic* within a pre-existing regional geography, whereas in Queensland regional governance grew out of the *functional logic* of managing a self generating metropolitan region within a federal system of government. We analyse recent policy documents, to assess the ways in which the two issues of growth and adaptation are managed individually and separately. In doing so, the paper exposes the tensions inherent in trying to manage both urban growth and climate change issues in a multi-level system of governance. In Australia and in the UK, contemporary urban and regional governance literature contains at least two broad features relevant to the present concerns:

1. it reveals the ways in which regional governance is about the re-distribution of state powers at intermediary spatial levels between central and local government (Brenner 1999; see Rayner and Jordon, 2009 for a review of regional governance in the context of the European Union that includes inter-state co-operation), and
2. it addresses the emergence of regional governance as a means of engaging or co-opting a new set of institutional actors within a policy making process dealing with complex (and possibly wicked) issues (see Counsell and Haughton 2003, Head 2008, Gibbs et al 2002).

Other authors stress this regional governance complexity both in terms of the policy issues being confronted but also in terms of the multi-level co-ordination required to deliver public policy (see Stilwell and Troy 2000 and also Brenner 2005). Within this realm governmental capacity to plan and deliver infrastructure has been diffused among a wide array of actors and agents in urban

political, policy and technical processes (McGuirk and O'Neill, 2002). In such a context formal centralised authority is often exercised through a more distributed mix of institutional actors with formal and informal governance roles who may straddle the conventional divisions between the public and private sectors. Such agents may include QUANGOs, public trading enterprises, special development vehicles, public-private partnerships and outsourced advisory or service providers (McGuirk and O'Neill, 2002). This shift from traditional hierarchical spatial government and infrastructure planning and delivery towards multi-level, multi-actor arrangements has complicated the urban management and regional planning task as well as creating the possibility of new ways of working. In this environment the use of conventional policy instruments such as regional or metropolitan strategies and land-use plans now intersects with a more fluid policy environment characterised by multiple policy aims and objectives.

This literature includes explorations of the ways in which these regional governing arrangements have tried to balance growth and environmental sustainability (Counsell and Haughton 2003, Gibbs and Jonas 2001, Marshall 1998 and Hanna et al 2007). The debate to now, however, has concentrated on the broader issue of managing either the conservation of biodiversity and the regional environment or on achieving some rather vague sense of sustainability. More recent work by Ruth (2007), in the USA, and Gleeson and Steele (2010), in Australia, has started to explore the relationship between regional developmental pressures and climate change.

There remains a need to comprehend how regional governance frameworks attempt to manage the pressures of and for urban growth along while responding to the rapidly mounting challenge of climate change adaptation. The region is a key site at which populations experience both the direct and indirect impacts of environmental change and resource insecurity as a result of processes of climate change and changing energy or food markets. The direct effects of climate change on both metropolitan regions and cities in regions include meteorological threats, such as floods, droughts and heat waves that exert direct force against human activities but also include stresses on critical infrastructure such as water supplies and waste disposal, transport systems and wider social infrastructures on which existing and future populations rely. In both England and Australia the region has become a site for the organisation and provision of critical energy, water and transport infrastructure. These will present major challenges for regional governance frameworks and pose considerable problems for those who try to manage within them. The additional pressures of accommodating and servicing considerable and rapid urban population growth will only add to these (see Dodson 2009; Gleeson and Steele 2009, Burton 2010).

In addition to the dynamic perspectives on metro-regional development trajectories, new literature has begun to explore the prospective vulnerability of cities and regions to future shocks and disruptions and the extent of their resilience to these stressors (Dodson and Sipe 2008b). A strong focus has been resource security threats, particularly linked to petroleum depletion (Atkinson 2007a, 2007b; Dodson and Sipe 2008c; Newman, Beatley and Boyer 2009). Climate questions about city-regions are now also being expressly raised as anxieties over future resource security, such as water supplies, and meteorological events, such hurricane-driven coastal inundation have rapidly encroached on the central core of the strategic planning imaginary. Urban resilience is emerging as a potential successor to sustainability as the overarching object for contemporary planning (Byrne et al 2009; Gleeson 2008; Newman, Beatley and Boyer 2009). The formal management of processes of transition from a climate vulnerable urban condition to a resilient urban state can also be seen as one of the major tasks expected of planners (see for example the work of (Geels 2002; Geels and Schot 2007). Steele and Gleeson (2009) have argued provocatively that the period of planning in anticipation of climate change is over and that cities are now planning *in* climate change necessitating an accelerated intensive program of mitigation and adaptation to ensure resilience (and in some cases basic survival). The policy and planning strategies that can improve and bolster the adaptive capacity and resilience of cities to climatic

threats are now being widely debated both within scholarly and policy circles (Hamin and Gurran 2008; Davoudi, Crawford and Mehmood 2009).

A number of key scholarly questions loom over this emerging regional climatic nexus, whether it is informed by an administrative or by a functional logic. To specify this challenge, addressing climate change at the regional scale inevitably intersects with the complex array of economic spatial and political processes operating within contemporary regional systems. While our understanding of the dynamics of such processes is developing there remain significant gaps in our appreciation and comprehension of the linkages between governance structures at multiple (national-regional-local) scales, scientific projections of regional climatic adjustments, responsive regional policy processes and adaptive strategies and the implementation of adaptive measures to ensure urban resilience to climate change at the regional scale. The urgent timescale for both urban climate mitigation and adaptation challenges scholars to report advances in the rapidly developing policy development of this area and to support timely inter-jurisdictional transmission of new policy knowledge. The remainder of this paper responds to these multiple and intertwined imperatives by posing three key questions about regional governance and planning for climate change within two cognate but contrasting examples of urban and regional planning:

1. How do the regional spatial strategies in SWE and SEQ respectively conceptualise the relationship between urban growth and climate change management?;
2. Does regional spatial planning in these two cases mediate between national and local planning policy for creating an urban pattern that is adapted to likely climate changes?; and
3. What are the conceptual and policy lessons might be drawn from this analysis?

This paper answers these conceptual and empirical questions through a comparative investigation of the recent experience of two comparable regional case studies – the South West England and South East Queensland. It does this in three stages. It first describes the governance frames for spatial planning and climate change adaptation policy within the regions. Secondly it identifies how growth is conceptualised and measured in each region, including an analysis of how urban growth may confound climate change management. The final part sets out how regional spatial plans have framed policies for housing growth, climate change and their inter-relationship. The conclusion assesses the implications of the case studies for the capacity of regional scale planning to achieve the twin objects of urban growth management and climate change adaptation.

## **Regional governance frames for spatial planning in South West England and South East Queensland**

### **Regional governance of South West England**

The two case study regions are situated within complex, multi-level governance systems. In the South West of England, for the period 2004-2010, the *Planning and Compulsory Purchase Act 2004* charged the Regional Assembly with producing a Regional Spatial Strategy (RSS). The Regional Assembly was a body made up of councillors elected within local authorities in the region and then nominated to sit on the Assembly. However, within the Region and in common with all English regions outside of London, there were two other significant regional institutions, the South West Regional Development Agency (SWRDA) a Regional Development Agency, overseen by a Board appointed by a central government Minister and the Government Office for the South West, a regional office of central government responsible for administering a range of programs and policies.

The RSS was developed and elaborated through extensive consultation and research effort which produced a draft scheme in June 2006. The draft RSS was subject to consultation, public

examination and submission of suggested changes over the period 2006-08. The ambit of the RSS in the South West, in common with RSSs generally, was to:

- Provide guidance on the location and scale of [land use] development for interpretation in local plans (elaborated by the 45 local planning authorities);
- Guide investment in transport and offer a framework for Local Transport Plans; and,
- Provide a spatial context for other regional strategies. (SWRA 2006, p4)

At the time of writing (May 2010) the RSS for the South West has still not been adopted by the Minister.

Below the regional tier for the period 2004-09, sat 45 local government authorities and these were responsible in this area for local spatial plan-making and the administration of the development control system by which permission to develop is acquired. These 'lower' tier planning authorities are charged with developing local plans in compliance with the RSS although considerable discretion is available within the English planning system to provide for specific planning decisions within the process of seeking planning permission to vary from stated planning policies and principles (see Cullingworth and Nadin 2006 for overview of English spatial planning system for this period).

The overall planning system has a clear territorial hierarchy in terms of plan-making with strategic issues addressed at the level of the region (in the form of the Regional Spatial Strategy) and detailed land allocation and development decisions situated at the lower tier local authority level. However, the general public service delivery role of local government has a slightly different territorial configuration. Here oversight of local government activities rests with the Government Office in the region but Local Strategic Partnerships (LSPs), charged *inter alia* with meeting targets on issues such as climate change adaptation, are located at the upper tier local authority level. These negotiated service delivery frameworks are called Local Area Agreements (LAAs) and were introduced in 2006.

In urban areas there is mainly a unitary local government system in which a single local authority has responsibility for all local services and functions. Outside the main urban centres there is a two tier system in which responsibility is divided between district and county councils. This balance of responsibility has been subject to constant change over the last century and changed again in some areas in 2009.

Both regional governance and governance within the region have been subjected to a rolling set of reconfigurations since 1997. However, the 2000's especially was a period when regionally-specific planning policies and visions were debated with the idea of framing regional development over the period up to 2026.

### **Regional governance of South East Queensland**

The regional governance frame for SEQ is configured noticeably differently to SWE. The sub-national state within which SEQ is situated – the State of Queensland – possesses a constitutionally guaranteed existence and area of jurisdiction. Its government is entirely responsible for the composition and conduct of local governments, to which a number of powers and responsibilities are delegated. Following a period of review by the Queensland Local Government Reform Commission concluded in mid-2007, and a state-wide round of amalgamations and name changes, the SEQ local authorities now comprise a mix of five city and six regional (i.e. semi-rural) councils. The State Government has described a spatial hierarchy in the new South East Queensland Regional Plan which helps define the regional scale in this case. South East Queensland is described as a region, while constituent local government areas are described as sub-regions. The five city councils are clustered together in the south eastern corner

of the SEQ region and are surrounded to the north, south and east by the geographically large and predominantly rural regional councils. Operational planning scales below this sub-regional level include districts, neighbourhoods and nominated sites which are all subject to a range of planning scheme instruments.

**Table 1: Governance frames for housing and climate change issues**

Planning context	South West England	South East Queensland
Regional governance	Regional Assembly (nominated body from local councillors) elaborates regional plan (2004-2010) Also: Regional Development Agency and the Government Office	State Government oversight of SEQ planning region comprising of 10 Local Government Areas Council of Mayors <i>Queensland Sustainable Planning Act 2010</i>
Lead planning agency in the region	Regional Assembly (2004-2010)	State Government Department of Infrastructure and Planning
Key strategic regional document(s)	SW Regional Spatial Strategy SW RDA Regional Economic Strategy 2006-2015 Climate South West <sup>1</sup> : climate change action plan (SWCCAP) 2008-2011	SEQ Regional Plan SEQ Infrastructure Plan Draft SEQ Climate Change Management Plan
Local planning governance	16 upper tier authorities (sites for local area agreements), local transport planning 45 local planning (lower) authorities (2004-09) plus two planning authorities for the National Parks (local plan-making and development management)	Local planning managed by individual municipalities according to SEQ Regional Plan and Infrastructure Plan.

In 1990 the eleven councils of SEQ formed an association known as the SEQ Regional Organisation of Councils, spurred by the State Government, to represent their interests more effectively, especially in dealing with federal and state governments and this was superseded in September 2005 by the Council of Mayors (SEQ). This forum includes all of the councils with the exception of Moreton Bay Regional and Ipswich City which for the time being have chosen not to participate. The Council of Mayors is now an incorporated body (a company limited by shares) with the following stated priorities:

- Securing the region's water supply despite continuing drought;
- Developing a regional carbon sink and reducing greenhouse gas emissions;
- Advocating for true next-generation broadband services;
- Improving housing affordability;
- Establishing a single South East Queensland Infrastructure Plan endorsed by local, state and federal governments (Council of Mayors 2010).

The SEQ Council of Mayors also coordinates local government representatives on advisory committees and working groups established by the Department of Infrastructure and Planning and other State Government agencies. This process is designed to support the effective implementation of the SEQ Regional Plan (SEQRP) and the SEQ Infrastructure Plan & Program (SEQIPP).

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<sup>1</sup> Climate SouthWest was formerly the South West Climate Change Impact Partnership (SWCCIP) for most of the period under discussion here (ie 2004-2010).

Another institutional actor in the regional policy space between state and local governments is Regional Development Australia (RDA) which was established in 2009 as a partnership between the federal, state and local governments. This new body replaces a network of Area Consultative Committees, established in 1994 to support local labour market policy interventions. This new network of RDA committees will "...build on the success of its predecessor, but will take on a broader role to develop strategic input into national programs to improve the coordination of regional development initiatives and ensure that there is effective engagement with local communities" (Albanese, 2008). . Again, 'regional' is used somewhat ambiguously to refer to the extensive swathes of rural Queensland as well as to sub-state level regions. Half of the RDA Committees are located in SEQ with two (Brisbane and Gold Coast) matching city council boundaries, two (Moreton Bay and Sunshine Coast) matching regional council boundaries and two formed by amalgamating sets of councils. Each RDA is required to produce a Regional Roadmap, setting out a long term vision for the development of their region which is consistent with existing policies and initiatives of all tiers of government as well as reflecting the views of 'regional communities' established through programs of community engagement and consultation (RDA governance briefing, 2009).

Within the frame of urban growth management, the pre-eminent plan for SEQ is the SEQ Regional Plan, which was first published in 2005 and revised in 2009. The SEQRP takes precedence over all other planning instruments and is one of six statutory regional plans in Queensland existing alongside four non-statutory regional plans developed under the previous *Integrated Planning Act* 1997 (replaced by the *Sustainable Planning Act*, 2009).

## Planning for urban growth

Within both regions the management of urban growth is heavily driven by two shared imperatives:

1. to generate enough new housing to both meet current unsatisfied demand; and
2. to accommodate projected growth in both the total population and in the formation of new households.

Table 2 sets out selected demographic characteristics of the two regions at the time of their last census of population (2001 for SWE and 2006 for SEQ). The population size and dwelling stock of SWE is double that of SEQ. Yet the aggregate population density of the two regions is of a similar order of magnitude, with the SEQ population being less densely concentrated -- 150 persons per km<sup>2</sup> as against 216 persons per km<sup>2</sup>. Measuring dwelling density as the number of dwellings per square kilometre, it is clear that the dwelling stock of SEQ is less dense at 4.9 dwellings per hectare as against 6.2 dwelling per hectare in SWE. The significance of these figures derives less from the comparison between the two regions but rather from their exhibiting lower (and in SEQ's case significantly lower) dwelling densities than in the national urban systems in which these regions are located.

This low dwelling density is reflected in the rural components of each region. South West England is one of the most 'rural' regions in England. The settlement pattern varies across the region with a heavily urban eastern end (see Figure 1 where the strategic cities and towns identified in the RSS are mapped) structured around the principal urban areas of Bristol, Gloucester, Cheltenham and Swindon connected to the historic but small city of Bath. This part of the region is wealthier and has the advantages of being well linked internally and to other English regions via the national motorway and rail network. The western parts of the region are much more rural even though the county of Cornwall has a historic legacy of mining and

agriculture. Overall the population within the region is relatively dispersed and many are dependent upon the private car as their principal means of mobility.

South East Queensland is Australia's third largest metropolitan area and has been the nation's fastest growing urban region for some time. The urban structure of SEQ is distinctive in the Australian context as it comprises a core metropolitan area of Brisbane (Australia's largest municipality) surrounded by a set of major regional sub-centres, including Australia's second largest municipality, the City of the Gold Coast (see Figure 2). Much of the urban form of SEQ is comprised of dispersed and highly car-dependent urban settlements, particularly in the Gold Coast and Sunshine Coast municipalities, both of which were developed almost entirely after WWII.

The attraction of sea, sun and sand has seen high levels of coastal development to the north and south of Brisbane along both the Gold and Sunshine Coasts. But the region also has extensive inland development, particularly in the western corridor linking Brisbane with the sub-regional centre of Ipswich and the rural service centre of Toowoomba. While inner-urban parts of Brisbane and the coastal strips of the Gold and Sunshine coast have attracted multi-unit and high-rise apartment development, SEQ's residential form is comprised predominantly of individual detached dwellings on relatively large allotments, although the typical size of allotments is diminishing (see Hall, 2010). A regime of transport investment dominated since the 1960s by major road construction has generated relatively low levels of public transport use, especially in comparison to UK and other European cities. In 2003/04, approximately 80% of regional travel was undertaken by private motor vehicle while in Gold Coast City just 3.7% of travel occurs by public transport (Queensland Transport 2008).

**Table 2: Selected urban attributes of South West England and South East Queensland**

Urban attribute	South West England	South East Queensland
Population	5.2 million (2008 mid-year population estimate)	2.6 million (2006 Census)
Average population density across region	216 persons per km <sup>2</sup> (based on 2008 mid-year population estimates)	155 persons per km <sup>2</sup> (based on 2006 Census)
Dwelling stock	2.1 million (2001 Census)	1.1 million (2006 Census)
Median gross dwelling density (dwellings per ha all uses)	6.2 dwellings per ha (MSOA level – 2001 Census)	4.9 dwellings per ha (SLA level – 2006 Census)
Predicted (net) demand for dwellings	800,000 dwellings for period 2006-2031 (SWRA 2006)	754,000 dwellings for period 2006-2031

From a comparative perspective the SWE and SEQ regions provide ideal sites within which to test questions about urban growth and climate change management. Not only do both regions demonstrate similar settlement profiles within their national contexts they are also regions that are identified and marked for future growth. In SWE the distribution and location of the projected 30% growth in new dwellings has been one of the major challenges for the Regional Spatial Strategy through its various phases of development. Historically, population growth in South West England has been driven mainly by net domestic in-migration (SWRA 2007, p4). The economic growth rates indicated in the Regional Economic Strategy have been interpreted as pointing to the need for economic growth to be supported by the development of housing in the region (SWRA 2006). The spatial options for the distribution and location of this growth explored through the process of developing the RSS have been mainly about reaching a technically feasible and politically acceptable balance between accommodating growth in the principal urban areas and its dispersion throughout the rest of the region (see SWRA 2004).

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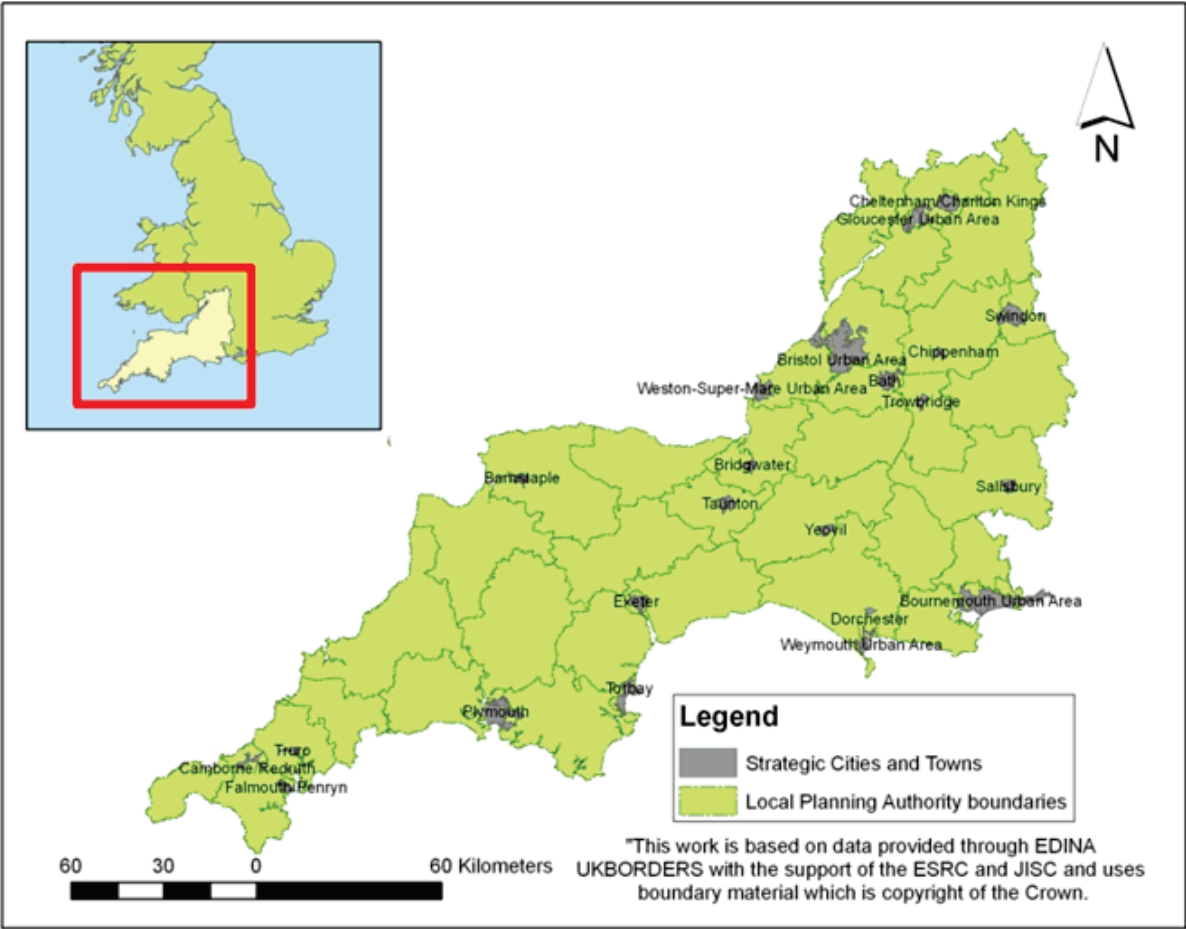


Figure 1: South West England



(Source: SEQ Regional Plan 2009-31, Map 1)

**Figure 2: South East Queensland**

Both regions are almost certain to experience a strong growing demand for housing. Table 2 outlines the order of magnitude of the demand for housing over a 25 year period. While these projections are susceptible to changing assumptions they are useful in showing the magnitude of growth that both regions will need to accommodate over this period. If these forecasts come to fruition both regions will have to manage significant growth including a 30% increase in dwelling stock in SWE and a 75% increase in dwelling stock in SEQ. If such a large level of new dwelling construction is carried out in accordance with appropriate standards of housing and urban design, it could represent a significant contribution to the creation of a more climate-adapted housing stock in 30 years time. Conversely, the energy required to build this expanded stock of dwellings and the likely continuation of current patterns of consumption of the people living in this housing stock may well drive a substantial increase in resource use and CO<sub>2</sub> emissions in this region. From a national perspective, however, this may be balanced to some extent by population decline in other areas.

In order to assess the potential environmental impacts of population growth, it is useful to consider the environmental impact of the current regional populations. Table 3 outlines some of the environmental impact of the current regional populations including the emission of greenhouse gases, water consumption and private motor vehicle use.

**Table 3: Selected environmental consumption indicators in SWE and SEQ.**

Consumption factor	South West England	South East Queensland
Greenhouse gas emissions per capita	7.9 tonnes CO <sub>2</sub> equivalent (all local sources) (2007, AEA) 2.4 tonnes CO <sub>2</sub> equivalent (domestic fuel use only)	43.4 CO <sub>2</sub> equivalent (all local sources) (2007, State of Queensland)
Consumption of domestic water	154 litres per person per day (2005, Regional Sustainability Indicators, DEFRA)	170-200 litres per person per day (2009 Queensland Water Commission)
Percentage of residents using private car to commute to work	65% of those in employment aged 16 to 74 years (2001 Census)	68% of those in employment aged 15 years and older (2006 Census)

For both regions it is clear that the problems of planning for relatively high levels of population growth and even higher rates of new household formation are compounded by the need to deal also with increasingly unsustainable levels of household consumption that usually accompanies current growth patterns. The relationship between population growth, housing demand and the likely impact of urban growth on the environmental carrying capacity of the respective regions is clearly problematic. In both cases, additional urban growth is likely to place water resources under pressure and under a ‘business as usual’ scenario they are likely to result in higher regional emissions of greenhouse gases. Indeed, in SEQ the growth of new households is anticipated to be dominated by older, single people and childless couples who may be relatively well disposed to living higher density, more urban lifestyle that has been shown, somewhat paradoxically, to generate a higher profile of carbon emissions than lower density suburban lifestyles (Dey et al 2007).

Climate change scenarios suggest an increased threat from a range of climatic changes to properties and communities in most parts of the region manifest through various hazards and resource constraints. The next stage in this analysis is thus to consider how regional planners are proposing to balance the demands for growth against the opportunities and threats of climate change through the regional planning frameworks currently operative in both regions.

## **Framing urban growth and climate change management in South West England**

Regional work on tackling climate change in England dates from the early 2000s. All English regions carried out some scoping work to identify climate change related issues in the period 1999-2003 with all regions producing some form of action plan. In the South West the action plan focused on identifying vulnerability and promoting action to tackle the various risks associated with flooding. In order to explore the relationship between housing growth and adaptation to climate change in South West England we will consider two regional strategic frameworks in SWE: the Regional Spatial Strategy (RSS) and the South West Climate Change Action Plan (SWCCAP). Although developed through extensive processes of consultation, the RSS was elaborated by the South West Regional Assembly, a body made up of local councillors representing local authorities in the region and supported by a secretariat of professional planners.

The RSS has been subject to both a Strategic Sustainability Appraisal (through 2005/06) and an Examination in Public (EiP) during the Spring and Summer of 2007. At both these points the RSS was subject to scrutiny in how it dealt with climate change. By contrast the Climate Change Business Plan for the South West was produced by a partnership of institutional stakeholders

(Climate SouthWest) that included the South West Regional Assembly and representatives of central government in the region as well as an array of other bodies. This climate change plan has not been subject to a formal public examination although it has been through an extensive round of stakeholder consultation.

The RSS for South West England emerged between 2004 and 2009 following Central Government guidance (see CLG 2007) although by the time that Central Government revised the process for its production (in 2009/10), the RSS was still only in draft form (that is it had not been formally signed off and adopted). However, the process by which the RSS had been produced (to date) had “been informed at every stage by inputs from the Strategic Sustainability Assessment (SSA) process” (SWRA 2006, p1) such that the draft RSS does claim to be a planning framework for a credibly sustainable vision for the South West. Climate change is identified as a cross-cutting issue that offers a significant threat to the economic and social viability of the region. The issue of climate change is thus afforded a policy statement (Policy SD2) of its own where the policy response to climate change is conceptualised both in terms of mitigation and adaptation. Measures include reducing carbon consumption through more efficient domestic use of energy and reducing the use of private cars, while the principal issue for adaptation centres on dealing with fluvial flooding and from threats of inundation associated with sea level rise. Thus the RSS presents a vision where the need for widespread adaptation is acknowledged but the only adaptive actions described are those which respond to the increasing risks of flooding in the region.

In dealing with the threat of increased flooding, the RSS aims as its first principle to defend existing settlements, although it also concedes that there may need to be relocation where defence is not possible. Development in flood plains may be permissible where certain requirements are satisfied and where possible, new development should be located so as to reduce the overall risk of flooding within the region. While there is a stated general principle that development within the region should be limited by some consideration of its environmental impact there is no attempt in practice to identify what these limits might be and how they might change in the light of climate change.

Where concerns about tackling climate change are linked specifically to housing much of the technical work has concentrated on the carbon emissions associated with housing (of the construction itself and energy use within the home). The Regional Assembly stated in its submission to the Examination in Public (EiP) of the RSS that ‘some apparent policy contradictions remain’ within the RSS as a climate change response (SWRA 2007d, p11) although the tensions explicitly acknowledged by the SWRA relate mainly to transport and in particular to its support for airport development. The consultants charged with producing the SSA for the RSS identified that as a baseline position, housing was responsible for around 32% of carbon emissions for the region (Levett-Therival 2006, para 3.1). Considering the likely impacts of housing development over the lifetime of the RSS, the consultants considered that there would be a balancing out of three trends: housing will become more energy efficient; the total carbon emissions of the population will increase; while per capita carbon consumption will decrease (Levett-Therival 2006, para 3.13). Overall the consultants considered transport to be the most problematic contributor to total regional carbon emissions in so far as its growth could not be constrained or limited.

Sustainability appraisals carried out on both the RSS and the RES in the period 2004-07 identified inherent weaknesses in the regional strategic planning system in the South West (Davies et al 2007). The RSS identifies a general principal and vision but does not offer a plan of action for dealing with a range of climate hazards other than flooding, either in terms of the existing or the yet to be built environment.. We can concur with the CABE (2010) therefore in concluding that regional adaptation planning in England is still in its infancy.

Issues of climate change were also scrutinised in April 2007 as part of the Examination in Public process associated with RSS development. During the four sessions on climate change, consultees were asked to consider three key issues:

- What are the spatial consequences of climate change and the actions required to tackle climate change in the South West?
- Does the RSS set out a clear set of climate change objectives and does it set out a clear way of framing a regional climate change response for mitigating and adapting to climate change?
- Are RSS policies across the board (other than Policy SD2) supportive of achieving the climate change objectives of the strategy?

Overall the report by the inspectors conducting the EiP found the position on climate change to be adequate in that the sustainability appraisal was judged to be sound and the policies in the RSS were consistent with national policies. Unsurprisingly consultee submissions showed a wider range of views. The Climate Change Partnership supported the presence of a policy but thought that there was insufficient clarity on the likely impacts of and on the likely responses to climate change in the South West. The Partnership also stressed the importance of making new development (including housing) 'resilient to impacts of climate change according to best available guidance' (SWCCIP 2007).

The main concern of many of the consultees was less with housing growth and more with transport policies and their associated carbon emission profiles, especially on airport expansion. Only the Campaign for the Protection of Rural England (CPRE) explicitly advocated 'avoiding any increase in overall housing numbers' (CPRE 2007 para 8) although the principal campaigning issue of the CPRE is that of urban containment. Within these submissions the debate about forms of adaptation are less clear than the policy positions on mitigation. Somerset County Council whose local authority area is likely to face a significant and serious threat of flooding under climate change projections, advocated the need for the RSS to be more clear on how the RSS will achieve climate change adaptation.

For the most part climate change adaptation within the region is being articulated not through spatial planning but through a raft of central government initiatives centred around the *2008 Climate Change Act*. Regional planning and local planning authorities are named in the *Climate Change Act* as having a responsibility to tackle climate change. However, this responsibility is hierarchically cascaded via the region down to the local authority level. The symbolic prioritisation of climate change issues was seen in the Local Area Agreements process during 2008 where nine of the sixteen upper tier local authorities in the South West region identified 'adapting to climate change' as one of their thirty or more local priorities; indeed twelve of the sixteen had climate change mitigation as another local priority. This contrasts with the national picture for England where only 56 of the 150 upper tier local authorities have included responding to climate change as one of their local priorities.

Climate SouthWest is a partnership with few resources and for whom the principal levers for action are based on the 'steering' power of partnership working rather than its rowing capacity, to use Osborne and Gaebler's (1993) terminology. In its early work, the Partnership chose to focus on extreme events and this led to work building 'resilience partnerships' of the emergency services. However, as central government has sought to frame an adaptive response to climate change, increasingly local authorities have been identified as important. This has been institutionalised through the inclusion of a climate change adaptation indicator (known as National Indicator 188 or NI188) in the 2008 round of negotiations on Local Area Agreements (LAAs) in which local authorities are expected to play a significant leadership role (within a local strategic partnership of key public service bodies). Under the *Climate Change Act 2008*, central

government expectations increased such that all local authorities (including those in areas where NI188 had not been adopted as a local priority within the LAA) were expected to demonstrate progress on the indicator. Local planning authorities through the auspices of the Regional Planning Authority were to be 'actively supported' in requiring new development to be 'adapted' (although not necessarily more adaptable) however there was no specific guidance on what this might mean in practice. The plan to build 800,000 new homes offers significant potential for ensuring that a quarter of all homes in the region are 'adapted' by 2031 although as noted above this comes with a problematic increase in the total consumption of carbon in the region.

There is evident concern in a number of regional plans with vulnerability to climate change and an acceptance that adaptation is required. There is, however, a shortage of specific guidance as to how this will be implemented. It could be argued that the regional planning authority is able to shape the pattern of new development through the RSS and that this development should take place within an as yet unspecified 'environmental limit'.

This issue of spatial distribution can be addressed through the plan-making system but it remains to be seen how effectively it can be facilitated via the processes of land development that take place in the South West. Beyond the idea that new housing development should not be sited in places with a high flood risk, there is little specific guidance on how new development should demonstrate its level of adaptation to new climate risks. However, the regional body does mediate the projections for development from central government to local planning authorities via the RSS.

It is not clear, however, that the regional planning authority or the Regional Climate Change Partnership is playing a similar role with regards to climate change adaptation. The regional climate change partnership does not have the same powers of ensuring 'compliance' with its action plan. For the most part central government policies relating to climate change seem to bypass the regional tier of policy makers although the regional climate change partnership claims powers of steerage.

Given that regional adaptation policy is in its infancy in England, limited progress might be expected. However, there is an on-going issue of institutional instability in all English regions. After spending six years developing their respective RSSs, all regional assemblies were abolished in 2009 with responsibility for regional planning handed to re-vamped Regional Development Agencies. The South West RDA has been less sympathetic to the concept of setting environmental limits to growth under current climate conditions and it is not clear how the new regional agency will address adaptation and the planning responses to changes in the climate. The partnership model of the regional climate change body has neither the powers to enforce adaptation nor the resources to persuade others to act on its behalf through for example capital funding major adaptation projects. Thus adaptation action in the context of regional plans can only be described as a 'coalition of the willing'.

It is notable that in the European context, there was a pronounced variability in the speed and enthusiasm with which member states accepted the need to develop mitigation and adaptation policies in response to climate change. Following a series of high profile extreme weather events including the 2002 floods in central Europe and the 2003 heat wave, the European Union under the Dutch and UK presidencies in 2004 and 2005 began to move faster in its climate policy development (Rayner & Jordon, 2009) with the second European Climate Change Programme launched in October 2005. Most member states saw adaptation as primarily a national issue and EU regional policy has focused mainly on economic competitiveness with little practical rather than rhetorical emphasis given to the principles of sustainability or to the environmental consequences of economic growth. The significance of these European lessons lies in their relevance to the Australian federal system of multi-level governance but does not bode well for

attempts to exploit the regional space between national and local jurisdictions to advance a climate adaptation.

## **Framing urban growth and climate change in South East Queensland**

By the early-1990s the SEQ region's status as Australia's Sunbelt region was strengthening (Stimson and Minnery, 1998) and public and policy awareness began to recognise the implications of rapid urbanisation extending between and beyond the historical pattern of distinct and separate urban centres. The fragmented territorial boundaries within the region's local government structure was viewed as limiting capacity to manage urban growth sustainably and some commentators and scholars warned of the emergence of a '200 kilometre city', stretching from the exclusive resort of Noosa in the north to Coolangatta and Tweed Heads on the border with New South Wales border and producing North American-style urban 'sprawl' (Spearrit, 2008).

The Queensland Government responded by sponsoring a voluntary regional growth management initiative involving the formation of an SEQ Regional Organisation of Councils including State Government representation, which would formulate a Regional Framework for Growth Management (RFGM). The RFGM was inspired by North American models, in particular the successful Vancouver example (Dodson and Gleeson 2003). The RFGM covered an array of planning issues, including ecological, urban management and socio-economic concerns (Dodson and Gleeson 2003; Dodson 2009). Yet the RFGM had no statutory foundation and relied on voluntary adherence by its constituent councils which each had distinct priorities and preoccupations. The result was very weak implementation of the framework which proved largely incapable of re-shaping the development trajectory of the region as it continued to experience rapid population growth.

By the early-2000s popular concern intensified over anxieties that the ecological, economic and social costs arising from barely controlled urban dispersion and poorly coordinated, weakly integrated urban growth management were mounting and placing at risk the region's famed 'liveability'. An unusually vibrant period of civic debate about urbanisation followed, stimulated by a dedicated campaign by the major metropolitan newspaper and by sustained scholarly commentary with many arguing for the 're-booting' of regional planning in SEQ (Heywood, Baker and Bajaracharya 2004). The Queensland Government responded by establishing a new state Office of Urban Management to prepare a formal statutory Regional Plan for South East Queensland. The first SEQ Regional Plan (SEQRP) was released in early-2005 and revised in mid-2009.

From a planning governance perspective the plan has generally been successful in shifting the mode of regional growth management from a horizontally dispersed and weakly implemented set of arrangements to a far more vertically organised and centrally driven framework, with a robust set of policy prescriptions accompanied by new implementation and evaluation capacity. While the SEQRP was novel for Queensland and distinctive nationally, its content reflects contemporary planning principles and measures found in other jurisdictions including:

- An urban growth boundary (urban footprint);
- Sub-regional targets for accommodating housing growth; and
- Sub-regional urban activity concentrations.

The SEQRP was however significant and unique in the recent Australian context and to a degree internationally, because it was accompanied by the SEQ Infrastructure Plan and Program (SEQIPP) which set out in considerable, annually updated, detail the elements of regional

infrastructure to be delivered over the subsequent two decades. This infrastructure plan served as the main implementation vehicle for the SEQRP's strategic objectives and components. The strength of this regional infrastructure program led at least one observer to suggest that it has overtaken the spatial planning of the SEQRP and is at risk at producing a regional landscape dominated by a set of poorly coordinated major projects (Dodson 2009), including the 'TransApex' road projects which do not articulate with the underlying planning firework (Gleeson and Steele 2009). The balance may, however, be shifting partly back towards land-use planning with the 2009 SEQRP including a range of renewed spatial measures including a strong emphasis on 'Transit Oriented Development' (TOD) to better integrate mixed land uses with public transport infrastructure.

Notwithstanding criticisms of the content of the SEQRP and the SEQIPP they form the core of state urban policy in Queensland and offer a robust base from which a wider and more ambitious regional policy frame might be constructed. Responding to climate change will be as important a planning challenge as the management of rapid urban growth, with a similar pace demanded of responses to both these challenges. The presence of strong regional plans (SEQRP and SEQIP) for managing growth offers a ready made framework for responding to climate change in the region.

The SEQRP was prepared in the context of growing recognition of climate change as a mounting global threat but prior to the sharp intensification of national and global public and policy interest in the mid-2000s about the severity of climate change problems. Events such as Hurricane Katrina in the USA, the publication of the Stern Report by the UK government in 2006 and the release in 2007 of the 4<sup>th</sup> IPCC report on climate change science, impacts and mitigation each provided a spur to the integration of climate change issues into processes of regional planning.

The Queensland Government had taken an incremental approach to climate policy development driven by the gradual, if uneven, strengthening of national government policy development. The Australian government did not ratify the 1997 *Kyoto Protocol* to the 1992 United Nations *Framework Convention on Climate Change* until after the election of the Labor Party government in 2008, but pursued an independent greenhouse abatement policy. This policy comprised three components: a *National Greenhouse Strategy* (AGO 1998); the *Greenhouse Gas Abatement Program*, which targeted emissions reduction measures at particular sectors; and the development of an emissions trading scheme. Despite its failure to ratify the actual treaty Australia was one of the few developed nations to meet *Kyoto Protocol* abatement targets, largely due to the cessation of large-scale vegetation clearing within rural Queensland, which had been a major source of Australia's emissions growth.

Complaint in rural Queensland over the prohibition on land-clearing motivated the Queensland government to prepare a formal *Queensland Greenhouse Strategy* (QGS) (EPA 2004). The strategy was primarily focused on *mitigation* and covered a range of sectors with transport being the most relevant to regional planning although the content of the measures gave them little more than rhetorical status. The transport section of the strategy included a range of travel demand objectives, land-use and transport integration principles and emissions abatement statements but these typically reiterated current planning policies or deferred decisive policy change to future plan development.

Thus the Strategy reiterated components of the 1997 SEQ *Integrated Regional Transport Plan* (Queensland Transport 2007) while expecting that land-use integration measures to reduce greenhouse emissions would be developed through a future SEQ regional planning process. The overall impression of the QGS is of a timid document repeating through collation the weak measures of sectoral plans. Adaptation questions barely featured in the QGS with most

adaptation measures involving intentions to undertake further research on climate change impacts.

Climate was thus a weak component of the 2005 SEQRP and SEQIPP which focused on growth management pressures. Climate change was mentioned substantively in the SEQRP (OUM 2005) policy sections on 'the atmosphere' (p. 32) and on 'managing the coast' (p. 33) as well as cursorily in sections on rural futures and on water. The policy response to climate change was however modest; for example the atmosphere policy sought to 'improve energy efficiency, transport systems and land use practices to help reduce greenhouse gas emissions' (p. 32) but made few concrete commitments to actions that might reinforce this intent. The imperative to adapt to climate change was mentioned just once in a subordinate note at the end of the atmosphere section.

The relatively weak climate change response content of the first SEQRP was also partly contradicted by its limited integration with other elements of the plan and the SEQIPP, especially those reacting to the accommodation of urban growth. For example, one of the key challenges motivating the preparation of the SEQRP was the projected 48% increase in motor vehicle travel across the region and its implications for the regional transport network. Much of the SEQRP and the transport components of SEQIPP focused on responding to this increased transport demand.

Approximately 64% of the transport budget for the key greater Brisbane zone under the 2005 SEQIPP was devoted to expanding road capacity to meet this increased demand including a network of major tollway tunnels underneath the central city. In the absence of a radical improvement in the environmental efficiency of the SEQ motor vehicle fleet this expansion will inevitably result in higher regional greenhouse emissions (Dodson, Li and Sipe 2009). This contradiction between the pattern of current urban growth and the imperative to mitigate climate change was neither recognised nor addressed in the SEQRP.

By 2009 climate questions were placed at forefront of government thinking in the review of the SEQRP that year. Global attention on climate change combined with political panic over water shortages brought on by a severe drought during 2004-2009 meant that climate issues were prominent in policy thinking, although growth management still remained the dominant planning focus. Although popular discourses of growth management often generate calls for a population cap to preserve the 'lifestyle' of the region, there have yet to be any serious policy proposals to limit growth in this way, indeed increasing attention has been given to the need to stimulate further economic growth so that there will be enough employment opportunities for the growing population.

The first set of regional climate policies within the 2009 SEQRP focused on sustainability and climate change. They included mitigation measures relating to design guidelines to make new developments more energy efficient, reducing transport fuel consumption, renewable energy generation and carbon bio-sequestration. But the 2009 SEQRP also introduced new *adaptation* measures into the regional plan primarily in the section on 'natural hazards' (DIP 2009, p. 44). These existing hazards are likely to become more prominent as a result of climate change and include: riverine flooding; storm tide or sea level rise inundation; coastal erosion; bushfires; landslides; heat waves and high temperatures; reduced and more variable rainfall; cyclones and severe winds; and severe storms and damaging hail.

Climate change is now viewed by the State Government in terms of its direct material implications for the region with the planning of future development required to take this eventuality into account. The emphasis is overwhelmingly on physical hazards and typically those with an intensive temporal expression, such as tides, heat waves and storms and policy responses

typically take a risk management approach. Longer term incremental adaptation to non-catastrophic climatic changes, such as modification of housing designs for higher average temperatures was not included as a component of the adaptation task in the 2009 SEQRP.

This trajectory appears to have been indicated by the decision to prepare a South East Queensland *Climate Change Management Plan* under the framework of the SEQRP. The motivation for a separate Climate Change Management Plan in addition to the SEQRP is in part testament to the governance challenge for the region posed by climate change but also an indicator of the difficult political path the Queensland Government faces in responding to the scientific warnings of climate impacts while managing the wider and more entrenched expectations about the momentum of current urban growth patterns and emissions profiles. The Queensland Government has attempted in recent years to transform a state economy heavily reliant on the mining and export of coal through concerted attempts to promote the research and development sectors and other 'knowledge intensive' industries. It remains, however, among the most carbon intensive regional economies in the world (Figure 2).

The regional planning process also intersected with the Queensland electoral cycle such that the process leading up to the review of the existing SEQRP and publication of the 2009 version was accelerated in the hope that that it would provide the government with a strong platform for an early-2009 election. The global financial and economic crisis delayed this action and economic crisis management rather than growth planning temporarily became the dominant political concern. The spatial imperatives of the SEQRP also contributed to the weakening of substantive climate change content as the reduced timeframe prevented the inclusion of ongoing modelling and detailed evaluation of sub-regional spatial climate impacts. This analysis has begun through the State Government sponsored research initiative, 'SEQ Climate Adaptation Research Initiative', involving Queensland universities and Australia's national science institution the Commonwealth Scientific and Industrial Organisation. However, the lack of comprehensive modelling and downscaling of local impacts at regional or local scales continues to compromise the planning process. The importance of this was strengthened by the findings of an Australian Parliamentary Inquiry (APH 2009) which revealed that Queensland's coastal zones, particularly in the SEQ municipalities of the Sunshine Coast and Gold Coast, are at the highest risk in Australia from sea level rise, flooding and erosion.

A further document that has framed the SEQCCMP is the 2009 *ClimateQ: toward a greener Queensland* (OCC 2009) which sets out the next steps for Queensland's transition to a lower carbon future. It builds on the approaches taken in *ClimateSmart 2050* and *ClimateSmart Adaptation 2007-12*, and takes into account recent developments in national and international science and policy. Along with the State Government's 2009 strategic statement, *Toward Q2*, this new strategy offers a suite of new initiatives and investments to take forward and enhance.

## Insights and conclusions

Both SWE and SEQ have regional frameworks in place that articulate directly with local and super-ordinate governance levels: most importantly, the State of Queensland and the UK central government. These governance arrangements may be understood as variants within an historical trajectory of British governance frameworks, albeit with a strong post-colonial hue in the case of Queensland. Both have regional planning frameworks designed to manage the spatial development of the region and both are addressing climate change questions and problems through these regional frameworks via a combination of spatial planning and other strategies.

A further set of similarities and some stark contrasts are apparent within these regions' environmental contexts though. SWE is a temperate oceanic climate including with mild

temperatures and low levels of variability. SEQ is marked by relative stable subtropical climate patterns including warm, often wet, summers and relatively cool dry winters. Both regions contain extensive urban areas and a dispersion of settlements across their landscapes and are exposed to dynamic marine and riverine processes via extensive coastlines and river systems. For each region a range of hazards likely to arise from climate change has been identified, including extreme rainfall variation, higher average and extreme temperatures, heightened storm activity and a growing likelihood of coastal inundation.

This paper posed three questions about regional planning, growth management and climate change:

1. How do the regional spatial strategies in SWE and SEQ respectively conceptualise the relationship between urban growth and climate change management?;
2. Does regional spatial planning in these two cases mediate between national and local planning policy for creating an urban pattern that is adapted to likely climate changes?; and
3. What are the lessons that might be drawn from this kind of analysis?

In response to the first question the paper has demonstrated that both in the South West of England and in South East Queensland, regional planners recognise a number of important issues: planning for population growth; planning for a concomitant growth in housing demand; and shaping a response to climate change. The question arises as to how regional spatial planners see the relationship between the two. In both cases regional planning policy includes the notion of some form of spatial 'limit' to development, via the urban footprint in Queensland and the ecological footprint of South West England. These notional limits differ in the ways they can be converted into policy action but both recognise the concept of placing a spatial boundary on development (even if might not extend to constraining development volume). There is, however, no consideration in the case of SWE of how the environmental limits on development will change in the face of climate change. In the case of SEQ the description of an urban footprint does not in itself answer the question of how many people and how many houses could be accommodated within this boundary nor what their greenhouse gas emissions profile might be. Planners acknowledge that an increasing population and growing demand for housing is likely to increase the total carbon emissions of a region but in the case of SWE, planners are able to contemplate a reduction in per capita carbon emissions. Planners in both regions have considered the ways in which new housing development might contribute to the implementation of renewable energy strategies and the use of low carbon technologies. These policy linkages tend to focus on mitigation outcomes (i.e. they result in lower carbon emissions) rather than promoting climate adaptation. In SWE, proposals to steer development away from the potential harm of flooding is the only clear linkage between housing development and building resilience. Neither plan offers any substantial thinking or proposals for building resilience in the existing housing stock.

In SEQ there is little evidence in regional planning documents of any resolution of the dilemma presented by the two main alternative development futures:

1. To accommodate a growing population among a conventional dispersed and highly automobile dependent urban form beyond the current urban footprint; or to
2. Consolidate at higher densities within the existing footprint even if this means more intense development in the coastal areas most exposed to the manifestations of climate change.

The second concern of this paper was to assess how regional plans in SWE or SEQ mediate between 'national' (or in Australia, state) policy and local planning in shaping urban patterns to be

adapted to plausible future climate scenarios? In principle, the substantial projected growth in housing demand in both regions provides an important opportunity to increase the resilience of their regional housing stocks and urban patterns in the face of a changing climate. Perhaps the normative theory of multi-level governance which prescribes a nested set of governing structures, institutions and plans, operating according to the subsidiarity principle may assist in resolving this question. Under this ideal scenario, national principles and priorities guide regional strategies which in turn inform local plans and actions. Broad statements of national principle become more meaningful, especially to the public at large, as they are translated into regional and local plans. But as they become more meaningful and tangible, they also become more contentious and contestable as their implications and consequences become clearer to individuals, households, firms and other institutions. Policy opacity has long been used as a device for managing debate and criticism and there is evidence of this in the presentation of climate adaptation policies in the various regional plans produced for both SWE and SEQ. The opportunities for a productive mediation or articulation of plans produced at and for these different levels have not yet been fully grasped.

Nevertheless, regional planning remains an important vehicle for the articulation of national principles and local action in general and in relation to the challenges of responding to climate change this importance is underscored. The importance of the meso-level constitutional space in which regional planning is performed is increasingly recognised as providing potential purchase for intervening effectively in urban and regional systems or functional urban regions (Cheshire, Hay and Carbonaro, 1986). However, the constitutional vulnerability and fragility of regional policy institutions ensures that confidence in their potential is always tempered by concern at the threat of institutional 'reform'. Regional formations in both SWE and SEQ are both subject to the vagaries of superordinate tiers of governance. This is most obviously seen in relation to shaping the scale and distribution of housing development. In the case of the UK, the shaping of adaptation policy is currently most visible in the direct linkages between central and local government (via the intermediary of 'upper tier' local strategic partnerships). Thus for the period 2008-2010, regional planners in the South West had mediated the demands of central and local government on matters of housing and the issue of flooding issues that relate to climate change. Comparatively, at the time of writing the Queensland Government had announced its intent to establish a new Growth Management Authority to better control urbanisation within the SEQ region in response to re-inflating public qualms over growth impacts. This authority adds another thread to the multi-layered fabric of planning agencies within SEQ and could be regarded as a pre-emptive effort to address emergent fraying of the regional planning program under relentless urbanisation.

In response to our third motivating objective our analysis of regional planning in SEQ and SWE has provided a valuable opportunity to compare two different approaches to planning in response to climate change but within broadly similar, Westminster-style governance frameworks that share a historical legacy in regional planning. Both regions are areas of high growth pressure, spurred by the attraction of regional lifestyle possibilities. In SEQ there is a well-developed political system seeking greater implementation traction, while in SWE there is a well-developed administrative system looking for greater political legitimacy and regional leadership. In both regions there exist political challenges in achieving effective coordination among a plethora of regional plans and institutions and in balancing the contradictory pressures of growth and sustainability.

In SWE the concept of environmental limits to growth is espoused but these limits are not currently defined and the impacts of climate change on those limits are not currently addressed. Regional strategies abound but do not have the strong delivery mechanisms needed to facilitate adaptation at the local level by lower tiers of government.

Debate on climate change and its implications for growth management has highlighted the need for new forms of partnership working but these take time to develop and are not always effective vehicles for policy development and delivery. In the UK in general and in SWE in particular the last two decades have seen a profusion of governance partnerships. While they reflect the realities of a more dispersed pattern of political power such dispersion may rob them of the momentum to drive the development of clear and robust plans for managing growth in a time of climate change. The partnership model of governance may in fact be better suited to situations in which there is a relatively high degree of consensus over the way forward than to those in which strong leadership is required to promote and sustain substantial changes to the lifestyles of most people. The failure of attempts to construct international agreement on the best way to limit global greenhouse gas emissions do not bode well for resolution of the equivalent regional challenges in the UK and Australia.

In SEQ, the Australian federal system appears to offer a more robust political framework for managing growth in a time of climate change at a regional scale. However, this presents a different but equally challenging set of problems for regional governance. In a context with an established tradition and culture of growth promotion and boosterism, it is not easy to promote the principle of limits to growth let alone to implement strong policies of limitation. The dependence of the state economy on extractive industries and the role of this sector in dampening the effects of the recent economic crisis and in fuelling future growth through the urbanisation of mineral profits are not conducive to the development of policies that limit growth, even in the face of mounting evidence of the harmful effects of anthropogenic global warming. The political climate is also highly susceptible to the irruption of shrill populist calls for population caps in SEQ even if the mechanisms for implementing controls and caps are rarely discussed by their proponents. However, these factors all conspire against the development of strong regional plans and policies that might articulate the need for growth management with the imperative to adapt to climate change.

Beyond their respective jurisdictions both case studies offer clear insights into the challenges for urban regions that must mitigate and adapt to climate change while growing rapidly. While the technical 'solutions' to achieve climate-modernisation of urban growth are increasingly recognised in the scientific and technical literature (Weizsacker et al 2009) their achievement is likely to be filtered through complex multi-layered and dynamic institutional structures that are not necessarily aligned or sympathetic to the adaptive task. Rapid contemporary urbanisation, wherever it occurs, but especially in climate sensitive regions, now poses a governance challenge to planners and urban managers. This paper has demonstrated that growing adaptively will depend not solely on the super-inscription of new spatial schemas into planning schemes nor on the prescription of eco-friendly technical specifications for built form and urban design within such schemes. Rather the shape, form and dynamics of governance in contemporary regions, with all their strengths and weaknesses, will inevitably also mould the capacity of regions to achieve adaptive growth.

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**Urban Research Program  
Griffith University  
Brisbane, QLD 4111  
[www.griffith.edu.au/urp](http://www.griffith.edu.au/urp)**